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# INDEX

# BUILDING AGE

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As we scan the building horizon of 1920, a vista of unexcelled activity looms up before us. Building activities are three years in arrears, and a record year is predicted by all well-informed authorities.

As in Revolutionary days, when Minutemen dropped the hoe to snatch the musket, so almost every industry, during the period of the war, forsook its normal activities to lend what help was possible to aid the country successfully to consummate its war activities. Victory was the result. But now the war is ended and the pursuit of peace-time activities again predominates. Of no less importance than winning the war is the successful solution of the many problems now daily confronting us. In increased production lies our hope. We must make up our deficit in buildings and that as speedily as possible. Our population and industries must be properly housed. It is essential that every builder lend his utmost effort to "produce" on a scale far beyond his pre-war record.

BUILDING AGE will present to its readers during the coming year methods that will aid them in accomplishing this result. To-day, as never before, new ways of doing old things are being tried. Insofar as these possess merit and help solve the builders' problems, they will be set forth. The entire field of building—its every phase—will be fully treated, for BUILDING AGE will do its share toward helping its many friends to a successful and prosperous year.

# INDEX

Legal Department:



Legal Department (*Continued*)



Lumber:



M



N



O



P

HOUSE OF M. W. ELLIOTT, MELWOOD STATION, PA.
F. H. SMART, *ARCHITECT*

HOUSE OF MRS. R. G. PORTER, PITTSBURGH, PA.
LOUIS STEVENS, *ARCHITECT*

# BUILDING AGE

*New York, January, 1919*

# What Is the Building Outlook?

The building situation to-day is full of promise for to-morrow. There is only one factor that mars the situation. And that is, "Will building costs be lower in the near future?"

Upon the uncertain answer to this question hinges the attitude of financial circles. The ordinary channels are loth to loan money on security which may possibly depreciate in value owing to decreased cost of reproduction.

### *Private Investors a Good Financial Source*

But private investors have plenty of money, and these are willing to lend it or invest it in ventures which are likely to bring a good return.

They realize, as a class, that the shortage of buildings is *now*, not five years hence. They know that the house built now will sell more quickly and will very probably bring a better price than the one built five years from now.

This class of investor, wide awake to opportunity, is the one which in all probability will reap most of the financial benefit from the present shortage.

The long term mortgage is, of course, a different thing entirely. Investors of this class can hardly be blamed for going slowly. They are naturally unwilling to take any chance of the security falling below the value of the mortgage. But, are conditions in the building trade such as to warrant the holding of this attitude?

### *Why Costs Will Not Fall Far*

Secretary of Commerce Redfield officially stated a few days ago that the United States will be expected to furnish material for at least one million houses in England, France and Belgium.

The United States itself as a whole is 40 per cent underbuilt, as recent investigations show. Over 700,000 residences alone are needed here!

Manufacturers' stocks are lower than ever before. Production has been curtailed to the limit, manufacturing and sales forces have been depleted, and there is no prospect that these concerns will immediately resume manufacturing operations on the large scale of three or four years ago.

There is one consideration only which will affect the future cost of building—namely, supply and demand. The demand to-day is enormous, far beyond what would be expected even in a new country rapidly building up. And the United States is not only growing rapidly but must also make up a deficit both at home and in Europe.

This will tend to keep building costs at near their present level for at least ten or fifteen years, or until the supply exceeds the demand. *Then*, and not until then, will prices begin to fall appreciably. Only in cases where government demand has kept prices at a high level, will they be lower now. Steel, tin plate, glass and like materials will probably fall considerably. Other materials such as shingles, siding, etc., will fall little if at all, for their cost has not gone up extravagantly. Most of the present prices have increased comparatively little compared with those in other lines of business.

This increased cost of building will be with us for a considerable length of time, there being absolutely no likelihood of pre-war prices ever again being enjoyed.

> **WE TURN TO PEACE**
>
> **And now we are sure of the great triumph for which every sacrifice was made. It has come—come in its completeness, and with the pride and inspiration of these days of achievement quick within us, we turn to the tasks of peace again—a peace secure against the violence of irresponsible monarchs and ambitious military coteries, and made ready for a new order, for new foundations of justice and fair dealing.—President Wilson.**

### *How Costs Can Be Lowered*

The only way in which the present cost of building can be materially reduced is: by improved and more economical methods of construction, and by the adoption of labor saving equipment wherever possible.

Cutting costs in this way is entirely feasible and practicable. Elimination of waste and the use of improved equipment suited to the job will do much to put the building industry on a sounder basis than has been the case in the past.

For instance, take concrete work. Only too often is the cement dumped nearest the work, the sand further away, and the broken stone quite some distance off. The broken stone, being the largest quantity, should, of course, be dumped nearest the work, with the cement as the smallest quantity dumped furthest away. This may seem a small and obvious matter, but when one considers the usual waste shoveling involved, with similar waste all through the building, a very considerable saving is possible.

### *Profits Often Doubled When Waste Is Eliminated*

Again, the use of patented scaffold brackets cuts scaffolding costs. A saw rig or hoist may do much to lower costs, if intelligently used.

And it is not the effect on one job alone that must be considered. It is the accumulated effect on the entire year's profits which must be taken into account.

Ten dollars saved in handling concrete and fifteen saved on scaffolding may not be very much on one job, but on fifty jobs it will amount to well over $1,000.

Get in touch with every piece of equipment and every material manufactured. Learn just what the market offers you, even though you may have no immediate use for the information. File it, and be prepared to use this information whenever it will help you to cut costs.

### *Have a Good Knowledge of Equipment*

Knowledge is power, and nowhere does this hold more true than in the building business. When a man only half knows his subject, he finds that it is the other half that really would come in handy. You may know quite a bit about equipment, but if you don't know just what is the best equipment or material for your purpose, what you do know doesn't do you as much good as it might.

Lower costs are possible, yes certain, to the builder who makes his knowledge and ability cut costs. Prices are not likely to be much lower. Work to-day will therefore go to the man who can cut erection costs by knowing *all* his subject.

> Building costs to-morrow will be lower only through improved methods. Waste must be eliminated, labor saving devices must be used to the utmost. Builders who realize this are going to reap the big after-the-war profits

# A Five-Room Frame Cottage That Compels Attention

**Well Proportioned Design and Convenient Plan Make This Little House Exceptionally Attractive**

The plan of the house is based on a "T"

**Built in a Section Where Good Architecture Predominates, the House Is One of the Most Quickly Noticed**

The house that is so designed as to stand out from its neighbors is generally the one which brings the biggest price if the owner ever decides to sell. Home builders and buyers are beginning to recognize this fact more and more. As a result, houses are more generally built and bought with an idea to their resale.

This has resulted in the fact that no longer are houses being planned, then patched up so as to be built regardless of looks. Instead, plan and design go hand in hand. Both must be modified to suit the requirements of the other; each must give up a little so that full unity of result may be obtained.

Suburban developments are excellent examples of this tendency. Generally, they expect to draw many, if not most, of their buyers from large cities nearby. Such people are accustomed to a high standard of art and comfort, naturally demanding that their taste be catered to. Having been in all probability apartment dwellers, they are accustomed to rooms so planned as to include efficiency in a small space. When a house is bought, the size and number of the rooms is not considered so much as the convenience. Rambling, unlovely, inconvenient houses are not tolerated.

The house is well balanced and presents an attractive appearance from both sides

The suburbs of New York City have been extensively developed with beautiful small houses. The apartment dwellers of the big metropolis are more and more reaching out for homes that will cater to their love of beauty and family comfort.

The five room frame cottage illustrated is located in one of the most attractive of the suburban communities of exclusively small houses. Its appearance is striking, indeed one instinctively picks it out from its neighbors when entering the development. The impression given is that of a doll house, so tiny yet excellently proportioned is its very detail.

This little home, based for its plan on the familiar "T," is a good example of the effectiveness possible in a small house. It is plain and unostentatious, yet the handling of the stem of the "T" and the gable over the porch, supported by square columns appearing amply strong, constitute features that quickly attract the eye. In a "T" shaped house there is the possibility of the projecting front portion being out of scale with the remainder of the house, but this danger has been skilfully avoided in the house illustrated.

The design of the shutters, the hood over the porch, the flower box in the second story and the dormer on the stem of the "T" form some of the more interesting details of the design itself. Another interesting feature is the carrying of the plain frieze just above the window hoods and around over the porch columns.

The front entrance door opens directly from the porch into the hall. A closet for guests' wraps is handily placed.

At the left is the living room, which is large in size for a small house like this one. Having windows on three sides, this room is pleasant and cheerful as a living room should be.

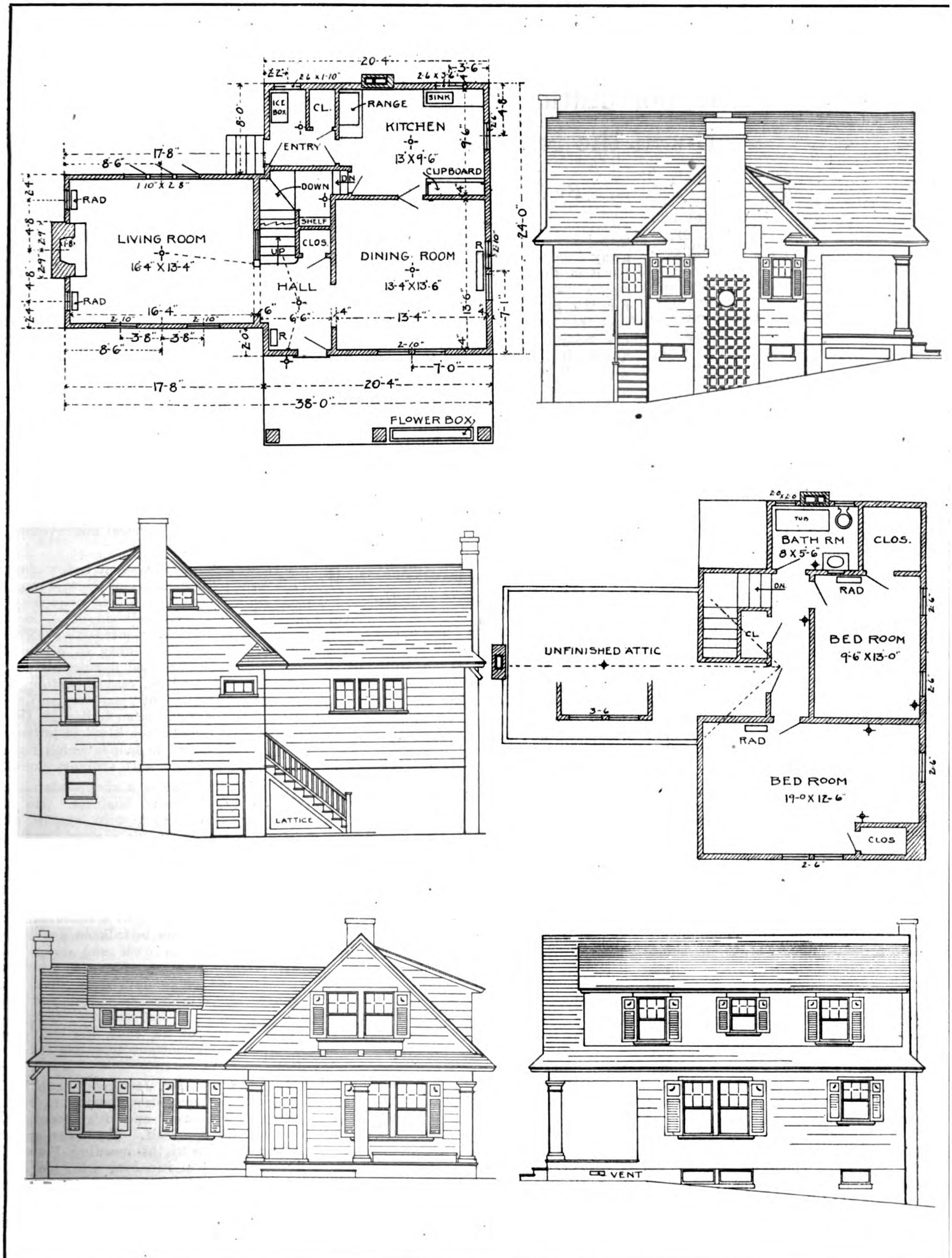
At the right is the dining room, of ample size. This communicates directly with the kitchen, there being no connecting pantry. Such a pantry is often omitted in small houses, due to the necessity of conserving space. An entry containing a closet and an ice box communicates from the kitchen to the outside.

The second story contains two bedrooms and a bathroom. The unfinished attic at the left could readily be converted into a small bedroom, especially if a dormer were added at the rear.

The basement is unexcavated under the stem of the "T."

This house is located at Nepperhan Heights, New York. It was constructed by Watson & Bremner, builders, 38 Douglas Ave., Yonkers, N. Y., in accordance with plans and specifications prepared by Philip Resnyk, architect, 40 E. Thirty-second Street, New York City.

The grade affords opportunity for plenty of light in the cellar




Plans and Elevations. Scale 1/16" = 1'.

# Promoting Big Business in Small Towns

## Opportunities on All Sides to Boom the Smaller Sorts of Work

*By Robert F. Salade*

Brilliant indeed is the outlook for the building trades of the United States. The time is not far distant when labor and materials will again be plentiful. Business in all lines is booming and will continue to flourish for many years to come. Certain lines of business which have been restricted will soon be free to grow larger than ever before. The people who have been holding on to their money will loosen their purse strings for many things which have long been needed. America's greatest period of prosperity is near at hand.

Wise business men have not been slow in recognizing these facts. They are preparing to handle the tremendous increase of business which will surely come to this country after the terrible storms of Europe have cleared away. The business man who is not preparing for the new era is making a sad mistake. He will have no cause for complaint when he sees his more progressive brothers occupying "first-line" positions in "the land of milk and honey."

It is easy for any sane person to understand why the building trades of America are soon to enjoy the most prosperous times in their history. It startles a thinking man to contemplate the amazing amount of building work and rebuilding work which is to be done in practically all of the villages, towns and cities of the United States. Even at this period villages are growing into towns, and towns are developing into cities. True, this process has been going on for ages past, but now we are to pass through the greatest Building Age—the greatest since the world began!

This article is addressed particularly to the smaller town builders, although the builders of the larger cities may also adopt some of the business building ideas which are presented in the following paragraphs.

It is a fact that people living in the smaller towns take more pride in owning attractive and comfortable homes than do the people of the larger cities. In the great cities we often see rows of dilapidated houses, mean streets and dirty alleys. We seldom see dilapidated homes in the smaller towns. There are exceptions to this rule, of course, and the point which the writer desires to make is that there is a wonderful, new field for the builder who makes a specialty of erecting new homes and remodeling old houses in suburban sections.

Thousands of business men have made fortunes in war industries during the last four years. It has been said that within the last few months more than seven thousand people of this country have become millionaires. Now when a man becomes wealthy, he usually moves away from the large city and buys a fine home in the suburbs, or in one of the smaller towns. This is mentioned merely for the purpose of demonstrating the fact that many thousands of Americans are going to have splendid new homes erected in the so-called country districts. All of this means new and profitable business for the builder.

At the present time the great cities of the United States are over-crowded with people who have come to engage in war industry. Many of these people will soon be returning to the smaller towns.

> **With the war over, thousands of people are not only in possession of more money than ever before, but they are willing to spend it in home betterment.**
>
> **It is fitting and proper that we should endeavor to bring the home circle in more pleasurable contact with its surroundings. Home, to many, means more than ever before. To them especially will your suggestions for home betterment be welcome.**
>
> **Do not hesitate to go out and seek this kind of business. It is profitable to you, and still more profitable to the owner who accepts your suggestions.**
>
> **This article gives many suggestions which will help you promote this sort of business in your town.**

They have earned big wages; they have saved money, and they will be looking for first class homes in suburban sections or in country towns. In cases where they buy old houses they will have the property repaired and remodeled. Your small town resident will not be satisfied with a house in poor physical condition. Mr. Builder, can you see this big "drive" of business which is heading in your direction?

In this reconstructive evolution which is sweeping over the United States, and which in truth will soon be spreading over the entire world, all classes of buildings in villages, towns and metropolis are going to be more attractive and more comfortable for the people than ever before. In the smaller town, for example, we are going to have better-built churches, banks, moving picture houses, business places and municipal buildings. Old buildings will be repaired and improved in many ways. Even the railroad stations in remote sections of the country will be enlarged and improved.

Progressive builders are in a position to "blaze the way" for many of these changes and improvements. Owners of property are in a receptive mood for hearing suggestions from the builder which would be the means of making their property more attractive and valuable. City officials are ready to consider plans for making municipal buildings more handsome and useful for the people at large. Those in charge of churches, schools, colleges, hospitals, etc., are willing to receive suggestions from the builder for the physical improvement of these structures.

The writer recently spent a few days in a pretty little town of New Jersey, and while there he became acquainted with the business methods of a local builder which are very interesting. This builder is continually busy in his own immediate neighborhood during all seasons of the year, the major portion of his work consisting of repairing and remodeling houses and other buildings. One of his important "specialties" is putting in hardwood floors in homes which have been originally built with ordinary floors.

This builder follows a simple plan for gaining this class of business. He is personally acquainted with nearly all the house owners in his district, and at intervals he calls upon the owners in the same manner as friendly neighbors visit one another. When making these calls he does not directly ask for business. In the beginning of a conversation the builder is ready to talk on any subject concerning the civic and social affairs of the locality. He even studies to learn the particular thing that his "prospective" is interested in, and he starts to talk on that subject. But, toward the end of the chat, the builder's remarks are somewhat like the following:

"By the way, Mr. Jenkins, I have just completed a parquetry flooring in Sam Browning's house, and it's beautiful, even if I say it myself. If you can spare a few minutes in the morning I would like to have you run over with me and take a look before Mrs. Browning puts down the rugs."

The average owner of a nice house is always interested in any improvement work which has been made in a neighboring house, and he naturally accepts the builder's invitation to inspect the new work. In the case of a job like new parquetry flooring in an old house, when the visitor sees what a remarkable improvement has been effected, he is influenced in having the same kind of work done in his own home.

The builder referred to is doing various kinds of interior work in homes, such as hardwood window seats, hardwood open stairways, extra closets under stairs, changing old-fashioned "inclosed" parlors over into spacious Dutch hall parlors, building open fireplaces, building toilets, laundry rooms and inclosed coal bins in basements of homes, and many other jobs of this variety. All of this class of work is done, as a rule, during extremely cold or stormy weather when outside work cannot be done to advantage.

Speaking of improvements in the basements of houses which were originally built with plain, open cellars, there is a great field here for any builder who will cultivate it properly. Take a laundry room for example. This can be arranged at small cost in any old-fashioned cellar of a house. One good plan calls for a room about the size of a living room, divided off at the rear of the cellar with a glass-and-wood partition, constructed of tongued and grooved boards and two or three window frames. There is a door leading to the front part of the cellar. When there is no stairway leading from the back of the cellar to the yard the stairway is built. The stationary wash-tubs stand upon a platform raised about 8 in. from the floor. The floor should be of concrete, covered with regular floorboards. The walls and rafters are covered with wallboard or with thin, hardwood lumber. A basement laundry of this model is of great utility in any home, and it will not be difficult for the builder to get orders for such work from folk who own their homes, and where the basement laundry is lacking.

**By inviting house owners to see up-to-date work which you have just finished, you offer a powerful incentive for them to fall in line.**

**This is merely helping the owner to visualize your suggestion, to make him appreciate that it will do all you claim. Make a man picture your suggestion in its actual relation to his home, and you have completed the hardest part of your sale.**

Inclosed coal bins are the same as ordinary coal bins with the exception that the bins are built across the front section of the cellar, and a wooden partition, with door and two window frames, divide off the coal bins from the main apartment. This plan makes the basement more neat and clean than with the old style open bins. A basement toilet is built in about the same way as a toilet in a summer kitchen. Another desirable thing in a basement of a home is a spacious closet, built of tongued and grooved lumber, containing a door and window frame, and lined on the inside with wallboard. A closet of this character is useful for the housekeeper in storing away heavy clothing.

One builder has completed several orders for remodeling old style basements of houses into three apartments: a basement kitchen in front, basement laundry in the center and the back room for coal bins and the heating furnace. An improvement of this kind calls for stairway leading from either the side or front of the cellar, in addition to the regular stairway which leads to the main floor of the house. In some instances it is necessary to enlarge the cellar windows to give sufficient light to the basement kitchen and laundry. Twin houses and detached houses are particularly adapted to these changes in the cellar.

In the suburban sections and in country towns there are always numerous houses that need repairs in shingle roofs. The shingle roof houses are also to be found in the large cities, but they are far more numerous in the smaller towns. The trained eye of the builder is quick in noting a shingle roof which is in need of repairs, and by calling the owner's attention to the defect, the builder can often secure the order to go ahead with the improvement. In cases where it is inconvenient to call personally upon the owner, a pleasantly-worded letter will often accomplish good results.

The new fireproof roll roofing which has become so popular for new work as well as for repairing shingle roofs is of advantage to the builder especially at this time when labor is so scarce. The roll roofing is finished in color, and when on the roof it looks exactly like real shingles. The roll roofing can be put on directly over the old shingles. The writer recently saw several houses with gable roofs, the roofs having been covered with the roll material of green color. The effect was very pleasing, and it appeared as though the roofs had been covered with regular shingles.

In the smaller towns where there are many cottages with front and back yards, the pale fencing which usually inclose the gardens is frequently in need of repairs. While iron fencing is replacing the pale fencing to some extent, still the latter remains very popular and there is no reason for believing that it will ever pass "out of fashion." The small town builder can do a lively business in both iron and pale fences by advertising this specialty prominently. Make the fact known among the people of your district that in addition to repairing and erecting pale fences you are also in a position to put up iron fencing.

Strange as it may seem to those who have not investigated the matter, there are many houses in both towns and cities which are not provided with the so-called summer kitchens. Numerous houses of this type have a bay window extending from the second story back and the bay forms the only shelter from rain and snow as occupants go in and out the kitchen door. It goes without saying that every housekeeper living in a house of this design would appreciate a summer kitchen, even if it were of no other use than to prevent rain and snow from beating against the regular kitchen door.

There is a wide field here for every builder. Summer kitchens, built of tongued and grooved lumber, and having two sliding window frames and a door, are not expensive. It is an easy matter to "sell" kitchens of this class. The owner of a house which does not possess a summer kitchen is ready to consider a suggestion from the builder to have such a building added to the house. Some people prefer the smaller size summer kitchen which may well be called a storm door. A kitchen of this type is just large enough to give an inclosed passageway to the yard, and to hold a few shelves. The floor is usually flush with the door sill to the regular kitchen, and the two, three or more steps leading to the yard are on the outside of the summer kitchen.

**Small repair jobs of all kinds can be profitably handled by developing specialists. These can handle the work more rapidly and cheaply than usual by reason of their specialization—and profits are thus greater.**

The most popular style of summer kitchen is one which extends across the back of the house, containing sufficient floor space to hold a gas range, sink, refrigerator, table, chair, etc. Some kitchens of this style are spacious enough to hold a kitchen cabinet, or "dresser," in addition to the other features mentioned. The floor is flush with the door sill leading to the regular kitchen. The steps leading to the yard are on the outside. The roof is covered with tin or rubberized sheeting. There is no brick work of any kind in a summer kitchen of this model.

One builder has erected a number of brick summer kitchens in addition to many which were built of wood. Where the back yard of a house is large a spacious brick kitchen makes a desirable addition to the home. We are speaking of a "summer kitchen," which is not quite so spacious as the main kitchen. With a brick summer kitchen for her cooking, refrigerator, sink and cabinet, the housewife can make a "breakfast room" out of her regular kitchen. The builder should mention this point when trying to induce an owner to have a brick summer kitchen erected.

Another builder who has been putting up both brick and wood summer kitchens is adding a little "service" feature to each kitchen which is highly pleasing to the housekeepers. This feature consists of a funnel and piping which acts as a draining system for the dripping water under a refrigerator. The pipe carries the water to the drain in the yard, making it unnecessary for the housewife to empty the drip pan which otherwise sets under the refrigerator. Builders of summer kitchens who have not been adding this "service" help to their work can use the idea to good advantage. The idea can be made to aid the sales of summer kitchens.

Repairing brick and stone chimneys of homes and other buildings offers another field for the builder who cares to do such work. There are many cases where owners of houses and other buildings desire to have chimneys enlarged so as to provide for better draught for furnaces. Take a walk along any street of a city or town, and it will not be hard to see some chimney that is in need of repairs. Frequently the owner of a building is not aware of the fact that the chimney of the building is in poor physical shape. By calling the owner's attention to the matter, the builder stands a good chance of gaining the order to have the chimney repaired. When about to repair a brick or stone chimney, the builder should always ask the property owner if there would be any advantage in enlarging the chimney. Ask the owner how the furnace has been acting. It may be that the owner has been having trouble with the draught of the heater, and it may be that he had not thought of having the chimney built a few feet higher.

The builders should devote more thought to the service idea. Make it a practice to offer helpful suggestions in the way of property improvements to the owners. Tell them WHY and HOW this or that work should be done.

# Practical Methods and Details of Roof Framing—IV

## How to Solve Difficult Problems That Occasionally Are Encountered

*By Lawrence S. Kerr*

Quite frequently, as in the case of a veranda roof that is carried around the corner of a building, the roof at the side of the house will have a different amount of run than the roof at end. Fig. 27 is the plan of such a roof. One side has 6 ft. of run. The other side has 8 ft. run and the roof rises 4 ft. A plan as here shown is preferably drawn to a scale of 1 in. = 1 ft., so that 1 in. on the plan will equal 1 ft. on the building and 1/12 in. on the plan will equal 1 in. on the building. A drawing of this sort is frequently known as a draft.

Consider the hip first. As the line of the hip in this case is not the true diagonal of a square, 17 in. will not give the proper run, so the run must be found by other means.

Take the run of common rafter on narrow side, which is 6 ft., on the tongue of square and the run of common rafter or wide side, which is 8 ft., on the blade. Measure across from 6 to 8 and it gives 10 ft. as the run of the hip.

Take 10, the run of hip on the blade of the square, and 4, the rise of hip on the tongue, and measure across. The distance will be 10 in. and 9½ twelfths of an inch, and, as we are working at a scale of 1 in. = 1 ft., we have 10 ft. 9½ in. as the length of the hip rafter. Run of hip 10 and rise of hip 4 taken on the square, the 10 gives the foot cut and the 4 gives the plumb cut.

All of the rafters are spaced 2 ft. on centers. We will take those on the short side first. The common rafters are easy enough. Simply divide the rise 4 ft. or 48 in. by 6, which is the number of feet run. The result is 8 in. Therefore 12 and 8 on the square, taken six times, will give the length of the rafter; 12 will be the foot cut and 8 will be the plumb cut.

To find the run of the shortest jack, No. 1, divide the run of the common rafter, No. 4, by the number of spaces there are between rafter No. 4 and the corner of the plate at No. 0. There are four spaces, and 6 ft. divided by 4 gives 18 in. as run of the shortest hip. The rise per foot of run is the same as the common rafter, so take 12 on the blade and 8 on the tongue of the square, mark along the blade for the foot cut and then slide the square along the foot mark until the 18 in. is even with the top edge of the rafter. See x, Fig. 28. The tongue will give the plumb line.

Another way to get the rise of the jack would be to divide the rise of the hip, which is 48 in. by 4, the number of spaces. This would give 12 in. as the rise and 18 on the blade and 12 on the tongue would give length foot cut and plumb line all in one operation.

To get the cheek out of jacks where the roof on one side has a different pitch to the roof on the other, take on the blade the length of a common rafter on the side on which you are working, in this case 7 2/12, and on the tongue take the run of the common rafter on the side of hip away from you, which is 8. The blade gives the cheek cut for jack rafters on the short side on which we are working. Jack No. 2 will have the same cuts as No. 1, but will be twice the length and the length may be found by taking 12 and 8 on the square three times, or 18 and 12 taken two times, or the short

Fig. 27—Plan of veranda roof, the two sides each having a different pitch

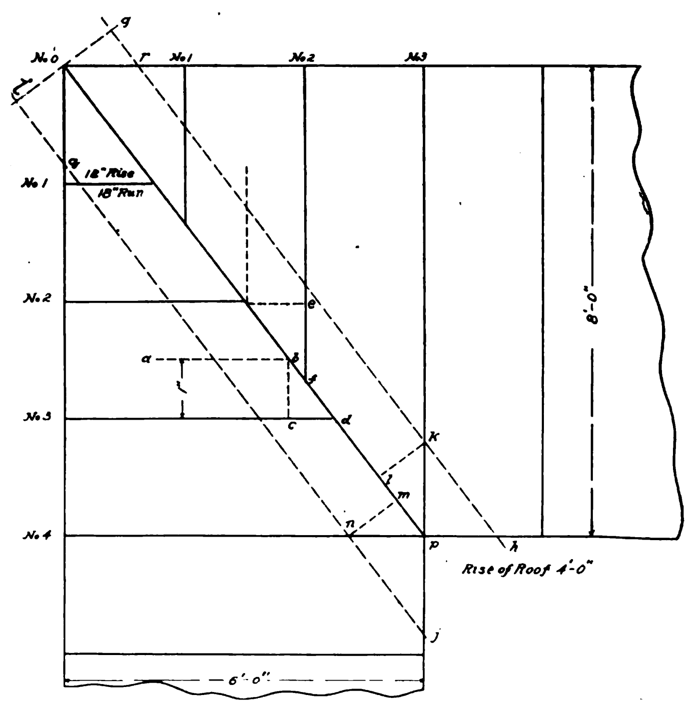
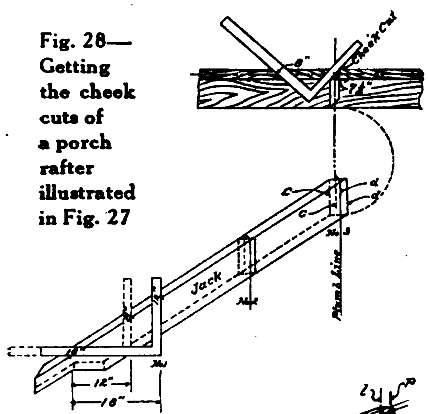


Fig. 28—Getting the cheek cuts of a porch rafter illustrated in Fig. 27



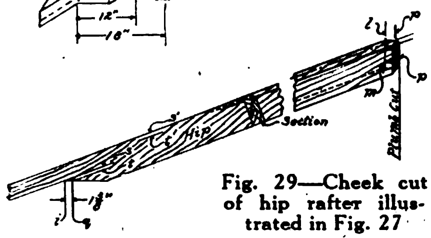




Fig. 29—Cheek cut of hip rafter illustrated in Fig. 27

jack can be used as a measure for laying off the other jacks on the same side.

Still another way to find the cheek cut of the jacks, and one that it is sometimes useful to remember, is to draw a dotted line as at *a*, *b*, parallel to the jack rafter, No. 3, on the short side of roof. Draw this line half the thickness of a rafter or, say, 1 in. away from the jack. From point *b*, where the dotted line strikes the hip, square down to *c* and *c*, *d* will be the distance which, when measured square out from the plumb line, will give the long side of the cheek cut, and the same distance measured square back from the plumb line will give the short side of the cut as shown at the upper end of Fig. 28, *x x x x* is the cheek cut and *c*, *d* and *c*, *d* the distances measured off on each side of the plumb line.

Now the rafters on the long side of the roof. As the common rafter on this side has 8 ft. run, divide the 48 in. of rise by 8 and it gives 6 in. as the rise for 1 ft. of run. Six and 12 on the square gives plumb and foot cut respectively, and when applied 8 times gives the length of common rafter. As there are three spaces on this side between the last common rafter and the corner of the plate, divide the run 8 ft. of common rafter by 3 and we have 32 in. as the run of the shortest hip, No. 1, on the wide side. Divide the rise of common rafter by 3 and it gives 16 in. as the rise of short jack. The square not being large enough to accommodate 32 in. and 16 in. divide the numbers by 2 and take 16 in. and 8 in. and apply twice for length, foot cut and plumb line of short jack. Measure distance *e*, *f* square out from the plumb line for long side and square back for short side of cut and we have the cheek cut. The distance *e*, *f*. for jacks on this side of the roof was found in the same manner that the distance *c*, *d* was found for the jacks on the short side of the roof. The short jack will be used as a measure for the other jacks, which is twice the length of the shorter one.

All that is lacking now is the cheek cuts and backing for the hip. One way of finding these is as follows:

Suppose the hip to be 2 in. wide. Draw the dotted lines *g*, *h* and *i*, *j* 1 in. each side of the hip line and parallel with it. Where these lines cut common rafter No. 3 on the long side and common rafter No. 4 on the short side of the roof draw the lines *k*, *l* and *m*, *n*. Then the distance *l*, *p* measured square back from the plumb cut on the hip will give the cheek cut of hip on the long side of the roof and *m*, *p* is the distance to square back for cheek cut on the short side. See top end of Fig. 29.

At lower end of hip and square with it draw *i*, *g*. Transfer this distance to the foot cut of hip rafter, as shown at *i*, *g*, Fig. 29, and from these points draw the lines *s*, *t* parallel with the edges of the hip rafter. The distance between these lines if scribed along the top edge of rafter as shown at *s'*, *t'*, Fig. 29, will give the amount of backing on the short side of the roof. The backing for the other side is found in the same way except that *g*, *r* will be the measurement from which to determine the gage line.

In determining the lengths of rafters, it is the length along the center of the back that is found. Therefore all cheek cuts of jacks against hips will have the cut running beyond the plumb line on one side of jack and short of the plumb line on the other side. Hips will have the cheek cuts marked back of the plumb line on both sides.

*(To be continued)*

# Adding Value by Proper Painting

## Old and New Houses Offer Business to the Contractor Who Can Add Value by Attractive Color Schemes. *By G. Leonard**

It is not the privilege of every home owner to plan and build the house which fulfills his ideals. Many never experience the pleasure of planning or building one of any description, but must be content to make the best of a home which is the expression of another's tastes, and those the tastes of a decade or more ago perhaps. Much may be accomplished, however, in the way of bettering the appearance of the outside as well as the interior, and the more pleasing characteristics may be emphasized and the bad points suppressed through a wise color selection.

In regard to the well designed modern residence little need be said. An attractive color scheme merely adds another to its many charms. The style of the house, however, suggests its color treatment to some extent. The Colonial house calls for an all-white treatment with outside blinds painted green and the roof stained or painted in the same color. Yellow or buff with white trimming is another typically Colonial combination with roof and shutters either green or light brown. Small paned windows form a decorative feature and are most effective painted in a light color, throwing them into contrast with the dark tones of the interior.

The stucco house may be left in its natural state for a time at least. When it has become weather-beaten and dingy, one of the dull drying, concrete or stucco finishes will add a fresh, attractive tone, and will give relief from the monotony of the cold natural gray. The half beams and other trim may be stained a soft brown, green or gray to suggest a weathered effect and should be oiled. The roof, if of shingles, should be stained to harmonize. The house of rough siding or shingles is most satisfactory stained in browns, as exposure to the weather only intensifies the rich, warm tones. Stains in other colors come next in effectiveness. The quaint modified bungalow is charming with roof and sash in apple green and the rest of the house in pure white.

A sense of harmony between the house and its surroundings must be kept, whether it is in a closely built city block or surrounded by wide lawns and shrubbery or shaded by large trees. The house which stands in shade the greater part of the day requires a warm body color or its appearance will be chilly. The front of the building facing north will receive a very small amount of sun, but it can be made to appear more cheerful to the passerby if painted in a warm tone.

A cool shade will prevent the house which is unprotected from the sun's rays from looking unpleasantly warm. The proper combination of colors will tend to subdue the worst features in the style of a building, and to simplify an excessively ornate house. It may not be practical or possible to remove all of the "gingerbread," but it need not stand out and scream its presence from the housetops, or housefronts to be more literal. There should be but little contrast between the body and trimming of such a building. Dark body colors with white or very light trimming should especially be avoided, or the result may resemble a large and elaborately frosted wedding

*Of the Sherwin-Williams Co.

cake. While there should never be a violent or striking contrast between trim and body of any house, the one which is well proportioned and architecturally good will suffer the least.

While rules and formulas may not be made to suit all needs, there are certain truths which should not be overlooked. Color changes the apparent size of a building, darker tones tending to decrease the size. Cool but light colors such as pearl gray, light gray-green or creamy gray are a wise choice for the small house not shaded by trees. The large building without foliage should be in darker but cool colors such as slate, dark brown or green. The small cottage nestling in the trees may be in cream or ivory or in buff, while the larger house similarly situated will look well in warm golden brown or straw color. It is the knowledge of what not to do which goes a great way toward success in painting.

Don't use a light color for the upper body with a dark shade below. It disturbs the feeling of balance.

Don't try to combine a light color for the roof with dark side walls. It makes the roof appear to fade off into the sky.

Don't use white for the extremely large and unadorned house. It will make it look larger and plainer.

Don't use a cheap grade of paint in dark green or red.

Don't use a cheap grade of paint.

# Getting Farm Business

## How a Progressive Builder Built Up a Profitable Business Among Farmers.

*By Bricksand Mottor*

A well which is roofed with an attractive covering like this is an ornament to any farm

"Williams was in here a few minutes ago, just before you came," said Jones, the builder, after he'd shaken hands with Jameson. Jameson was traveling salesman for a big material concern, and had often given Jones pointers on how he could increase his business.

"Who's Williams?" asked Jameson.

"Oh, he's a chap who sits down waiting for work, just like I used to do.

"He's been coming in here regularly telling me how the building business was on the bum. Fact is, he went over to Hollins to work in a factory just before peace came. Now he's out of a job and around looking for some work. He wanted to know how I'd kept going with no business to be had.

"I showed him that new typewriter I bought last month, and the high school girl that I had running it, which are some of the results that I've secured by getting a bit of pep into me.

"I said 'Every farmer in this county has had a letter from me this last month. Hawkins is having me put up a granary for him and some corn cribs lined with expanded metal to keep the rats out; Gregory is having the sill of his house repaired and a new roof put on; Watson is having me put his living room in good shape with wallboard; Harrison is having his two chimneys rebuilt —and those are only a few of the jobs I've got under way.'

"Williams was rather sore. He seemed to think that I was stringing him along. I'd offer to give him a job if I wasn't afraid that his tongue would wag too much about high costs, for I need more help now, badly. That loose talk of his has done him more harm than anything else."

"I'm glad to see that you are getting some ideas of your own," said Jameson. "I really didn't think that you would be able to dope out any good ideas on how to get the farmers' business. Just what lines have you been working on?"

"Well, it's been this way," said Jones, glad for once to be able to give Jameson some ideas. "As soon as the governmnt put out those building regulations I figured that it was up to me to get mighty busy. No laying down for me, like Williams.

"I took my rig and spent a week going around talking with farmers that I knew as well as those I didn't know. I got in close touch with the conditions that they were up against, what money they were making, and just what they wanted in the way of, ideal farm buildings. I found out an awful lot of good information about local farming conditions and about what farmers wanted.

"Then I went to work and studied up all the barn plans, catalogs, books, etc., that I could get hold of. After a few days I had a lot of good ideas that I felt would be appreciated by farmers.

"Now I felt already to start off on my campaign. From my talks around, previous experience, observations and notes, I wrote personal letters to pretty nearly every good prospect in the county. In those letters I made suggestions that I felt would be appreciated by the farmers I had talked with. The girl helped me put the ideas in fairly good English, not too high toned, because I wanted those letters to seem like me talking.

"You see, I figured that if I wrote personal letters to all of those fellows they would remember my name and think of me when work was wanted.

"But I didn't rest there. I went right out after every one of those farmers and talked to him. Now, I didn't go up to him and say, 'Hello, Mister, want to build a barn?'

"No, sir. When I went to see Hawkins, for example, I talked about the fine yellow Dent he was raising. Lots of farmers buy their seed from him, because he takes prizes with his corn.

"From what I'd read and studied I had some good suggestions to make as to how his corn was being wasted by his careless handling and storing. I pointed out how he could turn that waste into money by more careful handling, and explained some good ideas for a rat-proof corn crib.

"Hawkins was so interested in saving corn that he sold himself the crib. I made him want to save corn, showed him how to do it, and he gave me the job of saving money for him, for that's just what it amounted to.

"You see, I tried to approach the subject from Hawkins' viewpoint, not from mine. He isn't interested in putting money into buildings, but he is interested in corn and its proper handling.

"After selling Hawkins the corn-crib idea he himself suggested a granary; and through the information that I gave him on storring hay I know that he is thinking of having me put up a hay barn."

"Pretty good, Jones," encouraged Jameson. "After a while you'll be a real live wire—if you don't get a swelled head."

"Maybe I got it already! I tell you that I feel pretty good at the idea that I am not going in to see these farmers for work, but am going to them as a builder who has devoted considerable time to studying ways in which I can make more money for them. They're glad to see me, and I make friends even if I don't get a job right away. That's worth money to me, too, almost as much as a job."

"You're right there!" exclaimed Jameson. "Good-will is the biggest asset you can have. The man for whose personality and ability everybody has a good word comes out on top every time."

"It was lots of fun getting Gregory's order," laughed Jones. "He's a tightwad farmer of the old school. His roof leaked, his front porch was tumbled down, and he lived from hand to mouth until the war boomed prices for him.

"When I sized up Gregory's house I saw that his sills were probably rotten; the ground sloped down toward his house, and the fool builder had carried the foundation wall only about 3 in. above grade at the back of the house. So I decided to suggest that the sills be fixed, and went about it in a way that made Gregory see the point—hard.

"'Hello, Mr. Gregory,' I said, as I went in. He was running a grindstone out in back.

"Gregory looked up and grunted.

"'Pretty good life insurance you must carry on your family. I suppose you sleep out in the barn so as to be sure and collect it?'

"'What the devil is the matter with you? What do you want, anyhow?' Nice way for a prospect to act, wasn't it?

"'Just what I say. It's a wonder your house hasn't fallen down long ago. Don't you realize that you're taking an awful chance by living in that house the way it is?'

"'Nothing wrong with my house. Maybe it doesn't look as good as some, but it is plenty good enough for me.'

"'I'm just going to show you something.' I walked over to the side of the house and pulled a partly rotted clapboard half off.

"'Just stick your fingers in there.' Gregory did so, and pulled out some timber that was more snuff than anything else.

"'Your sill is all rotted out, the ends of your studs are nearly gone, and the house will only hold together for a short time longer.'

"Then I explained what sills and studs were, what they did, and what was bound to happen when they rotted out.

"'Guess you're right about that,' admitted Gregory, after a while. 'I'll have to fix that up some day.'

"'Fix it up? Do you realize that it is a dangerous job to do that work unless the house is fixed up just right?'

"Then I showed him what would happen if his blocking weren't kept even, and how easy it would be for the whole thing to fall down if proper precautions were not taken.

"'What you want to do is to get a reliable builder to do the job, and have him sign a paper that will hold him responsible for all accidents or damages that may occur. Then you're protected.'

"That appealed to Gregory. So he gave me the job.

"Then, by showing him how his inside studs and plaster were being destroyed by dampness from the leaky roof, I got him to let me do that work also.

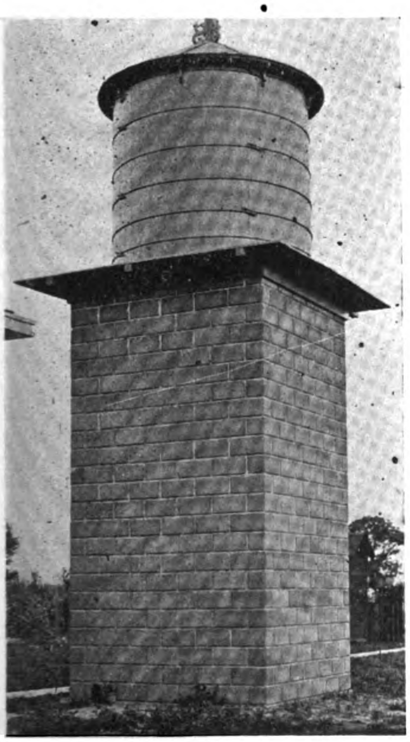
"You see, I know Gregory's reputation, and managed to approach him on the right side by taking advantage of his personal peculiarities.

"Everybody I studied up in that way. Not every one gave me work, but by studying up my prospects, and approaching them right, I am keeping pretty busy."

"You're getting the correct idea, all right." Jameson was genuinely glad for Jones' success. "As long as you remember that there's always business for the man who goes out and gets it, you're all right."

Sights like this, common enough in some localities, are a fruitful source for implement sheds

A granary on wheels facilitates feeding in the fields



A water tank and pumphouse combined into a durable structure like this is a worth-while addition appreciated by the up-to-date farmer

## Windows Closed Automatically When It Rains

An automatic device which takes care of the windows of a house or apartment and closes them when it begins to rain has been perfected by a Philadelphia man.

It is quite automatic and its action is said to be positive. In his device a loop lever, connected with a stationary hod attached as a permanent fixture to the lower corner of the upper window sash, is held in position by a narrow strip of blotting paper.

So long as the paper is dry it is rigid enough to hold the delicately adjusted lever, but a single drop of rain will so soften the paper that it allows the loop of the lever to fall, and thus to release the pressure of the lever against the lower sash. Since the sash is weighted with a bag of sand or small shot, it will drop and close the window against the rain.—*Southern Architect.*

Many a man digs his own grave by simply deepening the rut he lives and works in. When you hear of new construction methods, new ways to get business, and new ways to make your path wide and broad and easy—why, just look out over the top of your rut, jump out, and apply them. Knowledge and experience buried in a rut are worthless.

# Where the Building Industry Stands To-day

## Probable Trend of Wages, Material Costs, and Financing

*By Dudley Pollard*

To help facilitate the transition of industry from a war to a peace basis is the earnest desire of every form of work in the industrial world, and there is a feeling of hopeful optimism as to the outcome. In the industries which were stimulated rather than hindered by war contracts the problem is to revert to a prewar basis as soon as possible, while in other branches of constructive work, and more especially the building industry, the obvious duty is to take up at once the work where it was left off when war was declared.

There is nothing new in the pending period of reconstruction which confronts us, except as to its proportions. After every war the readjustment to normal conditions has been more or less long drawn out, depending mainly on economic conditions for a speedy solution. At the end of our Civil War it took ten years for building material prices to find their normal level, and the building program at that time was purely sectional.

To-day, however, we have a world-wide problem. With our own construction over 700,000 buildings in arrears, and England, France and Belgium calling for the building of 1,000,000 homes, the capacity of building material manufacturers of the world will be taxed to the limit. Our part in building devastated Europe will be a considerable one. The demand for all basic building commodities will be tremendous, and it is estimated will continue for a year.

It would be erroneous to suppose, however, that the European demand for supplies will represent more than a fractional part of our manufacturers' output. Our own needs are paramount, and must and will be supplied. The congestion brought about by inactivity in construction must be met and overcome. In every section of the country there is the same demand for every phase of legitimate construction.

### *Material Situation Encouraging*

In the matter of building materials the outlook is not as discouraging as it might be. In fact, it is decidedly hopeful. While there is an undeniable shortage of all kinds of building commodities, there is as yet no evidence of an effort at price control. The encouraging phase is that there has been a decided stand on the part of some dealers, notably the mason material dealers, against anything like arbitrary price advances, and there is not likely to be a material increase over present figures.

The labor situation has been greatly simplified by the release of thousands of workers in shipyards and various other work under Government control, thousands more from cantonments and still thousands of others from overseas. Among these men are many skilled craftsman in every line of the building trade. In the matter of wages there need be little apprehension, for the readjustment of the wage scale will automatically settle itself. While it is argued on one hand that men who have been receiving exorbitant wages in war plants will refuse to work for less than they have been getting, it must be remembered that skilled men in the army who have been obliged to be content with $30 a month for the past year will be glad to return to work at normal wages.

### *Labor Will Remain High*

The price of labor is high, of course, and will remain so, for once wages go up they are slow to come down, and there is even a possibility that higher wages will be demanded at the beginning of the new year. Yet builders have long realized that labor will not be content with the old wage scale, and are prepared to reckon with new conditions.

The financial outlook is by no means so favorable as to warrant the expectation of a general resumption of building construction in the immediate future. The lifting by the Government of all restrictions in the manufacture and use of building materials has brought about a resumption of that type of construction that can be financed entirely by private funds. This class includes business, commercial and industrial work.

In behalf of the lending institutions it may be said that their failure to come forward with necessary accommodation is not attributable to lack of faith in the building future, but to the fact that most of them are loaded up to the neck with investments in Liberty bonds, and some time must necessarily elapse before such obligations can be liquidated.

The advantage accruing, however, from this somewhat chaotic condition of affairs is that there is gradually developing a stability of the market which has been sadly lacking during the past few years. Materials and wages are high and they will remain high, yet the builder at least has a solid foundation on which to base future calculations.

There has been little building during the past year. During the month of November there was 85 per cent less construction than during the same month in 1917, the figures covering the building operations of 151 cities. The exact figures for these cities for November were $6,593,857 total cost as against $45,623,885 for 1917.

The builder then is face to face with the plain proposition of taking what material he can get at existing prices or deferring his operations until prices come down. If he proceeds he will have to pay high prices for both material and labor, but there will be an immediate demand for the completed buildings.

In a word, the situation is this: The builder has before him the greatest market the world has ever known. It is not good business to dally much longer with such an opportunity.

## How to Care for Oilstones

*By F. H. Sweet*

Like many other things, an oilstone can be ruined by wrong treatment and lack of care.

There are three objects to be attained in taking good care of oilstones: First, to retain the original life and sharpness of its grit; second, to keep its surface flat and even; third, to prevent it from glazing. To retain the original freshness of the stone, it should be kept clean and moist. To let an oilstone remain dry a long time, or exposed to the air, tends to harden it. A new natural stone should be soaked in oil for several days before using. If an oilstone is kept in a dry place it should be kept in a box with a closed cover, and a few drops of fresh, clean oil left on it.

To keep the surface of an oilstone flat and even, simply requires care in using. Tools should be sharpened on the edge of a stone as well as in the middle to prevent wearing down unevenly, and the stone should be turned end for end occasionally. To restore an even, flat surface, grind the oilstone on the side of a grindstone or rub it down with sandstone or an emery brick.

To prevent an oilstone from glazing requires merely the proper use of oil or water. The purpose of using either oil or water on a sharpening stone is to float the particles of steel that are cut away from the tool, thus preventing them from filling in between the crystals and causing the stone to glaze. All coarse-grained natural stones should be used with water.

On medium and fine-grained natural stones and in all artificial stones, oil should be used always, as water is not thick enough to keep the steel out of the pores. To prevent further glazing, the dirty oil should be always wiped off the stone thoroughly as soon as possible after using it. This is very important, for if left on the stone the oil dries in, carrying the steel dust with it. Cotton waste is one of the best things to clean a stone with.

If a stone does become glazed or gummed up, a good cleaning with gasoline or ammonia will usually restore its qualities, but if it does not, then scour the stone with loose emery or sandpaper fastened to a perfectly smooth board. Never use turpentine on a oilstone for any purpose.

Stucco and brick make an effective combination when well handled

# Two Family Houses Are Popular With Tenants and Investors— Supply the Demand

There are two types of two-family houses. In one, the building merely consists of two separate houses with a party or dividing wall; in the other, the one apartment is on the first story, and the other is on the second story.

For many reasons, the first type, often called the double house, is the most popular. For all practical purposes, the apartments are in separate houses, and this is the big feature which makes this type the more popular.

Such houses should be designed to meet the exacting requirements of the average dweller in a private house, for the same class of people will be attracted by both.

The double house illustrated presents many features which are popular and interesting.

The exterior is an effective combination of materials—brick for the first story and stucco for the second story. These materials go well with an English type of house like this. Carrying a hood across the front cf the house helps to relieve what otherwise would tend to monotony and plainness.

Each side of the house is provided with a porch, from which entrance is had to the respective apartments. By screening these porches during the summer and enclosing them in glass for the winter, the porches become an agreeable all-year addition to the house.

The porch opens into a vestibule, which is often considered advisable in a cold climate as it prevents the house from being chilled off when visitors arrive. A coat closet in the hall is a feature that is popular, as it provides a convenient place for guests' wraps.

The entrance is effectively placed. As one enters, a spacious vista is presented of the stairway, living room, and dining room, which latter is partially shut off from the hall by glass doors.

The main feature of the living room is a brick fire place, capped by a simple but effective mantel. A bay window forms a cosy spot. The living room is semi-separated from the hall by a colonnade. A convenient feature is that one window opens into the porch, so that visitors can be seen and recognized before going to the hall to open the door.

The dining room walls are panneled, as is a popular custom, the panel strips terminating in a plate shelf. The ceiling is beamed. Lighting is from a semi-indirect electric fixture, placed so as to illuminate the dining room table.

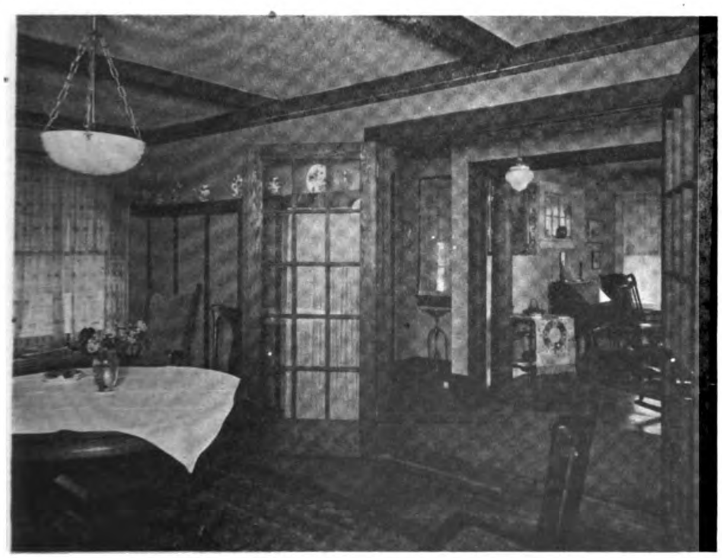
The dining room communicates with the kitchen through a small hall, which also contains the entrance to the cellar stairs.

The kitchen has a built-in china closet. One of the unusual features of this kitchen is a toilet.

The kitchen communicates with the outside through an entry containing the ice box, and out to a small rear porch.

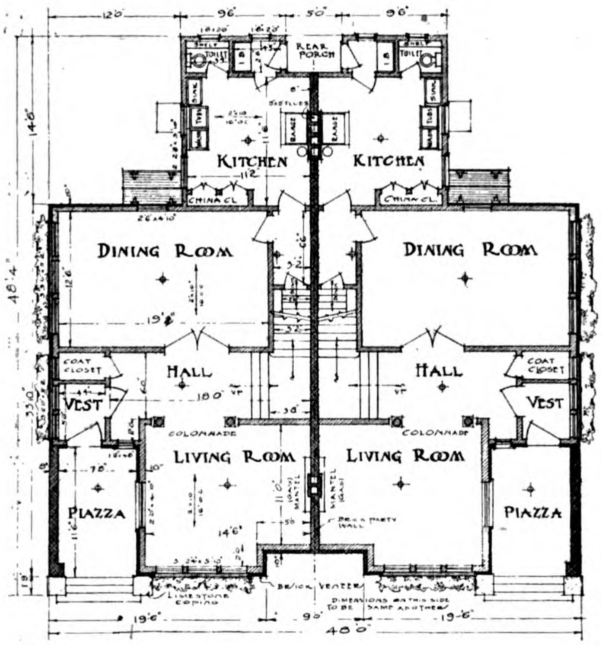
In the second story of each apartment, there are three bedrooms and a bath room. The closets in the two adjoining chambers are placed as a partition, thus tending to prevent noises passing through the partition wall to the next room. It is always a good idea to arrange closets with this idea in mind, if possible.

This house is located in Belleville, N. J., and was built for Wm. E. Howard and J. T. Telfair.

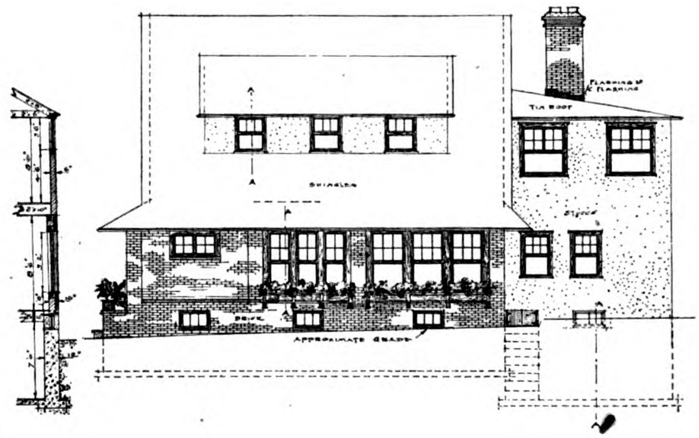


The dining room looking through the hall to the living room

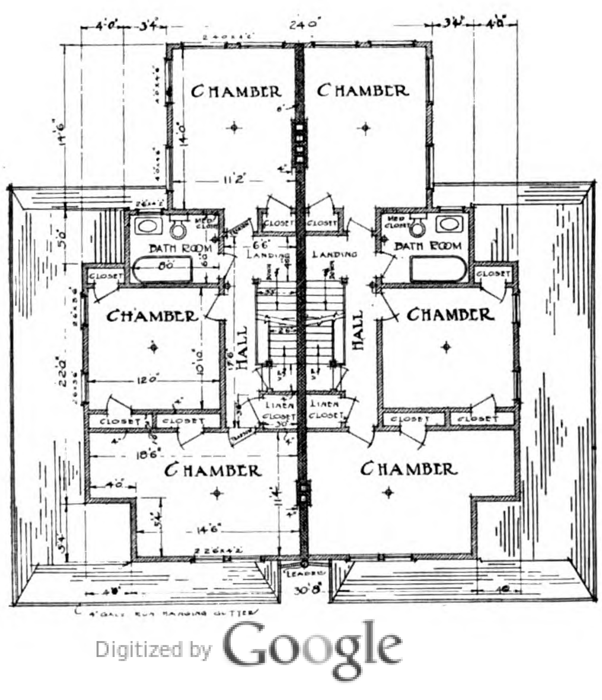
Each living rooms has a well balanced brick fireplace

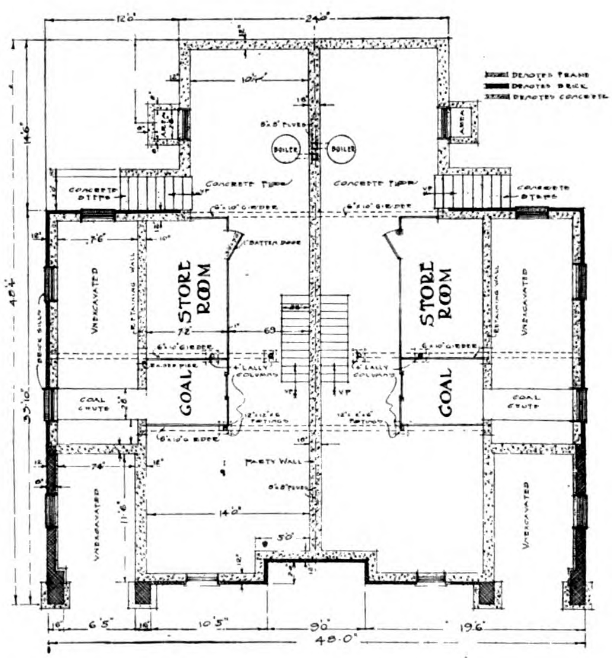











**Plans and Elevations**

**Scale $\frac{1}{16}'' = 1$ ft.**

# How to Use Steel in Timber Framing

## Practical and Appropriate Methods of Supporting Long-Span Floors and Bearing Partitions Upon Structural Steel Girders

*By Ernest Irving Freese*

The practical necessity for the employment of structural steel girders, or I-beams, in conjunction with timber framing, occurs when any, or all, of the following four conditions arise:

1.—When the imposed load is so heavy, and the span so great, that a wooden girder of sufficient size and length would not be obtainable;

> **Do you know when steel beams will give better results than wood?**
>
> **Do you know how to use steel beams in timber construction so as to avoid trouble arising later from shrinkage?**
>
> **Do you know how to frame steel beams where headroom is limited?**
>
> **These are only a few of the practical problems clearly explained in this article. Read it carefully. It will give you many worth-while ideas which you can apply in solving difficult construction problems, such as are likely to arise at any time in your work.**

2.—When the imposed load is so heavy that a wooden girder, even though obtainable, would be a clumsy and impractical means of support;

3.—When the span is so great as to cause a wooden girder to deflect excessively and thereby cause plastered ceilings to crack, floors to sag, and door-frames to be thrown out of square;

4.—When, either on account of appearance or limited head-room, a shallow girder is required, but where such girder, if of wood, would neither be sufficiently strong to safely carry the imposed load, nor sufficiently stiff to keep the vertical deflection within the allowable maximum of 1/32 in. per foot of span.

The above conditions, either singly or in combination, often arise in timber construction in any one, or each, of the following three cases:

*A.*—In the support of the floor-joists only;

*B.*—In the support of a partition only, lengthwise of the joists;

*C.*—In the support of a partition crosswise of the joists.

In the latter case, the girder must, necessarily, also support the floor-joists upon which the crosswise partition rests. In any of the three cases, the girder might either be concealed in the floor construction or be dropped below, as the conditions of the case may demand.

In the drawings accompanying this article, Figs. 1 to 9, inclusive, it is to be especially noted that the structural steel girders are so placed as to not only fulfill the various conditions of each case, but that they are so disposed as not to interfere with, or restrict, in the slightest degree, the equable shrinkage-settlement of the timber fabric. Moreover, and fully as important, it will be seen that the timber-work itself is so designed as to absolutely eliminate disparity of settlement between any of its parts, that is to say, the various horizontal bearing-timbers of interior partitions exactly correspond in number, depth and position with the horizontal bearing timbers of the exterior wall, or vice versa. This method of timber framing, together with the appropriate methods herein detailed of supporting long-span floors and heavily-loaded partitions, will result in a structure absolutely free from the aggravating faults of excessive deflection and unequal settlement.

In Fig. 1 is detailed a first-floor girder coming under case *A* or *C*, and subject to condition 1, 2 or 3. The joist-plate, interposed between the bottom of the joists and the top flange of the girder, corresponds with the same member, or sill, occurring in the exterior wall. It therefore equalizes shrinkage settlement, and also provides a nailing for the lower edges of the joists. This nailing should never be neglected, for, by toe-nailing the joists to the plate, and bolting the plate to the top flange of the girder, the girder is thereby held secure against buckling laterally. If the girder supports a partition as well as the floor-joists, the partition studding should *never*, under any condition, be extended down through the "zone" of the floor construction to the top of the girder. Instead, it should rest upon a partition sole, as is shown. The load is then transmitted to the girder through precisely the same amount of *horizontal timber* that occurs in the exterior wall at this point. Hence, no disparity of shrinkage-settlement can possibly take place. In both the interior partition and the exterior wall, the vertical studding transfers and distributes its load first to the partition sole, then to the sub-floor, then to the joists and solid bridging, then to the joist-plate, or sill, and finally to the steel girder or the foundation wall, as

FIG. 1.

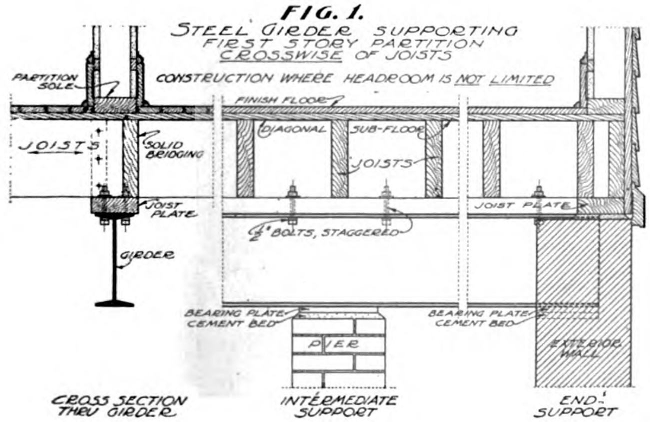



FIG. 2.

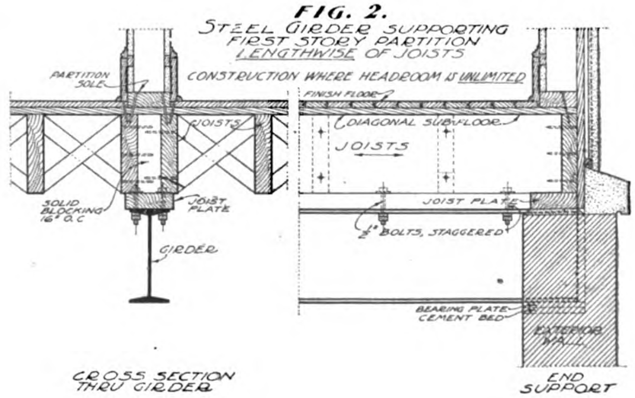


**FIG. 3.**

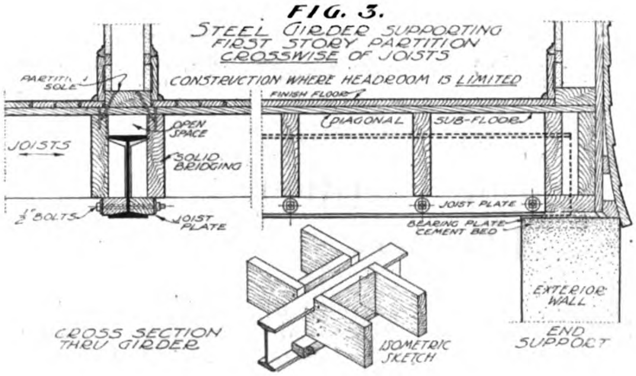
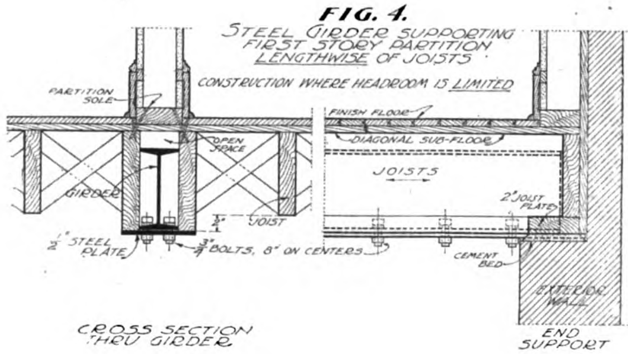



**FIG. 4.**




the case may be. The solid bridging, besides stiffening the floor-joists and distributing the load to the girder, also effectively stops the spread of fire. But it must always be put in with the grain *horizontal*, so as to shrink the same amount, vertically, as the joists themselves.

Fig. 2 illustrates a first-floor girder coming under case *B*, and subject to condition 1, 2, or 3. The girder is in the same position as before, but the partition load reaches it through the two parallel joists which should be here kept apart only far enough to afford a nailing for the ends of the finished floor, as shown. These two joists should be spiked to the joist-plate, and the latter, in turn, bolted to the girder-flange. The sub-floor, in all cases, should be laid *diagonal*, so as not to parallel the direction of the finished floor.

Fig. 3 shows a first-floor girder coming under case *A* or *C*, and subject to condition 4 only. The load is transmitted to the girder in the same manner as has been shown and described in Fig. 1, except that, here, the joist-plate rests upon the *lower* flange of the girder instead of the upper. As before, the joist-plate should be of the same thickness as the same member that occurs in the exterior wall. Here, also, the solid bridging performs the additional and very necessary service of affording the requisite support for the diagonal sub-floor which bridges the open space above the girder and thereby transmits the distributed load of the partition to the joists and bridging and thence to the joist-plate and girder, as is clearly indicated in the isometric sketch. The partition-sole, upon which rests the studding, should be wide enough to come just flush with the face of the plaster; thus forming a ground for the plaster, a nailing for the lower edge of the base, and relieving the sub-floor of any transverse strains. The open space above the top of the steel girder should always be enough to allow of the maximum shrinkage, and consequent vertical settlement, of the timbers in the floor construction. The maximum shrinkage of structural timber, crosswise of the grain, has been found to be

**FIG. 5.**

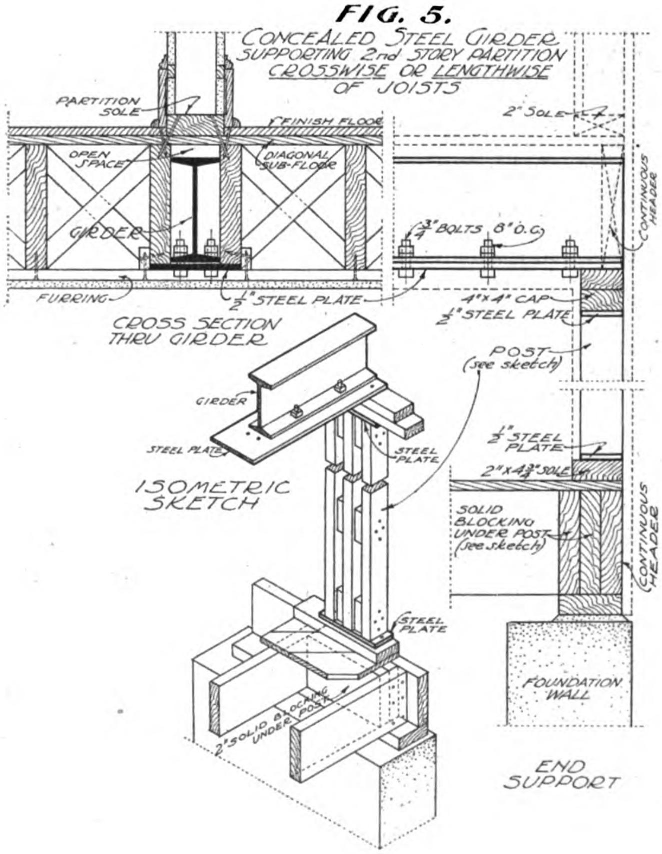
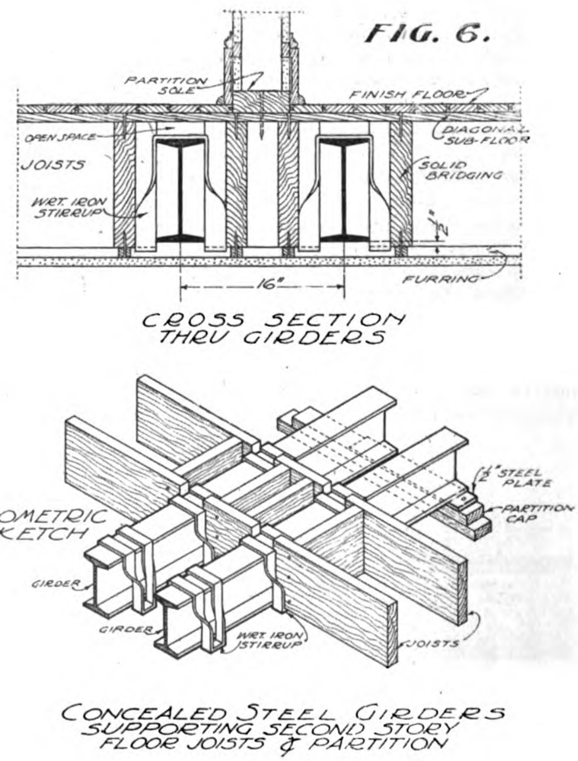



**FIG. 6.**



about ½-in. to the foot. Therefore, in *any* case, as well as this one, the distance from the underside of the sub-floor to the top of the steel girder should never be less than 1/24th the distance from the underside of the floor to the bottom, or bearing surface, of the joist-plate.

In Fig. 4, which illustrates a first-floor girder coming under case *B*, condition 4, only, it is to be especially noted that the two floor-joists, through which the girder receives its partition-load, are 2 in. deeper than the regular joists, that is to say, their depth is increased by an amount exactly equaling the thickness of the exterior joist-plate or sill. This is done to equalize the shrinkage-settlement, for, in this particular case, the joist-plate, heretofore shown for this purpose on the girder-flange, is impractical, and a continuous steel plate, *bolted* to the lower flange of the girder is substituted instead. The steel plate should *not be riveted*, for tension on rivet heads is not in accord with good construction, and should never be allowed.

Fig. 5 illustrates a second-floor girder which comes under case *A*, *B* or *C*, combined with condition 4 only. Here, unlike Fig. 4, the joists through which the girder receives its load are of the same depth as the regular joists, for the reason that the ends of the girder here rest upon the 4-in. studding-cap, which latter, as it shrinks, allows the girder and the entire floor-construction to thus settle uniformly with it. Steel columns for the end support of second-floor steel girders are unnecessary and uncalled for. Timber posts, constructed as shown in the isometric sketch of Fig. 5 fulfill all conditions of good construction. They are built up of ordinary 2 x 4 or 2 x 6 in. studs, separated by an inch or two so as not to vitiate the proper keying of the subsequent plastering. The posts must not extend through the "zones" of the floor-construction, for this would cause unequal settlement of the upper floor. On the contrary, the posts should be considered simply as studding. They should, however, be solidly supported by being blocked-in underneath them with short lengths of joist, as is clearly indicated in Fig. 5, Moreover, they should be provided with steel bearing-plates at top and base, so as to distribute the load from the horizontal timber to the vertical timber, and vice versa. The safe bearing strength of timber on end is about 2½ times its bearing strength on its side. Hence, the steel bearing-plates for the posts should be equal in area to about 2½ times the bearing area of the post, provided, of course, that the post be loaded to its full capacity.

When steel girders are concealed in the floor-construction, they must, of necessity, be of lesser depth than the floor-joists so as to allow of an open space above them for the unrestricted settlement of the joists, as has been shown in Fig. 5. Hence a single I-beam, of lesser depth than the joists, may not always be found to possess sufficient strength or stiffness to carry the imposed load without excessive deflection. In this case, two I-beams must be used, placed as shown in Fig. 6. This detail is an illustration of case *C* and condition 4, only; the twin girders being entirely concealed in the second-story floor-construction, yet supporting both the floor and the crosswise partition. In this case, the floor-joists may be supported either in wrought-iron stirrups, as shown in Fig. 6, or upon a continuous steel plate bolted to the lower flange of the girders as has been shown in Fig. 5. If stirrups are employed, then the girder load should be distributed to the partition cap by means of a steel bearing-plate, as the isometric sketch of Fig. 6 indicates. The design and construction of the posts for the end support of the I-beams should be the same as shown in Fig. 5.

Fig. 7 indicates details and end supports for second-story girders of various depths coming under case *A;* that is to say, for girders used for the support of the *joists only*, but subject to various conditions of loading. It is to be particularly noted, that, under all conditions, the girder transmits its load to the supporting posts through the same depth of *horizontal* timber that occurs in the partition-cap, and that this load is properly distributed by means of the *two* steel bearing-plates at each end of the girder—one plate interposed between the bearing-end of the girder and the horizontal timber upon which it rests, and another similar plate between the horizontal timber and the top of the post. In this manner, shrinkage-settlement is rendered invariable throughout

*FIG. 7.* STEEL GIRDERS SUPPORTING 2nd STORY JOISTS ONLY

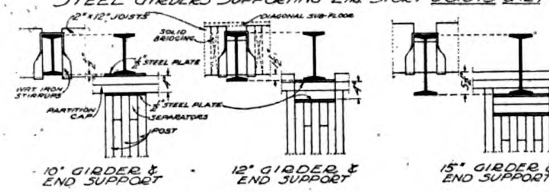
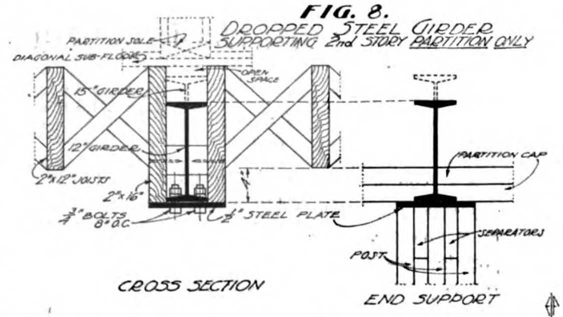


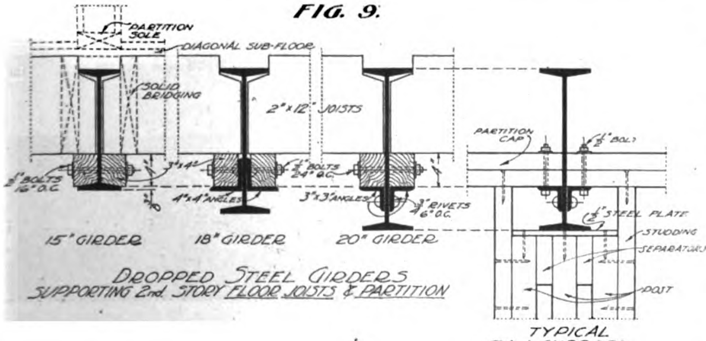

Fig. 8 shows the proper placement and end support for a second-floor girder in case *B;* for the support of a second-story partition only, but not being entirely concealed in the floor-construction. The girder is here dropped below the lower edge of the joists by an amount *exactly equalling the thickness of the partition-cap*—4 in. The two parallel joists, resting upon the continuous steel plate through which the girder receives its partition-load, are therefore made 4 in. deeper than the regular floor-joists, and no horizontal timber is interposed between the end-bearing of the girder and its vertical post. Equable shrinkage-settlement is thus assured. The base of the posts must be constructed the same as heretofore shown in Fig. 5.

*FIG. 8.* DROPPED STEEL GIRDER SUPPORTING 2nd STORY PARTITION ONLY




In Fig. 9 is shown the design, placement, and end support for second-floor girders carrying unusually heavy loads crosswise of the joists. These girders come under case *C* only. In this case, in order to provide against disparity of settlement, the ends of the floor-joists rest upon a horizontal timber plate, which latter member is of the same thickness as the partition-cap and is either supported upon the lower flange of the girder—as shown on the 15-in. girder detail—or supported upon steel angles riveted to the web of the deeper girders, as shown. As in all other cases where the joists run crosswise of, or frame into, the steel I-beam, the solid horizontal bridging each side of the beam is very essential, for it provides the requisite continuous support for the diagonal sub-floor and thereby uniformly distributes the partition-load to the girder. Moreover, it stiffens the joists themselves, retards the spread of fire, and offers considerable fire-protection to the steel girder.

*FIG. 9.*




DROPPED STEEL GIRDERS SUPPORTING 2nd STORY FLOOR JOISTS & PARTITION

When you learn a good idea, use it.

If you don't use it, your time in learning it was wasted.

If you do use it, your bank account shows it.

# The Community Garage—A Money Maker for Contractor and Owner

## Vacant Lots Offer a Fruitful Source of Business to the Builder with Ideas

The community garage is rapidly increasing in popularity. As an investment it is decidedly good, since it meets a popular need. Small individual garages, constructed in rows, can be put up cheaply, yet they are far more convenient for the owners than is the ordinary public garage.

In a community garage, the car owner has the assurance that his car will remain undisturbed during his absence. He can leave personal belongings in his car and on his return find them where he left them. He has all the conveniences of the public garage, with none of its inconveniences.

For that reason, the community garage has proved popular with property owners, since it is comparatively easy to keep the compartments filled to capacity.

In designing any speculative structure like this, the investment must be kept at a minimum. Yet the building must be attractive so that a car owner will not hesitate to point out with pride the place where his car is kept. He must feel that he is renting high class space and that his wife and friends will be impressed that way. He will also pay a bit more for space where good taste is shown in the design.

Much of the success of the community garage illustrated lies in the neat, simple, yet economical handling of the front. The column effect of the brick pilasters projecting above the wall, the irregular yet harmonious treatment of the top of the wall, balanced by symmetrical treatment of the triple windows, makes the design a particularly happy one.

The top of each column is capped off with a course of brick set on the narrow side; above this is a "soldier" course set on end; this top course is then capped with cement.

The top of the wall is similarly treated, having brick laid on edge and capped with a cement coping.

Each column has its sides laid as headers, so as to make a slight panel effect.

Brick set up on end forms the lowest course of the wall.

An interesting accent is the projecting ornamental brickwork in triplicate motif over each window. By placing a finger over this ornamentation, one can see how effective yet inconspicuous it is.

**When you see a vacant lot, visit the owner and suggest a building for that lot which will prove a money maker. If you show the owner how he can improve his property so that his investment will bring him good returns you will have secured a contract.**

**Any property owner will listen to a builder with ideas—if those ideas will turn idle capital into an active source of income.**

**The community garage is a profitable source of income for the owner. Thirty-four garages rented at $10 a month, with extras for gasoline, cleaning, etc., is a pretty good income for any small piece of property.**

**See what you can suggest to property owners in your town.**

The compartments are divided by 4" terra cotta partitions faced in front with brick

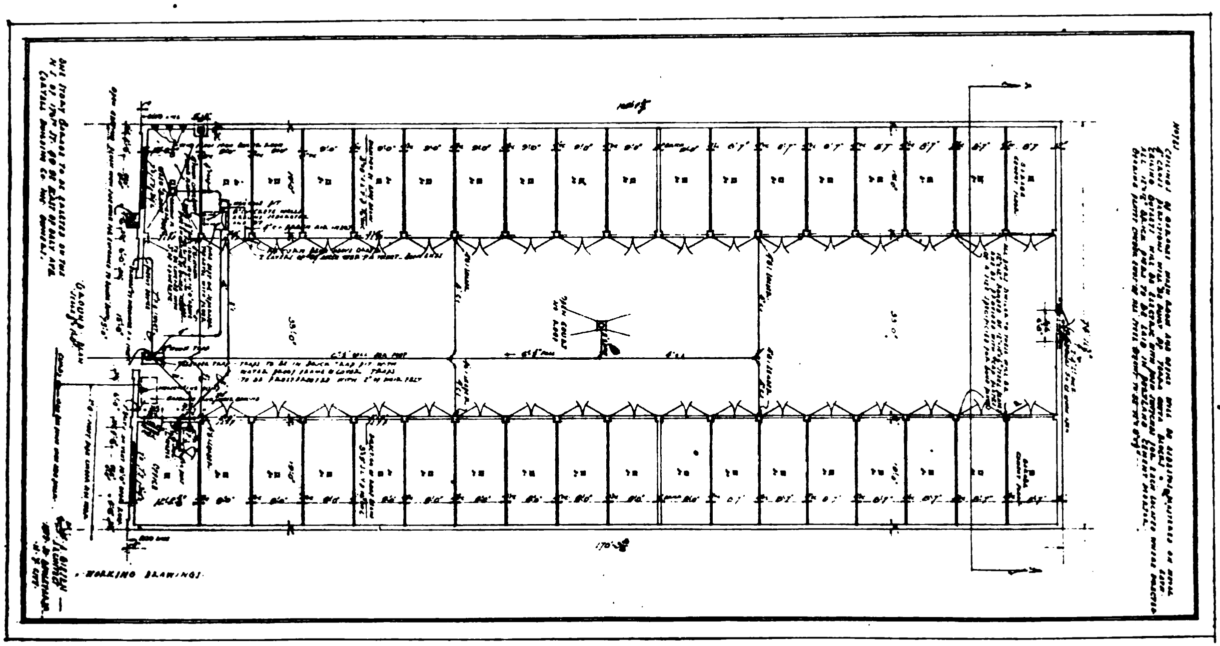
The compartments are placed on either side of an open court

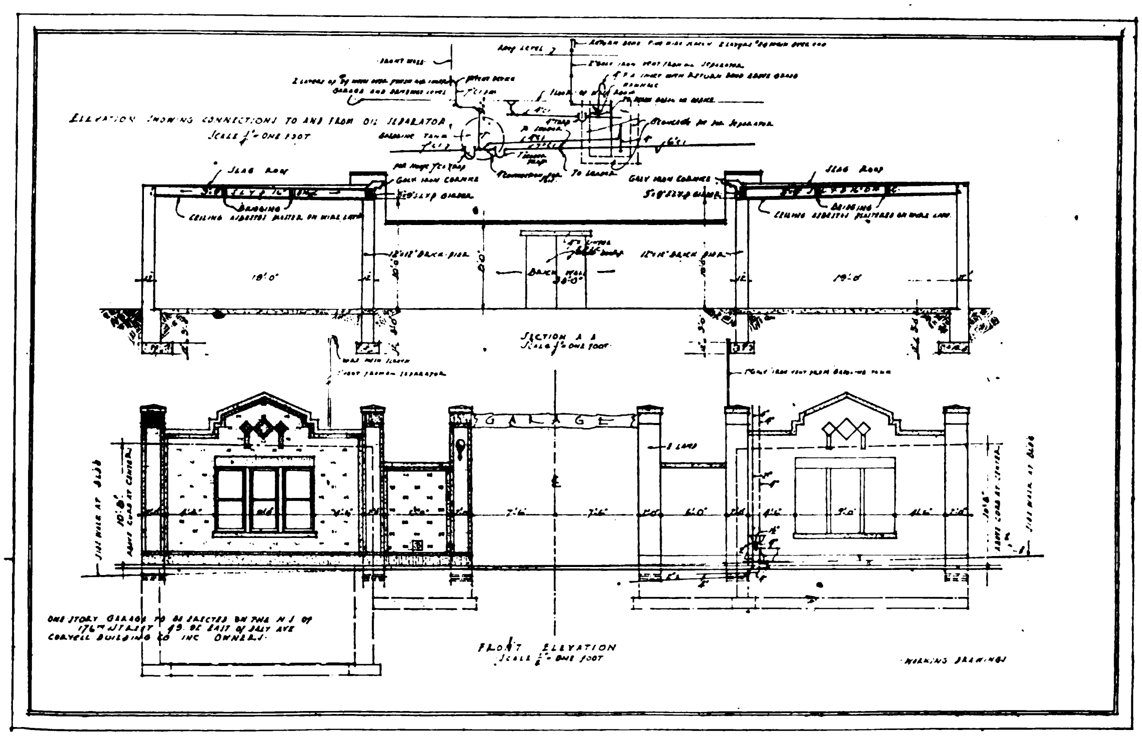
Inside are 34 individual garages, an office and a wash room for automobiles. Each individual garage is provided with a drain. The partitions are all hollow tile, the ceilings being covered with asbestos plaster on wire cloth, which protects the wooden rafters.

The garages can be built at a cost of about $140 each, which means that each one will pay for itself in little over a year.

Furthermore, the garages are fireproof. In the community garage illustrated one of the automobiles was burned up, with no harm to expensive cars in the compartments directly adjoining the one in which the fire occurred. This is an important feature which appeals to the average car owner.

This garage was built for the Coryell Building Co. in accordance with plans and specifications prepared by W. A. Giesen, architect, 104 West Forty-second Street, New York City.

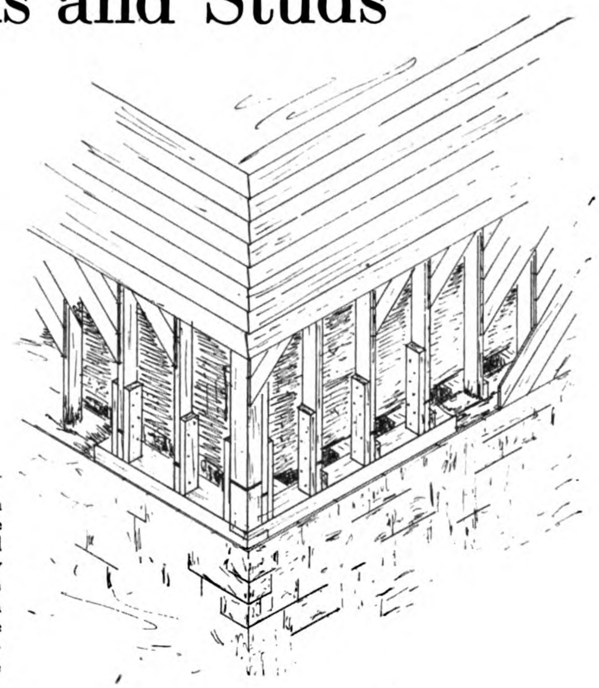




# Replacing Rotted Sills and Studs

## Profitable Repair Jobs Offered By Old Houses With Rotted Sills and Studs—This Article Tells How to Repair Them

*By W. A. Giesen, Architect*



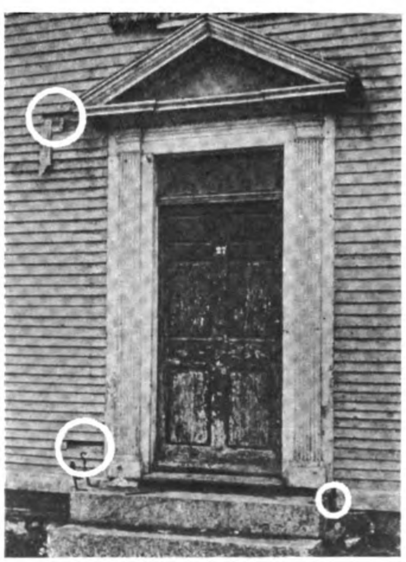
**The sill is replaced in short lengths. Studs are cut off, blocked and fished as shown. Usually one fishplate only is used, although both sides of the stud may be fished at intervals if desired, where winds are high**

The rotting of sills and bearing ends of exterior studs in frame constructions is usually caused either by rain water leaking through the exterior coverings or by extreme dampness due to condensation. With the alternate wetting and drying of the timber a condition known as "wet rot" sets in and timber so affected rapidly deteriorates with each alternate wetting and partial drying until it has reached the point where it no longer serves its usefulness and must either be removed or the structure of which it is a part abandoned.

The removal of rotted sills and exterior studs and their replacement with new materials is commonly accomplished in the following manner:

The exterior siding, watertable and sheathing should be removed from a point level with or below the top of foundation wall to twelve or more inches above where it is observed that rot ceases to exist. Should the space between the studs on top of sill be filled with brick or other material, it must be removed.

Let us assume that we have a condition in which we have uncovered the sill and studs at one corner of the house and find, upon examination, that both corner post and studs are rotted in addition to the sill. This being the case it will be necessary not only to place a new sill in position, but also to fish the corner post and studs.



**Places shown in the white circles afford entrance to rain and wet; rot will occur**

In order to do this all weighty furniture should be removed from the side of the house under which the new sill is to be placed. This will take off all the unnecessary weight from the wall, most times making it unnecessary to do any needling, particularly if the building is both sheathed and sided. As a precaution the corner post should be shored until properly spliced and the new sections of sills should be short.

Should the building be one that has no sheathing but merely siding as an exterior covering, it might then be advisable to needle it. A practical method of doing this is to take a 1¼-in. x 6-in. strip and securely spike it to the outside of studs in a horizontal position well above the point where same are rotted; under this needles must be placed of a size and spacing to safely carry the wall of the structure. The end of the needles on the exterior of the building will be carried on a sill supported by uprights which are carried by another sill on the ground; needles inside will be carried on sills running at right angles to floor beams and bearing on them.

There is an advantage in placing sills under needles walls, as longer sections of sills can be set in position than would otherwise be safe where the support of studs depended wholely on the sheathing and siding.

After removing the siding and needling where necessary, the next step is to remove the sills, corner post, and studs where rotted. The studs and corner post should be carefully cut off about where rot has advanced. The cut should be made as nearly level as possible so that a good fit can be had on the new bearing ends which will be placed in position below. After the old piece of sill has been removed and a new section set (which is well painted on under side), the new bearing ends of studs and corner post should be set exactly plumb with the old ones that they piece out above.

New bearing ends should be fitted as tight as they can be made and then wedged up tight where they abut the cut off end of studs, etc., above. Wedges must be of oak or other hard wood. The new bearing ends after being wedged securely are then fished as shown in illustration. Fishing pieces must be securely spiked in position and have a firm uniform bearing on sill to which they and the new bearing ends should be securely spiked.

The frame of an old house, the sills, studs, etc., of which have deteriorated as pictured, when placed in proper repair may be as good or better than one of new construction.

**The sill here is exposed to rain, and will gradually rot**

# Legal Department

### If Plaster Is Not Up to Standard Can Owner Insist on Better Plaster for Replacing That Originally Specified?

That an owner has the right to have defective plastering replaced with the kind of plaster contemplated by the original contract and to be paid a reasonable sum therefor, but is not entitled to substitute patent plastering for the plaster provided in the specifications is the decision in a recent New Jersey case.

Suit was instituted to recover damages for the failure of a contractor to properly perform the contract for the building of a dwelling house.

The court in holding the above, said, in short, the plaintiff was entitled to the house he contracted for and not a better house. If the contract and specification are not to be the builder's guide, he has none, and the owner may contract for a $1,000 house and demand a $10,000 house. A good workmanlike job is a job properly executed; whether the result is what it should be depends upon the plans and specifications.

### If Workman Injures Hand, and Burns Hand and Bandage While Lighting Cigarette, Is Employer Responsible Under Workman's Compensation Act?

A workman's compensation case which should be very interesting to builders was just recently decided in the California Supreme Court.

While an employee was at work he ran a nail into the palm of his hand. A bandage washed in turpentine was wrapped around it to relieve the pain, and he continued on the job. Some time later, while still working, he attempted to light a cigarette and was very badly burned. He sought an award under the Workman's Compensation Law, and it was granted to him. His employer sought to have the case renewed, and the Supreme Court of California affirmed the award, saying:

"Such acts as are necessary to the life, comfort and convenience of the servant while at work, though strictly personal to himself and not acts of service, are incidental to the service, and injury sustained in the performance thereof is deemed to have arisen out of the employment. A man must breathe and occasionally drink water while at work. In these and other conceivable instances he ministers to himself, but in a remote sense these acts tend to the furtherance of his work.

"We have the tobacco habit with us, and we must deal with it as it is. It will not do to say that mankind would be better for a lack of the need even if that statement be true. Tobacco is universally recognized to be a solace to him who uses it, and it may be that such a one, unless he finally shakes off the habit, cannot perform the labors of his life as well without it as with it. The courts are not without cases to the effect that the employer must expect the employed to resort to the use of tobacco as a necessary adjunct to the discharge of his employment."

### Does Architect's Certificate Shut Out Claim for Damages by Owner?

The Supreme Court of New York held recently that the certificate of an architect, when one is required as a condition of payment, is conclusive proof in the absence of evidence of corruption, fraud or palpable mistakes appearing upon its face, that the contract was completely performed, but it does not shut out a claim for damages by the owner for a breach of an express warranty.

The contract provided that payment should be made on the certificate of the architect. The contractor obtained a final certificate, and it was held that he was entitled to recover the amount due him.

**All readers are invited to ask any questions whose solution will help them solve any legal difficulty that they may be in. Our legal adviser, George F. Kaiser, LL.B., will answer direct by mail and give his opinion as to the correct procedure. Such of the questions and answers as are of general interest to the trade will be published in these columns.**

**All inquiries must be accompanied by the name and address of the correspondent, so that he may be answered direct or that he may be requested for further information if necessary to the intelligent answering of his question. No names will be published, only initials or a nom de plume. Remember that this service is free to subscribers.**

**Address Legal Department, Building Age, 243 West 39th Street, New York City.**

### Is Architect Responsible for His Plans?

In a recent case it was decided that an architect owes to his employer the duty of exercising and applying skill and ability, judgment and taste, reasonably and without neglect, in the preparation for the proposed structure of the plans and specifications which he was employed to prepare.

Suit was instituted for damages resulting from architect's negligence and lack of skill in preparing plans and specifications for a building and neglect in direction and supervision of construction of building.

The court held that the architect does not warrant or imply a satisfactory result. It is enough that failure is not the architect's fault.

### Meaning of Labor and Materials Needed in Prosecution of Work

There is a marked disposition on the part of the courts to enlarge the liability of sureties upon the bonds of contractors which contain a covenant to make payments to all persons supplying labor and materials in the prosecution of the work provided for in such contract.

The United States government requires that the following provision must be used:

"That such contractor, or contractors, shall promptly make payment to all persons supplying him, or them, labor and material in the prosecution of the work provided for in such contract."

In a recent case under a contract with the United States Government the contractor was required to furnish the United States engineers and their assistants with meals and camp accommodations at any camp under his control. The contract clearly indicated that it was intended that such camps should and must be maintained. In this particular contract the character and magnitude and location of the work rendered it imperatively necessary that boarding camps should be maintained. Its location was miles away from the habitation of man and the sources of supplies. In addition the contract required the contractor to provide sanitary and police regulations; to furnish warehouses and sheds for storing cement and for the use of broken stone, contemplating the use of crushers and mixing machines in the prosecution of the work. It was necessary for the contractor to use, furnish and provide powder, steel hammers, shovels, picks, nails, bolts and other hardware for the machinery; apartments for the men employed; cooking, feeding and sleeping ac commodations and furniture and other needs for the accommodations of the men.

There was an unpaid bill for provisions, dining room and kitchen furniture, sleeping apartments and bedroom furniture, and these for the purpose of providing food and lodging for the men engaged in the prosecution of the work under the contract.

The surety denied liability upon the ground that these did not constitute material within the meaning of the bond. It was held, however, that the surety was liable upon its bond on the ground that the equipment for the housing and feeding of the men was absolutely necessary to the performance of the contract; in fact, was specifically provided for under the terms of the contract, and therefore, it was material used in the prosecution of the work. McPhee vs. U. S. 174 Pac., 808.

### Can Contractor Break Contract When Owner Abuses Him?

**From B. C., New York.**—What right has a contractor when an owner abuses him, refuses to pay, and tells him to go to—and get off the property. Must he stand this abuse? If not, what is the best thing to do to protect himself?

**Answer**—If an owner is guilty of abusive conduct or threatens or assaults the contractor, and in addition tells him what you were told, the contractor would be justified in abandoning his work and would be entitled to recover for the work he has already done.

Of course, if the contractor prefers to go on with his work under the contract, he is privileged to do so, and if he is prevented from completing the job by force or otherwise, he can recover damages to the amount of profit he lost by reason of the owner's breach of contract.

### What Effect Has Ending of War on Soldiers' and Sailors' Civil Rights Bill?

**From L. L. G., New York.**—Will the ending of the war have any immediate effect on the Soldiers' and Sailors' Civil Rights Bill. Several people who owe me money are now in the army, and I want to know what I can do. Will you please advise if this bill is still in effect?

**Answer**—The Soldiers' and Sailors' Civil Rights Bill contains a provision that it shall continue to be in effect until "the termination of the war, and for six months thereafter." The words "Termination of the war" are defined to mean, "the termination of the war by the treaty of peace as proclaimed by the President."

Of course, if any of your debtors have been discharged from active service, or have died, the act is no longer effective as to them.

### When Man Is Under Contract He Can Be Discharged for Incompetency?

**From W. M., Illinois.**—What are the rights of an employer who has discharged a man for not doing his work? In this case there was a contract. The man is loafing around, boasting how he is going to collect his salary under his contract.

**Answer**—When an employee is discharged, he is under a duty to make a reasonable effort to get similar work to that which he was under contract to do. The employer must show he could have obtained other employment, or that it was offered to him and he refused it.

If he just loafs around and refuses to work the amount he could have earned will be deducted from any damages he may recover.

Of course, if an employee does not do his work he should be discharged and cannot collect damages. It depends on the facts in each particular case, however, as to whether or not the discharge was justified.

# How to Use the Movies to Boom Business

## This Kind of Publicity Brings Good Results if Judiciously Used

*By Chesla C. Sherlock*

There are many ways in which the enterprising builder can keep his name before a given community, but probably none of them offers the possibilities that intelligent movie slides do.

Advertising depends upon several things in order to be successful. In the first place, your advertisement must be seen and it must be so worded or arranged that it attracts attention.

This the movie slide will do in a way that cannot be approached in any other fashion. Slides are used in the moving picture theatre for a definite purpose; namely, as fillers to divert the attention of the audience while reels are being changed or the orchestra given a rest.

People do not object to them, provided there are not too many, as they prefer watching the screen to sitting in dreary idleness. Not only that, but people sitting in a darkened theatre building will be forced to see your advertisement whether they are willing or not. Such is not always the case with other mediums.

By a careful selection of the localities in which you are particularly anxious to build up business, you can cultivate that field in no better way than by having attractive movie slides made and used in the progressive movies of that section.

Much care is needed in selecting the proper shows in which to advertise. There are undesirable shows just as there are undesirable newspapers and magazines. Then, again, some operators are very lax in taking care of the slides. They allow them to become dirty, cracked and soiled or fail to run them for whole days at a time. Such practices will not bring the desired results any more than a newspaper that runs your advertisement every once in awhile would.

Men who follow such courses should, of course, be avoided. There are theatres also to be avoided. Because of the very class of patrons and films to which they cater they are undesirable mediums for the builder to use. It is only the modern theatre in the best districts that should be cultivated to any extent.

The designing and wording of the slide must be as carefully worked out as the best magazine or newspaper advertisement. It should convey a message that will get across quickly. There should be little wording on it. The appeal should be through a picture rather than through wordy reasoning.

Remember that people in a movie theatre are there to be amused before they are to be instructed or induced to do anything else. Do not antagonize them by wordy advertisements in small type.

If you have an especially attractive design for a bungalow to go well upon a standard size lot, show a picture of it. If you are making a speciality of interior finishing and can remodel an old house at especially attractive figures, show a picture of an interior before and after being remodelled and make some reference to the slight cost. The most prominent thing in a movie slide, outside of the lesson you are attempting to get across in your picture is your firm name. It should be in large type, easy to read—above all, your street number or phone number.

**Advertising by means of the movies is a method of booming business that has been used by many builders successfully.**

**It brings your name and business constantly before people who will read and remember through constant repetition.**

**In order to make this branch of advertising productive, certain factors should be considered in order that the best results may be obtained.**

**How to do this, is explained in this article.**

Slides may be had to cost almost any price. They run as low as thirty-five to fifty cents each for stock slides on up to almost any price you care to pay. While this is usually a small initial cost, the real matter of expense comes in the rate charged by the theatre manager to run your slide.

Theatre rates are almost wholly made upon the basis of monthly showing. This means that your slide will be shown upon the screen an average of three to five times a day, between every change of program.

Managers generally have their own ideas as to the value of such a service, basing it sometimes upon guesswork, but more often upon some definite basis of calculation, such as an estimate of the daily attendance throughout an average month.

Rates will vary according to the character of the advertisement, usualy running from $5 on up to as high as $50 per month in some of the more exclusive theatres.

The possibilities of movie advertising have, as yet, only been slightly touched. They will become more and more a factor of business building in the future, especially a strong factor for the builder and decorator.

One of the best appeals that the builder can use in this class of advertising is the appeal to the beautiful. Suppose that the audience has been looking at a love scene showing a comfy bungalow in a California setting. Then the picture fades out and your slide is flashed upon the screen showing an attractive little bungalow, so pretty, so comfortable, so reasonable that people wonder who builds them. They read your name, they have been informed through your slide that the price is right.

What is more natural than for them to say: "I am going to have a bungalow." If they don't say that, they will be saying: "I'm going to have a bungalow some day!"

The chance to use colors in your movie slide is of great advantage in adding to the advertising value of your slide. Even the use of two colors has greatly increased results in newspaper advertising, but in the movie slide you are not confined to one color or to two. You can use every color in the rainbow without it costing you any more and you have the chance to greatly add to the attractiveness and the appeal of your slide.

The enterprising builder will be using movie slides more in the future because they are real business builders. And the insurance he has that they will be read is greater than in any other form of advertising.

If other conditions are right, it is one of the least practiced and still the most profitable sources of publicity.

# Big Profits in Remodeling Store Fronts

## How Successful Contractors Handle This Class of Work. *By Willard S. French*

Ordinarily contractors, builders and almost everyone affiliated with the building industry applies himself to whatever work presents itself. Seldom do they, in normal times, really specialize in or make particular efforts to secure a certain kind of work. But that is not surprising.

There is a big opportunity in every community remodeling store fronts. Retailers have long ago passed that stage where they cannot recognize the value of modern fronts. Practically eighty out of every hundred retailers in this country (among those who have not modern fronts) are either now remodeling their fronts or making special preparations for it.

### Cultivated Market

The market is big, retailers are more prosperous than ever before, and modern retailing makes good displays a necessity. This condition exists not alone in the large cities, but right down the line even to the general stores in the rural districts. The era of new store fronts naturally began in the large cities. There it became a necessity in order to catch the eyes of as many of the thousands of passers-by as possible. In the beginning it was a matter of attracting attention, but by scientific application the subject of store fronts has become one of wide study.

The subject is not so closely connected with retailing that the average building contractor cannot grasp it. The development of store fronts during the past ten to fifteen years has been so universal and so enthusiastically taken up that the underlying fundamentals are before us—we only need to look at and analyze them.

I will try to set down a few facts about store fronts, not from the standpoint of carpentry and not entirely from the retailers' viewpoint, but from the retailers' viewpoint as it interests you.

It seems quite unnecessary to say that the idea of a store front, of show windows, is to sell merchandise, but if you were to make an investigation of what has been done by retailers (and contractors) you would also make mention of the fact.

To verify what I say here, I suggest that you count the fronts on both sides of the street of any block of stores in your city. You will find that approximately 80 per cent of them are of the design illustrated in Figure 1. Those fronts cost all the way from $300 to $2,500, still the $300 kind are just as successful as the $2,500 fronts from the standpoint of adaptability. Practically the only difference lies in the amount of money spent for art glass, panel work, etc.

You will find displayed in those fronts like Figure 1 shoes, hats, clothing, drugs, cigars, furniture, auto accessories, hardware, pianos, bottled goods—practically every line of merchandising sold at retail. Seems strange that a furniture

**There are big profits possible in remodeling store fronts.**

**Merchants are beginning to realize the value of appearances. They are realizing that an attractive looking store front is just as essential as well kept stocks.**

**In the face of retail competition as it is to-day, customers must be induced to enter a store realize the value of appearances. in.**

**This article tells you what fronts are most successful, and gives hints on how to design them.**

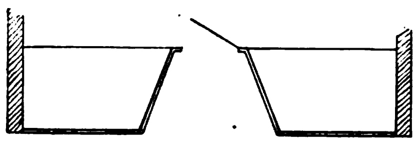


Fig. 1—A store front that is awkward because it is not distinctive; the entrance is uncomfortably crowded.

dealer would put up a store front like the front used down the street for the display of shoes and vice versa.

Anyway, you will find that most store fronts (including the modern ones) are not adapted to the merchandise displayed in them. It is therefore my recommendation that when called upon to design and build a new front you keep clear of the Figure 1 type. Most any other kind is better.

### Avoid Freak Types

To make a front distinctive it is not necessary to adopt freakish designs. Figure 2 is popular, but with the proper proportions it is very successful. It lends itself to the display of small articles such as shoes, hats, clothing, jewelry, phonograph records, 5 and 10-cent goods, drugs, etc. With this style of front the window trimmer can catch the eye of the passer-by and encourage him to enter the lobby of the front in order to look at the other articles displayed. The lobby, or entrance, is large and inviting—it permits a large number of people to pass into and out of the store without crowding. Women with baby carriages can enter and leave such a store without the embarrassment of bumping into the other people. Such a front offers shelter during rainy and cold weather,and for that reason appeals to the retailer whose store is near a street car stop.

### Good Design Always Effective

A front of Figure 2 style costs comparatively little more than the one shown in Figure 1. The plates of glass are of narrow widths and 84 in. in height is practical for most fronts. The bulkhead varies, of course, with the nature of the merchandise to be displayed, but usually between 12 in. to 24 in. The bulkhead of a jewelry store window should be no less than 22 in. high, preferably 24 to 26 in. For the display of clothing and haber-

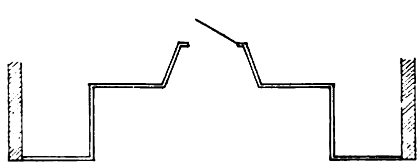


Fig. 2—A front that permits goods to be well displayed and affords a commodious entrance.

dashery the bulkhead should be between 12 in. and 18 in.

Wherever it is possible use tile prism in the transom and run it straight across the front as shown in Figure 3.

Many otherwise good fronts have been ruined by setting the prism glass as shown in Figure 4.

The chief objections with the treatment of transom glass as shown in Figure 4 are that the windows are difficult to trim and that the front is not pleasing to the eye—it has a rambling appearance.

Whenever the width and depth of a store front permits it is advisable in

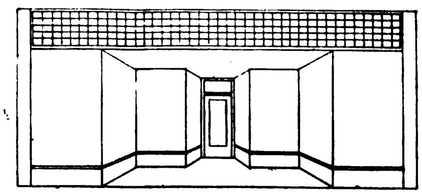


Fig. 3—Prism glass should be set straight across the front.

many cases to build in an island or outside show case as shown in Figure 5. These precautions, however, should be kept in mind when designing a front of this character: Distances "A" and "B" should never be less than 4 ft., "C" and "D" should not be less than 4 ft. 6 in., and "E" not less than 5 ft. The reason is obvious, for the successful front makes it easy for the people to enter and leave the store. The depth of the island show case, shown by "F," varies with the merchandise displayed in it. Even as narrow as 18 in. makes a splendid case to show specials. When used for the display of shoes, etc., its depth should be about 24 to 36 in.

### Store Doors

Three ft. 6 in. seems to be the universally adopted single store door size. Some have put in 3-ft. doors, but they

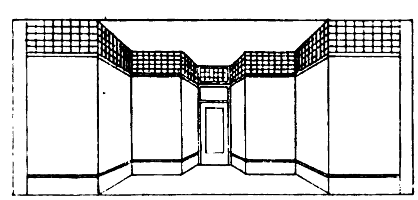


Fig. 4—Carrying prism glass back like this will spoil an otherwise good front.

are not satisfactory. Many have gone the other way and installed doors as wide as 4 ft. 6 in., which take "two men and a boy" to swing. I find that most contractors favor doors of 2¼ in. thickness and of compound construction. Double doors are practical for some stores, but most retailers who have adopted them say they should be double acting. When double doors are used they can be made narrower than 3 ft. 6 in., therefore not so thick. Seldom should a store door (except in very large stores) be over 7 ft. to 7 in. 6 ft. high.

### Entrance Flooring

Mosaic tiling is, of course, most popular for the entrance floors of modern store fronts. In practically every city there are tile setters who can do such a job in very short order. Provision for grouting must be made and the floor joists should be chamfered. Ordinary concrete flooring can be satisfactorily used if it is necessary to trim the cost wherever possible.

### Panel Work

Much could be said about the panels of modern store fronts, but I feel that the kind used in each case depends upon the expense that is permitted. Many of the country's most attractive fronts have inexpensive panels—panels made up of yellow pine and composition board. The trade papers which are published for retailers are full of suggestions for window backs and panels. Work this part out with the retailer for whom you are building the front. The same can be said about window lighting. There are manufacturers of reflectors who will gladly tell you how to light the windows to get the best effect. Their advertisements appear in the retailer's trade papers. For

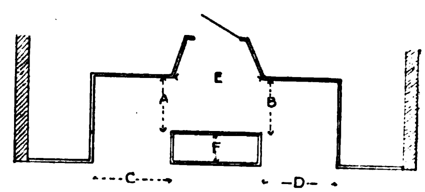



Fig. 5—An outside showcase frequently helps sell goods. But it should be so placed as not to interfere with entrance to the store, and designed as explained in this article.

slight cost valances can be purchased for the front—see the above trade papers.

Many of the points brought out here ordinarily do not interest the contractor who builds the front, but my experience shows that the more a man knows about store fronts, the better will be his success and the greater will be his profit.

### Do a Little "Drumming" Yourself

One of the surest ways to get business is to go after it. Study up on store fronts, learn about the various styles, then make up a list of some of the retailers in your city who need new fronts and *talk to them.* Explain to them that now is a splendid time to remodel their fronts. You can do the job immediately, can get the materials, and that you will not interfere with their business (most retailers say that while the carpenters are busy building the front people are more anxious to get in than ever before. Some say that remodeling in itself boosted their business).

You can make a clean profit on every store front you remodel. Why not go after it—thousands of other contractors are doing it.


## Will Blue Vitriol Ruin Granite or Marble?

From H. F., Rhode Island.—Will blue vitriol acid, either straight or with water mixed with it, ruin granite or marble if sprinkled or poured over it? A block of granite in a building here was destroyed recently and it was claimed that blue vitriol acid had been spilled on it.

**Answer**—The action of blue vitriol on granite is such that after spilling on the stone an immediate deterioration takes place. The acid has the property of dissolving the lime and soda in the mica or feldspar, which are present in the composition of granite. The action of vitriol on marble is such that it will destroy it entirely, as it readily attacks the carbonate of lime of which marble is composed. The dilution of the acid would simply have the tendency of delaying immediate action by the acid. Vitriol acid is commonly known as sulphuric **acid.** W. G.

## How to Line Up Sills, Posts and Studs

**From I. M.**—Being a subscriber to your valuable paper, I would like to ask a few questions.

Could you kindly give me a good method as to the setting of 4 x 6 sills, showing how to level them, how to sight from one to the other, also how to line them from one corner to the other so they will be in perfect line? Also, if it would not be too much trouble, would you give me a good method for plumbing of corner posts and studs and how to line up the plates from corner to corner.

**Answer**—A good method of setting 4″ x 6″ sills is as follows: Assuming that the foundation wall is about a foot and one-half in thickness and fairly level on top.

On top of foundation spread a bed of cement and lime mortar in which the 4″ x 6″ sill is laid and well bedded by means of repeated blows from a heavy hammer. The outside edge of the sill should be kept back about one inch from the face of the wall at both ends. If the sill is in several pieces it can be readily lined up by means of a mason line running from end to end; if the sill is not in line, it would be immediately noticed and it can be easily adjusted. After the sill is lined up, it should be leveled by means of a 16′ 0″ straight edge from end to end, and where high further settling should be done by means of a heavy hammer.

Some advocate the setting of sills in lime mortar, but the addition of cement makes a much stronger bed and does not set up fast enough to interfere with the lining up and leveling.

When one section or side of sill has been set and leveled, the levels for the others should be taken from it, as in this way the top of sills will be level all around. The sighting method of leveling may also be used with success, providing one gets the object to be leveled directly in back of object already leveled. But the most reliable way is to use a straight edge or preferably a builder's level.

A good method of plumbing corner posts is to set them at the edge of the sill and plumb them with a plumb bob and line. For example: The post is first plumbed on one side and then on the other and then replumbed both sides for a check. When the bob shows plumb both sides it must be O. K. To plumb a post with the bob build a scaffold, the higher above the sill the better. A carpenter gets on top of this and holds the line on his rule, say 3″ away from the post. The point of the bob near sill is measured by another man, and if it measures more or less than 3″ the post is out of plumb. The upright position of the post is then adjusted until it shows that it is plumb. The operation is then repeated on the other face of post and when both show plumb it is securely temporarily braced into position.

After a post has been set on each corner a line can be nailed to the face of them running from one to the other. A line can be run through at sills and one higher up and if the studs are set to this line they must both line up and be plumb at the same time. I use the same method for lining plates as hereinbefore described for sills.

Some years ago, I had some work on the Jersey Coast and any of it that was parallel with the shore was leveled by means of the eye with the horizon. Where this can be done it is one of the best methods of sight leveling. W. G.

*If you want help in any branch of building construction, just write to this Department. We will be glad to answer all your questions without charge.*

*Questions should be confined to construction only, as the editors cannot undertake to design any structures.*

*All readers are invited to discuss the questions and answers published.*

## Filing "Building Age" Construction Data

Hardly a day passes in the carpenter's routine of work without which some puzzling problem confronts him, some intricate "kink" which he's done before but forgotten; perhaps he's been asked to figure on some job he's not thoroughly familiar with. In such frequent instances I consider the correspondence department of BUILDING AGE about the best medium to find the answer. However, as it takes time to hunt through several years' issues before finding just the subject wanted, to facilitate this search I have adopted the form of sheet illustrated. Very simple indeed—just a sheet of paper size 8½ x 11 inches. Then I have twenty-four heavy 4 x 9½ in. manila envelopes. Each envelope is lettered, from A to Z. I place the sheets in these, the sheet subjects, of course, to correspond with letter on the envelope. Then when I want to study framing roof of unequal pitch, I look for envelope marked F, note on the slip which gives the year, month and page, and instantly find the subject. Estimating would come under the letter E, and so on. The author's name or other brief notes would be written in column under "Remarks." Added sheets may be filed in the envelopes as becomes necessary. This whole filing scheme, being compact, may be placed in a desk drawer, pigeon hole or any compartment where handiest.

DATA ON CARPENTER WORK

| SUBJECT | YEAR | MONTH | PAGE | REMARKS |
|---|---|---|---|---|
| FRAMING ROOF OF UNEQUAL PITCH | 1913 | OCTOBER | 471 | |
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RAY W. WOOD.

# Country House Details-IV

## The Best Way to Place and Frame Water-tables So That They Will Be Weather Tight — Flashing Details

*By A. Benton Greenberg, Architect*

A water-table is a contrivance to keep water away from the foundation wall and to give a finished appearance to the lower part of a house. If the water-table were omitted from a building the water washed down the side of the house would deposit its accumulated dirt on the face of the foundation wall; or, it would settle on top of the foundation, form puddles in the crevices between the masonry joints or in the depressions of the stone, and eventually cause the sill to rot.

A study of the water-table shown in Fig. 1 will show how these dangers are overcome. The vertical member or "apron" extends 1 in. below the sill, thus completely protecting the joint between the masonry foundation and wooden superstructure. The surmounting member, called "drip-cap," is inclined so that the water falls clear of the foundation wall. The bed mould conceals the joint between apron and cap and adds decidedly to the appearance of the water-table. It will be observed that all members are made of thin stuff, and that the principal ones are nailed to the sheathing, over which building paper has been previously put to increase the warmth of the house. The lower course of the rebated siding, which forms the exterior covering of the wall, is beveled to fit snugly over the incline of the cap.

Fig. 2 shows how a water-table is formed when shingles are used as an outside finish. Two or three furring blocks are nailed to the bottom of the sheathing and the lowest courses of shingles are bent over them, with a curve sufficient to shed the water away from the foundation wall. Note that the first or lowest course is a triple one, although a double course, with joints properly broken, is the more common practice. Note also that the butts of the first layer project from 1½ to 2 in. over the bed mould, thus forming a drip which casts any water that is not thrown off by the curved shingles, away from the concrete foundation.

The water-table shown in Fig. 3 consists simply of a board nailed to a furring piece which makes it project beyond the face of the wall. This board is rabbeted at the top to provide a seat for the last course of clapboarding. The bottom is finished with a cavetto moulding, to conceal and protect the joint.

When a wall is covered with siding, it is customary to use corner boards at all the exterior angles. Corner boards are made up of two boards at each corner, set vertically, one 5 in. wide, the other 3⅞ in.; both being 1⅛ in. thick, and connected with a simple butt joint. See Figs. 3 and 6. It is inadvisable to mitre these boards at the corner, for then the joint would be apt to open with changing temperatures of the weather.

In elaborate houses, corner boards may be made to assume the shape of pilasters. They are then made much wider than if built of plain boards, from 10 to 18 in., depending upon the height of the building, and about 1¾ in. thick.

Corner boards are usually omitted in houses covered with shingles, for these may be easily and effectively lapped over each other, alternately.

Fig. 4 shows still another design of a water-table, applied to a frame wall finished with stucco. The construction of the frame for a cement exterior differs little from that of a clapboard or siding exterior. The sheathing is put on in the usual manner and covered with waterproof building paper, well lapped and tacked. Wooden strips about 1 in. thick and 2 in. wide, and set 12 in. on centers, are nailed vertically to the surface. On these, metal or wood lath is firmly fastened; and finally the plaster is applied. To prevent the feather edge in the stucco where it comes in contact with the water-table, the cap may be cut away at the upper end, similar to the rabbet shown in the same member in Fig. 3. The wide projection of the cap is obtained by spiking blocking pieces, roughly shaped to conform to the outline of the water-table, in front of each stud.

Before passing on to the next figure, we will say a word about "wind-filling." Although this subject was slightly touched upon in the December issue of the BUILDING AGE, its importance is so manifest that it will bear discussion to greater length. Should a fire start in the cellar, the spaces between the joists and studding would form a ready flue for the flames. If these openings, however, are filled in with brick or other incombustible material, there is less likelihood of a fire starting; and if it does start, it would be held in check and the chances of saving the building are much better. As explained in the note accompanying Fig. 4, this filling may be placed either on the sill between the studding, or on the foundation wall between the joists. If bricks are used, care should be taken to allow for shrinkage of the timbers. This is done by building the brickwork a little below the upper edge of the joist, as shown.

Contrasting the water-table shown in Fig. 5 with the one shown in Fig. 4, we find that the cap of the former is much smaller, the apron considerably wider and the projection comparatively slight. In that way the design of water-tables may be changed almost endlessly, with this condition however, that the top must always pitch forward, say about 45 deg., and the bottom must always extend below the bottom of the sill from 1 to 1½ in.

In all well constructed houses flashing is used to cover the top of the water-table where it joins the wall. This flashing may be of tin, lead, zinc or copper, extending up behind the clapboards or siding, and covering the top of the water-table about 1½ in. Not infrequently the entire top is covered, as shown in the isometric drawing, Fig. 6.

The terms "clapboards" and "siding" have been used rather loosely in connection with the foregoing description of the design and construction of water-tables. Nor is their difference quite generally understood. We shall, therefore, now define them with greater discrimination.

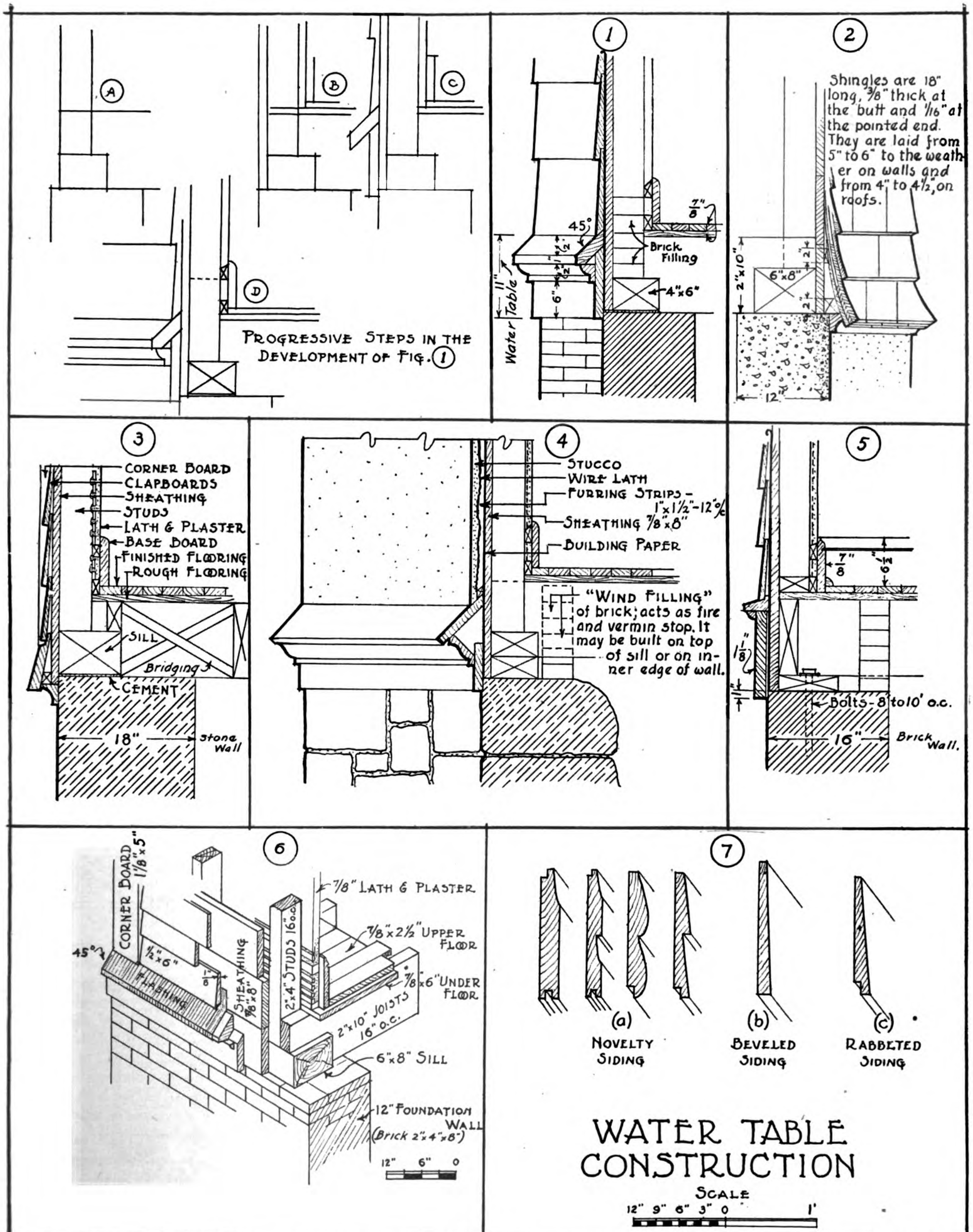
Siding is the general name given to that exterior covering of a frame wall which is made up of boards laid horizontally and nailed to the sheathing. Clapboards are a specific form of siding.

There are several kinds of siding (see Fig. 7):—(a) Drop or Novelty Siding has a uniform thickness of about seven-eighths of an inch and a width of 5½ in. It is usually ornamented. (b) Beveled Siding is from 4 to 6 in. wide, from 10 to 16 ft. long and ⅝ in. thick at one end and ¼ in. at the other. One disadvantage in the use of beveled siding is the fact that when the nails are driven through the lower end of one piece they pass through the upper end of the piece below and so increase the possibility of both pieces splitting. This disadvantage is overcome by cutting a rebate at the butt, on the inside face. Siding thus rebated is called (c) Rabbeted, or Shiplap, Beveled Siding.

Clapboards are a form of beveled siding differing from the latter in the following respects: They are generally quarter sawed; they are thinner, being about ½ in. thick at the butt or bottom edge and ⅛ in. thick at the upper edge;

they are shorter, for they come in 4 ft. lengths; they are 6 in. wide. They originated and are used almost exclusively in the New England States.

The sketches shown in the rectangle in the upper left-hand corner delineate the different stages in drawing any water-table. The foundation wall is represented first, then come the sill, stud, sheathing, etc., the draftsman following the same procedure that the builder does in the erection of the water-table.



Department of
# Masonry Construction
CONCRETE, BRICK, ETC.
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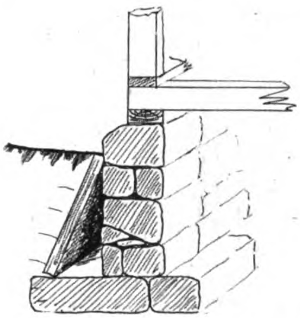


Fig. 1—Where space is limited, this is a good way of forming a variety of area

# Making the Cellar Waterproof

## An English Builder Describes Some Interesting Ways Used in His Country to Secure Dry Cellars.

*By John Y. Dunlop*

The dampness of basement walls will probably be considerably reduced by the drainage of the subsoil, but one of the greatest improvements is the addition of damp-proof courses with special construction.

Subsoil drains are seldom found under or around old houses, or, if they have been laid, they have probably collapsed or have become choked with silt. In damp situations these houses will often be made drier by laying new deep subsoil drains round the house without disturbing the fabric. In place of a subsoil drain, often a deep narrow trench is cut round the house and filled in at the bottom with field stones, smaller stones being filled nearer the top, until the last layer is the same as the surrounding soil. This is called a rumbling drain in Britain, and is a very effective, although rough, method of often clearing a basement of dampness.

With the walls of a new house we want to treat this subject in an entirely different way.

Damp may not only rise through the floor of a house, but may find an en-

Fig. 5—Carrying a course of asphalt vertically down in the wall

trance through the basement walls. Hence it is necessary to treat these walls in some special way. This is especially so in a house which is built on the lower part of a hillside with nothing to protect its back wall from damp.

Undoubtedly an open area along the back wall of such a house would be a good way of keeping back this draining moisture from the top of the hill. The bottom of the area could be formed with concrete with tarred sand or asphalt on the ground layer. Where space for an

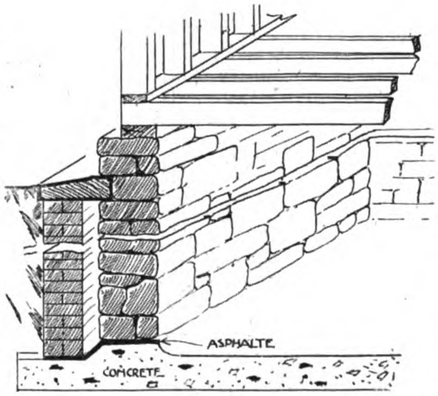



Fig. 2—A brick wall can be built outside of the foundation

area cannot be afforded, an air drain could be formed with a stopping-stone slab, as shown in Fig. 1.

Of course, a dry area can best be constructed with an additional thin wall of brick or stone, the area being covered at the surface of the ground with a weathered stone or slab of concrete, which must be jointed and pointed with Portland cement so as to prevent the ingress of water.

A dry area of this type is shown in Fig. 2, in which an asphalt damp course is built into the lower point. The outer wall is of brick, and the size of the area is 6 in., with the floor sloping to the outer wall.

Another form of dry area is shown in Fig. 3, in which the minimum size of the space is 14 in. The outer walls in this case are turned over in the form of a half arch to cover the air space.

Brick work of this kind will need to be built on centering. Therefore, the width of area must be sufficient when the centering has to be slackened to allow a boy in to pass the centering timbers out. The asphalt is shown on the outside wall. Work of this kind is generally done with plate of asphalt. These are made by the Lunner Asphalt Paving Co., and are laid in position as the work proceeds. The layer inside the basement walls consists of artificial asphalt (tarred sand) laid in a ¾-in. thickness and rolled when the wood joists were laid on the top.

Closely akin to the dry area is the hollow wall, shown in Fig. 4. In this the air space or cavity is formed within the main wall itself and not outside it, as in the previous case. The two thicknesses of the wall are tied together at intervals with suitable ties, which prevent the passage of moisture from the outer to the inner thickness.

Both the hollow walls and the dry area are quite satisfactory methods of construction where there is a desire to have the basement free from damp. In each there is the cavity which prevents the

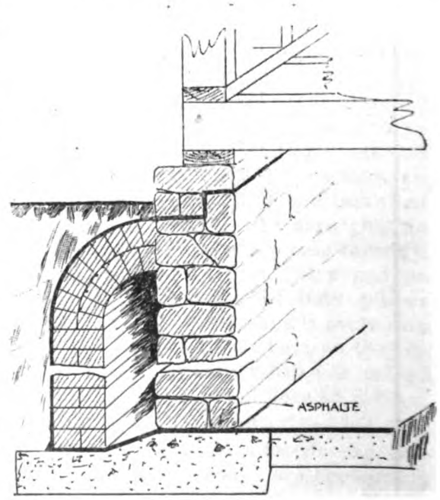



Fig. 3—A type of wall construction where conditions are severe

passage of damp and which impedes the entrance of ground air and water.

A very good method of waterproofing a basement wall, and where a solid wall is necessary, is that shown in Fig. 5. Here a half-inch cavity was formed in the body of the wall, and the horizontal joints were bedded bare next the cavity, and the work, as it was raised, run with molten asphalt in every third course. Great care has to be taken that the cavity is kept clear of mortar. This the writer finds can be best done by building in the cavity a ½-inch board equal to the depth of three and a half courses of brickwork. When the cavity is to be run the board is lifted out.

For convenience in filling the cavity the outer skin of the brickwork is carried one course higher than the other and a piece of sheet iron stopping down toward the cavity is laid on the inner part of the wall. This allows the asphalt to run easily into the space.

For waterproofing walls in this way some kind of artificial asphalt is often recommended, but I have always found that the best results are obtained by using Hygeian and Tenax composition. The difficulty with these artificial stuffs made by rule of thumb by the builder or one of his laborers is that they are far from reliable unless very careful supervision is exercised.

One disadvantage of this method of construction is that the outer portion of the wall is not protected against damp. In order that this portion may be as small as possible, the outer skin of the wall should only be 4½ in. thick. The only way of making the whole of the wall in wet ground quite dry is to spread a waterproof coat on the outside of the wall.

For cottages and domestic buildings where economy is of first consideration, a thick mixture of boiled pitch and oil may be applied to the wall with a brush, but this method must be carefully done and a good even coat given.

The best method is to spread on the wall a layer of natural asphalt carefully connected with the horizontal damp course as shown in Fig. 6 and Fig. 7. In connecting horizontal and vertical

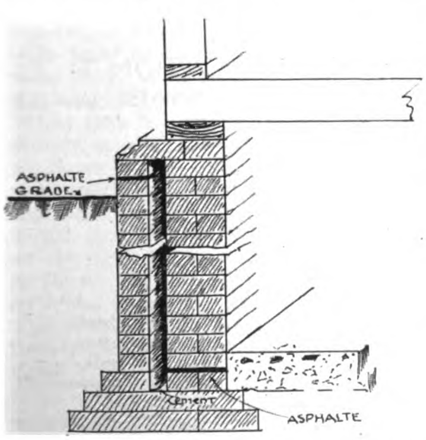



Fig. 4—A double wall provides an air space

damp-proof courses the addition of a triangular fillet does much to strengthen the joint. The top of the vertical damp course may be finished by tucking it into a joint above the ground and then continuing the horizontal asphalt along.

Before laying a vertical damp course of natural asphalt, the wall should be dried by coke fires and raked and brushed out. The joints are then filled with the asphalt when the proper layer about ½ in. thick is laid on the wall.

Waterproofing of walls in this way, which is shown in Fig. 6, is a very suitable method for a small factory with a brick basement which might be required in a wet situation.

When the basement or cellar is required to extend below the floor level of an adjacent river or ground water, it is necessary to cover the ground layers and walls with a sheet of asphalt free from flaws. In exceptional cases, where the pressure is great, the concrete layer may take the form of a concave surface

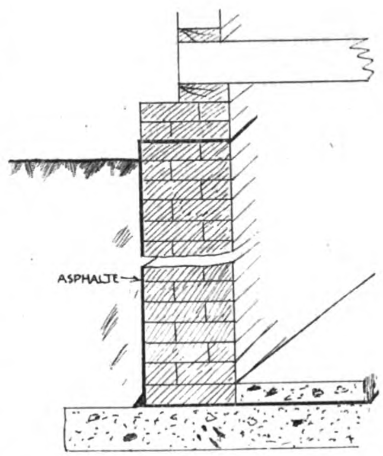



Fig. 6—A layer of asphalt can be mopped outside the wall and through it as shown

on which the asphalt would be laid. An inverted arch of one ring would then be laid and finished above with asphalt.

Of course, only in exceptional cases should basements be constructed below the level of the ground water, as it is more conducive to health to raise the building well out of the ground than to sink it to such a depth.

The material used in the walls of basements, especially in those walls which are in actual contact with the ground, are often of the commonest kind. "Anything is good enough to be buried," is the builder's thought.

Certainly where asphalt layers are used there is not so great a necessity for impervious and non-absorbing materials, but as a general rule it may be said that materials exposed to damp, as in basement walls should be hard and durable.

With reference to the ground layers, concrete for this purpose need not be so strong as that for foundations, but it must be more solid and should contain more sand in proportion to gravel or broken material.

When the whole of the basement floor is covered over with solid material, the movement of the ground air need not be

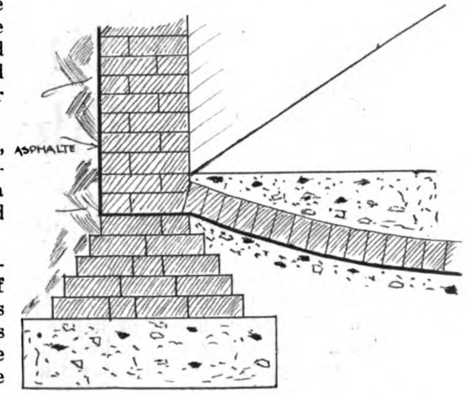



Fig. 7—Construction where there is considerable water pressure on the cellar floor.

troubled with. But when there is no floor in the basement the ground air will find its way into the room and is dangerous in more ways than one. It often contains a relatively large proportion of carbonic acid and in some cases ammonium sulphide.

A warm house tends to draw the cool damp ground air into it, especially when the external temperature is low. Hence the necessity of covering the basement of a house with a solid material which shall be impervious alike to moisture and gases.

## Drip for Concrete Porch Floor

### *By Vernon Redding, Architect*

In putting down a concrete porch floor, overlapping a brick wall, a good drip should be put in to keep the wall under this clean when the work is done, as well as to keep it clean afterwards, as these walls always get badly discolored


A strip of galvanized iron placed in the concrete so as to provide a drip

in time. I use a galvanized iron strip for this, which is easily made. I used to try to cast in a wood strip, and often broke the edge off in trying to take it out. The iron strip remains in, and if in time it corrodes away entirely it will have formed the drip in the cement and not weakened the edge. The galvanized iron, however, should last a great many years.—*Concrete.*

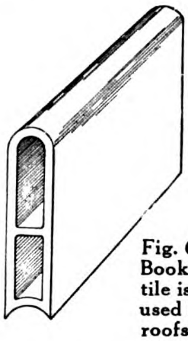


Fig. 63—Book tile is used for roofs

# How to Build and Fireproof with Hollow Tile—IX

Fig. 64—Heavy-weight book tile made on the tongue and groove principle

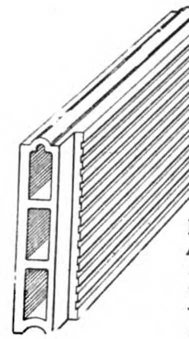


Fig. 65—A special shape tile made with grooved surfaces

## Construction of Floors, Roofs and Bulkheads

*By J. J. Cosgrove*

The subject of floors, roofs and bulkheads is here treated only so far as it applies to ordinary buildings of hollow-tile or brick construction having bearing walls of masonry. The use of hollow tile in connection with buildings of steel skeleton construction is so different, and

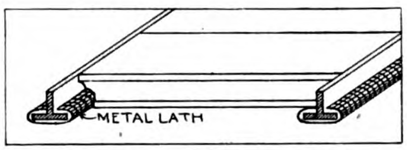



Fig. 66—When underside is to be plastered, the book tile are rabbeted so that the bottom of the blocks will be below the flanges. Metal lath covers the lower end of the "T" so as to provide a clinch for the plaster

of so much importance in building practice that it will be considered separately.

For the roofs of buildings special tile blocks, known as "book tile," are made. The reason for this name will be seen by referring to Fig. 63. This shows a standard or light-weight block used for light construction where it is not necessary to sustain heavy loads. A special shape and heavy weight block is shown in Fig. 64. This block, it will be observed, is made on the well-known tongue-and-groove principle, so that, as in the case of the standard weight tile, one block will interlock with the two adjoining blocks.

Book tile are intended primarily for the construction of pitch roofs, also for covering the flat roofs of pent-houses, tank houses or bulkheads, and may be used for the main flat roofs of buildings when the live load to be carried will be light. When providing for future increase in height of a building a floor of flat arches is usually set, the roof graded above the flat arch and supported on T iron or dwarf walls, and book tile used for the roof covering. Book tile are made especially for roofs to be covered with concrete, tar and felt, or any composition roofing material. They are made of uniformly hard burned material either 3 or 4 in. thick, and of a length depending very much on the weight to be carried. Three inches is the standard thickness for roofing tile, and 4 in. a special thickness.

For pitch roofs where roofing tile are to be used, or any other covering material which must be nailed to the supports, special tile of porous material are required. The roofing tile can then be nailed to the book tile as easily as they could to roof boards. Book tile are made both with smooth surfaces and with grooved surfaces, and the kind wanted should be stated when ordering. The grooved surface tile are for use when they are to be cemented or plastered. A roof of book tile which is to be cemented on top and plastered underneath would want book tile grooved on both sides.

Book tile may be used simply as roof tile; as combination roof and ceiling tile, or as ceiling tile when a light ceiling is to be constructed under the roof, or a false ceiling put in to mask plumbing pipes. Ceiling book tile, however, are made thinner than book tile for roofs. They may be had as thin as 2 in., or of the regular thickness of roof tile, 3 and 4 in.; also they may be had in dense, porous and semi-porous materials.

The standard sizes and weights of book tile, both for ceiling and roof construction, can be found in the following table:

**Standard Sizes and Weights of Book Tile**

| | |
|---|---|
| **Roof Tile Inches** | |
| 3 x 12 x 18 | 20 lb. per sq. ft. |
| 3 x 12 x 20 | 20 lb. per sq. ft. |
| 3 x 12 x 24 | 20 lb. per sq. ft. |
| 4 x 12 x 24 | 24 lb. per sq. ft. |
| **Ceiling Tile, Inches** | |
| 3 x 12 x 16 | 20 lb. per sq. ft. |
| 3 x 12 x 18 | 20 lb. per sq. ft. |
| 3 x 12 x 20 | 20 lb. per sq. ft. |
| 3 x 12 x 24 | 20 lb. per sq. ft. |
| **Ceiling Tile, Inches** | |
| 2 x 12 x 16 | 12 lb. per sq. ft. |
| 2 x 12 x 18 | 12 lb. per sq. ft. |
| 2 x 12 x 20 | 12 lb. per sq. ft. |

When book tile are to be used for both roof and ceiling the ends of the tile are rabbeted, as shown in Fig. 65, so the under surface of the tile will extend below the under side of the flange of the T beams. Specifications for the steel framework for the roof of buildings where book tile are to be used should call for the spacings of the T beams to be 1 in. further apart than the length of tile to be used. For instance, for tile 18

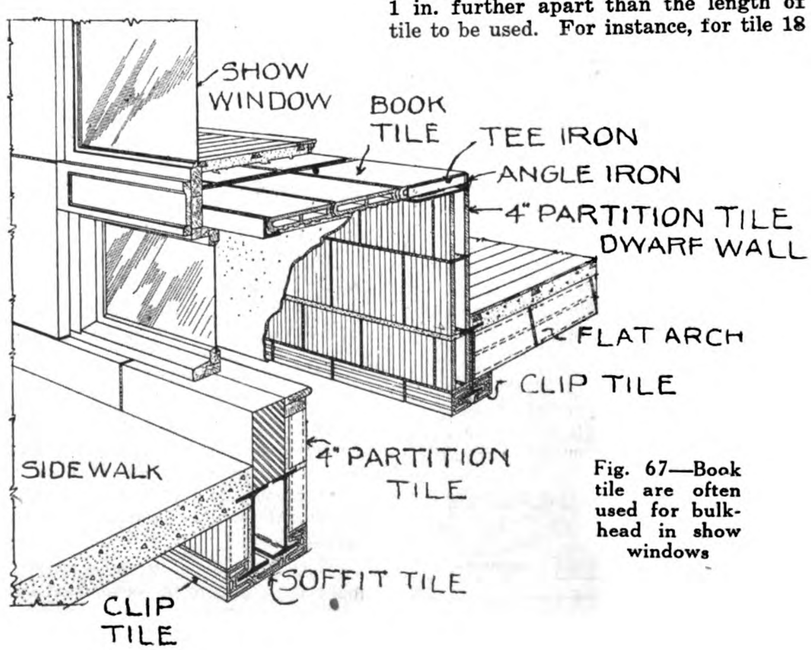



Fig. 67—Book tile are often used for bulkhead in show windows

in. long the T beams should be spaced 19 in. on centers.

When the book tile are not to be plastered on the under side, or the flanges of the T beams protected, the book tile may be cut square at their ends and be laid on the flanges of the T beams. When the under side is to be plastered, the book tile are rabbeted so the bottom of the blocks will be at a lower level than the flanges, as shown in Fig. 66. If the flange of the T is narrow the plaster will cover it without trouble. If, however, the flange is of considerable width, it should be wrapped with metal lath before the tile are set. A practical, every-day, use for book tile will be found in the typical bulkhead construction for a show window illustrated in Fig. 67. It is important that the first or ground floor of store buildings be of fireproof construction, and the building laws of most cities now require that the first floor of all buildings over four stories in height be fireproof. Fire is more liable to start in the cellar or basement of a building where the furnace is located, and once started finds plenty of rubbish to feed upon. It is a wise provision therefore, and one which has protected many merchants from being burned out.

The construction is simple. A four inch dwarf wall of hollow tile is supported by an I beam. This wall in turn supports an angle iron from which T irons are sprung to support the book tile. The surface of the tile can then be plastered, cemented, or given any treatment desired.

It is often necessary to raise toilet room floors in order to provide space for the roughing-in pipes of the plumbers. When that is necessary it can be done, simply, speedily, easily and economically, as shown in Fig. 68. Tee irons or metal supports of any kind are not necessary for this form of construction. Ordinary 4-inch partition tile are laid on the floor at the right distances apart to form supports for the book tile, and the tile are extended across the room to form beams. The book tile are then laid on these hollow-tile supports and the cement or tile floor laid thereon.

In case it is found more advantageous to conceal the pipes with a hanging ceiling, doing the roughing-in of the plumber's pipes below the floor, 2-inch ceiling block book tile can be used for the purpose, supporting the tile on a framework of T irons.

Hollow-tile floors for buildings having hollow-tile bearing walls are becoming more numerous each year. They are light, inexpensive, fireproof, comply with the building and fire laws, and can be laid with common labor. One view of such a floor construction can be seen in Fig. 69. In this type of floor the reinforcement is in the form of steel rods and expanded metal or wire lath, embedded in the layer of concrete on which the hollow-tile blocks rest. The tile are set with cement mortar joints and floors of this construction have been made with spans as great as 25 feet.

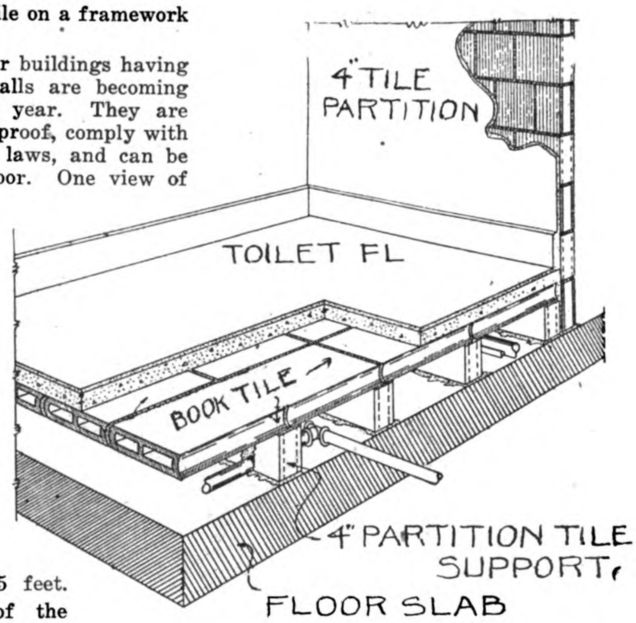



Fig. 68—A toilet floor raised with book tile so as to provide room for roughing in

The construction of the wall where the floor rests upon it is worth studying closely. The top row of wall tile on which the floor is to rest is covered with a course of solid slabs. On top of these slabs the floor is rested, extending to within about 3½ inches of the outside surface of the wall. Short 3-inch facing tile are then laid to close the end cells of the floor blocks and carry the outer portion of the wall to the level of the top of the floor. The wall is then continued upward, the first tier of blocks resting partially on the 3-inch facing tile and partly on the floor blocks. Another form of floor construction and the way the floor is laid is shown in Fig. 70. This might be called the beam and block type, for in it a concrete beam alternates with a line of hollow-tile blocks. In laying this form of floor, 2-inch planks are spaced 16 inches apart or rather on centers, and the hollow tile laid end-to-end on these planks, spanning them as indicated in the illustration. The steel reinforcing rods are then put in place between the rows of hollow-tile blocks, and supported a couple of inches from the planks. The floor is then ready to pour.

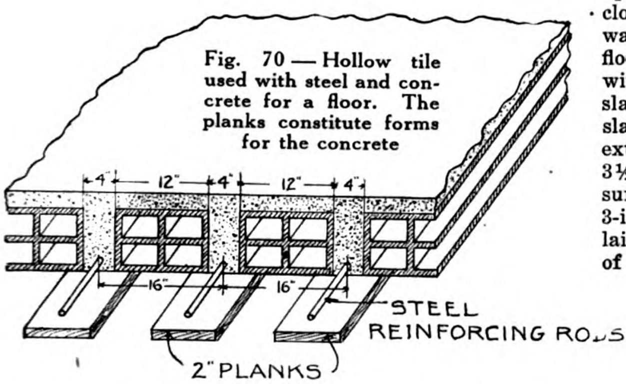



Fig. 70 — Hollow tile used with steel and concrete for a floor. The planks constitute forms for the concrete

Floors of this type can be made to cover any span of 25 feet or less, and to support any weight of load within reason. The weight the floor must sustain per square foot of surface determines the amount of concrete and the weight of steel that will be used. It might be well to point out here that the steel reinforcing rods are bent upward near the wall supports so they will be bedded near the top portion of the concrete near the bearings.

Whether the floor is designed for heavy service or for light loads and work will determine, too, whether or not there shall be a layer of concrete above the tile blocks, and what the thickness of this layer shall be. The floors can be laid with no concrete above the blocks. On the other hand, they are sometimes called for with cement both above, below and at the sides of the hollow-tile blocks.

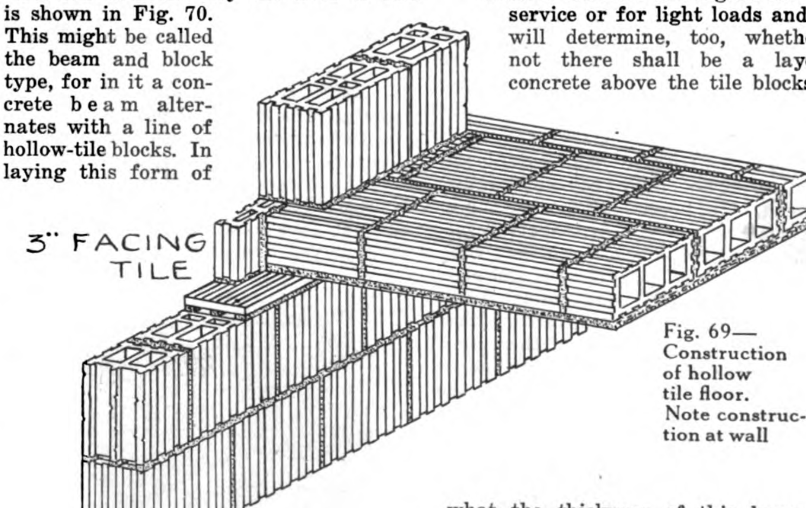
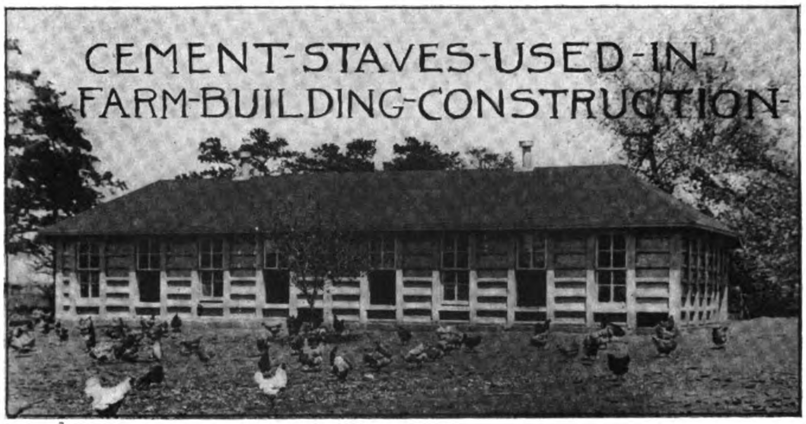



Fig. 69—Construction of hollow tile floor. Note construction at wall

When the blocks are to be bedded in a layer of concrete, however, whether plain or reinforced, a continuous flooring must be provided on which it will rest. It might be well to state here to guard against misunderstanding, that if there was a layer of concrete below the hollow tile blocks it would be reinforced with steel mesh or with steel rods, otherwise it would be useless. This will be explained more fully when we take up the reinforcement of concrete with steel. It will be sufficient to state here that steel is used to provide tensile strength, and to serve its purpose must be used where the concrete will be subjected to tensile stress, or a tendency to pull it apart. In this case it would be in the concrete beneath the blocks, and the concrete would be useless there without the steel.

*(To be continued)*



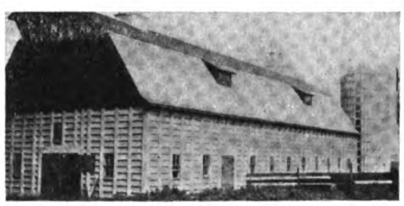

# A New Type of Construction That Is Gaining Headway in the Central States

*By W. F. Kaiser*

Rural contractors everywhere will be interested in the new type of concrete construction which is fast gaining headway in the central states. This new method of construction is particularly suited to building farm structures. The concrete units used are known as cement staves and each are about 30 inches long, 10 to 12 in. wide and 2½ in. thick. At present there are several different types of cement staves being manufactured. They differ from one another principally in the way they join together. The simplest stave and the first one to be used extensively is rectangular in shape, the top and bottom edges being perfectly flat while one side has a convex edge and the other a concave one. Later types of staves have incorporated some interlocking feature in the top and bottom edges also.

The first structure to be built of cement staves was a circular stock watering tank. Although built more than a dozen years ago it is still rendering satisfactory service. From a watering tank to a silo was only a short step and soon cement stave silos were being built. These have proven so satisfactory that to-day there are thousands of these feed saving structures on our American farms. If the present rate of progress of the cement stave silo continues, it will be only a short time until every part of the United States where meat or milk are produced will be represented with its fair proportion of these structures.

Many factors have contributed to the success of the cement stave silo. Two are outstanding and deserve special mention. In the first place, the cement stave business is a good proposition for the contractor. The factory for making the staves does not require a very large outlay in the way of machinery or buildings. By installing a simple system for steam curing the staves, the plant can be kept in operation throughout the winter months, thus making it possible to retain the factory employees the year around. A cement stave silo is quickly erected and very little experience is necessary to do a first class job. A crew of three men can put up a hundred ton silo in two or three days. No other type of masonry silo can be built in so short a time. It is not uncommon for a cement stave silo concern operating on a small capital to manufacture and erect a hundred silos in a season. The Michigan Silo Co., Kalamazoo, Mich., built 481 silos during the summer of 1918. In the same length of time, The Minnesota Cement Construction Co., Fergus Falls, Minn., erected 250 silos in addition to building five large cement stave barns.

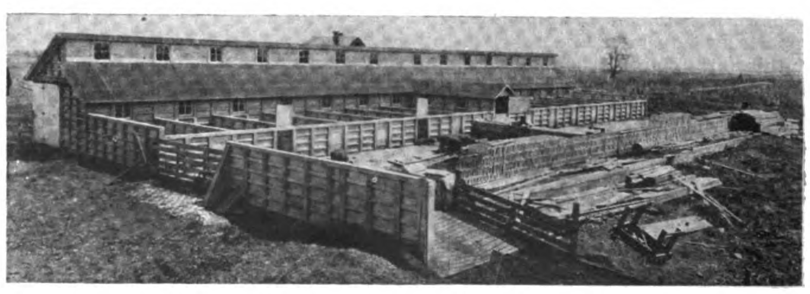


Barn and silo built of cement staves

In the second place, cement staves make good silos. They fulfill all the requirements of air-tightness and water-tightness besides having the advantages of being fireproof rot-proof, storm-proof and repair-proof. The fact that cement stave silos can be built to compete in price with wood silos and yet embody most of the advantages of a permanent masonry silo, makes them such a good business proposiiton for the contractor.

Because the cement stave silo builder is such a wide-awake individual he was not satisfied to restrict his building season to the months when silos are usually erected. In looking for fields to extend his operations, he hit upon the plan of lengthening the building season by using the cement stave units in constructing barns, hog houses, poultry houses, garages and in fact every kind of farm building.

To the original inventor of the cement stave unit S. T. Playford, Elgin, Ill., must go the greatest credit of extending the stave to rectangular farm building construction. The cement stave poultry house and hog house which illustrate this article were designed and built under his direction. The stave used in these structures is of the rib type and represents the latest development in these units. It has practically the same dimensions as other types of staves, the main difference being that it has a rib along one edge which is reinforced with a quarter inch steel rod. Also, the stave is made using a wet mix concrete, whereas the majority of other staves are made of semi-wet concrete, or what is sometimes called the dry mix process.



Cement stave hoghouse with concrete feeding floor and exercising fences; fences are built of cement staves

When used in constructing rectangular buildings, the cement staves are cast in reinforced concrete pilasters; about one inch of each end of the stave embedded in the poured concrete. The staves are placed when the forms for the pilasters are set up. The size of the pilasters will vary according to the length and height of the wall in which they occur and also in accordance with their spacing and the load to be carried. In small structures, they are usually 6 by 8 inches in cross section, while in a barn they may be as large as a foot square.

A description of the cement stave barn shown in the illustration will help to explain some of the construction details of building with cement staves. This barn is 36 ft. wide, 120 ft. long and 18 ft. high to the plate. It is built upon a concrete foundation which extends to the height of the window sills.

The staves used in this barn are 30 in. long, 10 in. wide and 2½ in. thick. Pilasters 6 by 8 in. in section occur every two feet ten inches or at the end of every stave with the exception of the double pilasters between the window groups, there being but a half stave length between them. The double pilasters are larger than the others, each being 6 by 12 in. The space in between them is utilized for ventilation. Two thicknesses of cement staves with a 6-in. air space between form a fresh air intake flue. The fresh air enters the flue through an opening at the height of the window sills and is discharged into the stable through a register just below the ceiling. Over the windows is a reinforced concrete belt course which supports the hay loft floor joists. A second concrete belt course was placed at the plate level. The gambrel roof is supported by plank frame trusses spaced 10 ft. apart and which rest on the wall where the double pilasters occur.

The cement stave poultry house and hog house shown herewith are of similar construction and have been in use several years and have given perfect satisfaction. The tenant who operates the farm on which these structures are located is very much pleased with them. He tells an interesting story about the poultry house which reflects great intelligence in his poultry flock. According to his tale, the chickens deserted the old wooden structure and took up their home in the stave poultry house before it was completed and refused to be driven out. This poultry house has been in service three years and the tenant reports that he has not lost a single fowl by disease which formerly carried away most of his flock annually. One glimpse at the healthy flock of chickens in front of the poultry house ought to convince the most skeptical that their quarters are both sanitary and comfortable.

# Short Cut for Estimating Materials in Concrete

*By Ross McLane*

Every concrete job deserves to be planned in a workmanlike manner, with a reliable estimate of the quantities of materials required, but this is not as easy as it should be, for the common units of measure—cubic yards, barrels and tons—bear no likeness to each other.

Dealers use these terms without thinking how inappropriate they are or how much confusion and inconvenience they cause for the buyer, but, knowing that their cement is never packed in barrels but in sacks holding one cubic foot each, and that there is no likeness whatever between barrels and cubic yards, they should see the advantage of making all transactions in cubic feet instead.

Even though it has been customary to estimate in cubic yards on big contracts, the distinct advantage of being able to express cement, sand and gravel in the same terms would seem to compel the use of cubic feet, and there is no excuse at all for cubic yards on a small job. The concrete may be mixed by hand or in a mixer, but in either case the materials will be measured in a bottomless box built to hold a certain volume in cubic feet, and this term can be employed without confusion from the time the first estimate is made until the last batch of concrete is deposited in the forms.

Before the required amount of any of the materials can be ascertained, the number of cubic feet of concrete in the finished structure must be found by multiplying length, width and thickness—or

ESTIMATING TABLE

| Proportions of Materials (or Cubic Feet) | | | Cubic Feet of Concrete Produced | Cubic Feet of Materials Required for One Cubic Foot of Concrete | | |
|---|---|---|---|---|---|---|
| Cement | Sand | Gravel | | Cement | Sand | Gravel |
| 1 | 1½ | 0 | 1.75 | .57 | .86 | ... |
| 1 | 2 | 0 | 2.1 | .48 | .96 | ... |
| 1 | 3 | 0 | 2.8 | .36 | 1.08 | ... |
| 1 | 1½ | 3 | 3.5 | .29 | .43 | .87 |
| 1 | 2 | 3 | 3.9 | .25 | .50 | .75 |
| 1 | 2 | 4 | 4.5 | .22 | .44 | .88 |
| 1 | 2½ | 5 | 5.4 | .19 | .47 | .90 |
| 1 | 3 | 5 | 5.8 | .17 | .51 | .85 |
| 1 | 3 | 6 | 6.2 | .16 | .48 | .96 |

depth—together, doing it carefully, taking into consideration all the variations in the dimensions of the work.

For example, consider a walk 82 ft. long, 3 ft. wide, and 5 in. thick, with 246 square feet of surface, and this multiplied by the thickness in feet to give the number of cubic feet of concrete in the completed walk. Doing it all in one operation: $\frac{82 \times 3 \times 5}{12} = 102\frac{1}{2}$ cubic feet.

The accompanying table gives the figures with which to multiply this quantity to find the amount of each material, in any proportions. The first three mixtures are for cement mortar, grout, plaster or stucco work, in which only sand and cement are used.

Suppose the concrete is to be of the proportions 1:2:4; one part cement, two parts sand, and four parts gravel or crushed stone. The first advantage in having all the materials expressed in the same way is here brought out by stating the proportions in cubic feet, one cubic foot (one sack) of cement, two cubic feet of sand, and four cubic feet of gravel or crushed stone; for these proportions, in the first three columns of the table, the fourth column gives the amount of concrete which will be produced by these quantities, or 4.5 cubic feet.

To find the amount of cement required multiply by .22, found in the fifth column; for sand multiply by .44, in the sixth column; and for gravel multiply by .88, in the last column. This is the method usually employed and it cannot be shortened if the common terms—cubic yards and barrels—are used. Only one multiplication by a decimal is necessary, however, when all the quantities are in cubic feet, for the last three columns run just as the proportions do and when the amount of cement is determined the amounts of sand and gravel can be calculated mentally. In this case the amount of cement will be .22 x 102.5 = 25 sacks, or cubic feet; the amount of sand will be twice this, or 50 cubic feet; and the amount of gravel will be four times the amount of cement, or 100 cubic feet. All these quantities should be increased by ten per cent to allow for the waste that cannot be prevented in handling and mixing.

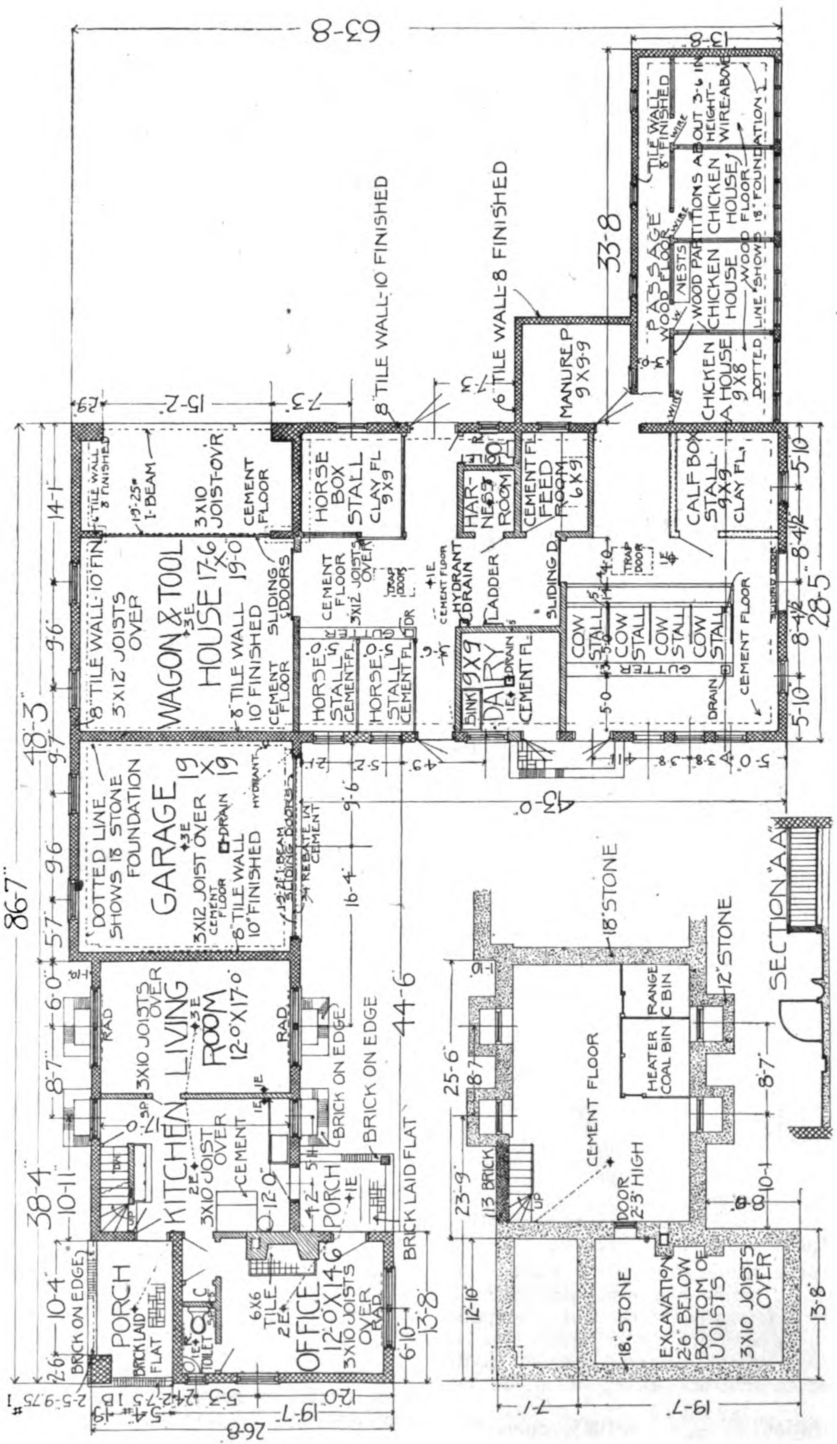
For comparison with any other method of measuring, 4 sacks of cement are counted to a barrel, 27 cubic feet of sand or gravel to a cubic yard, and 19 to 22 cubic feet of sand or gravel to a ton of 2000 pounds. If it is necessary to estimate the cost of hauling, a sack of cement weighs 94 pounds and a barrel 376 pounds; a cubic yard of sand or gravel will vary from 2400 to 2900 pounds.

Sometimes on walk and floor construction when the local sand or stone is too poor to make a good wearing surface, it is wise to get some more suitable material brought from a distance for a wearing surface about one inch thick. Then two estimates are necessary, one for the base and another for the top course.

No practical purpose is served by resorting to unrelated and confusing terms for concrete, which is steadily coming into greater favor for permanent and sanitary structures, and its popularity would increase more rapidly if it were not so difficult to make the estimate and feel confident that it is accurate and practical. This difficulty is removed at once by disregarding the units usually employed and keeping all the quantities in cubic feet.

# The Department Store Idea Applied to Farm Buildings

## Farm House, Garage, Wagon and Tool House, Horse Barn, Dairy, Dairy Barn, and Chicken House Are All Part of the One Structure




Floor plan of the farm group. Scale, 1/16 in. = 1 ft. Walls are of hollow tile. The basement plan is shown at the lower left hand corner of the cut.

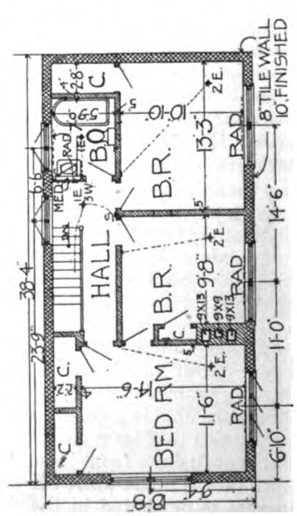
Just as the department store has found it economical to combine several stores under one roof, so are other business classes finding that it cuts construction costs and increases efficiency to have buildings serving the same general purpose all connected together.

This has been well done in the farm group illustrated. All the main buildings are attached, thus obtaining decided economy in construction as well as a facilitating of the farm work.

The farmhouse is separated from the main farm building by a garage. This helps to prevent odors from cattle and other sources reaching the house—thus tending to remove the usual objection advanced against farm buildings of this type.

The dairy, it will be noted, is entered only from the outside, thus tending to avoid the tracking in of dirt from the stable.

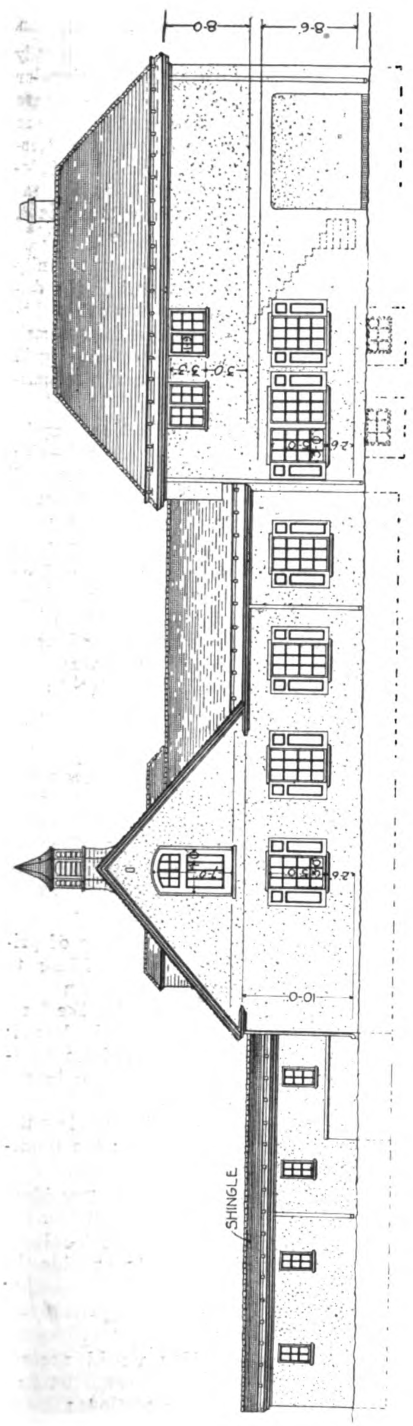
The farmhouse itself is convenient in plan, possessing several features of unusual occurrence. Entrance into the

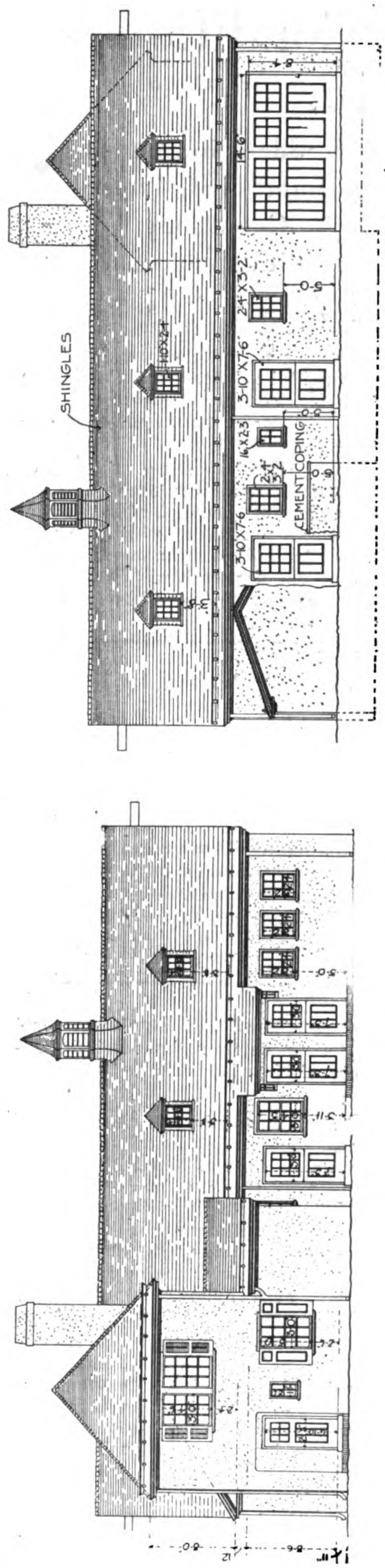


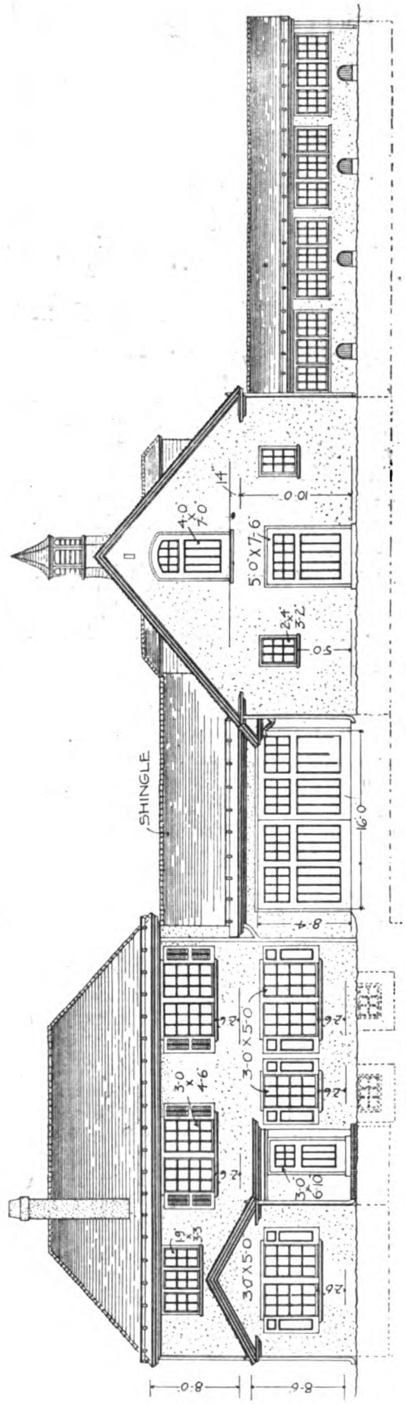

Second floor plan of the farmhouse. Scale, 1/16 in. = 1 ft.

*Supplement to Building Age, January, 1919*

**Farm Group for Mrs. Edwin N. Benson, at Chestnut Hill, Pa. Druckenmiller & Williams, Architects**




Front, side and rear elevations of the farm group. Scale 1/16" = 1 ft.

house is had from a porch directly into either the office or the kitchen. One must enter the living room through the kitchen, thus making the former unusually quiet. This feature is advantageous where privacy is desired in the living room, making it more the center of a family circle. Furthermore, in a farmhouse, the kitchen is much used, and visitors usually come there first.

The office, being entered directly from the porch, affords privacy to the rest of the house. It would generally be used for all usual visitors. It is shut off from the kitchen by a door.

The stairway to the second story leads from the kitchen. As it is shut off by a door, cooking odors are not apt to rise to the second story. It is interesting to note how the whole plan has been built around the kitchen—the workshop of the farmhouse.

The second story contains three bedrooms and a bathroom.

This farm group is located at Chestnut Hill, Pa., and was built for Mrs. Edwin N. Benson in accordance with plans prepared by Druckenmiller & Williams, architects, Land Title Building, Philadelphia, Pa.

# Building Trade Conditions in Britain

## English Government Demobilizing Builders in Advance of Rest of Army—Necessity for Large Imports of Materials —Great Activity Is Expected—Conditions As Seen by an English Builder

*By John Y. Dunlop*

One of the first tasks of the new British government is to build hundreds of thousands of dwellings which will meet a primary need and at the same time employ men who have returned from the army in the building and allied trades.

Already the process has begun by a Government inquiry into the brickmaking industry.

They are very anxious to find out all about this industry, where the right kind of clay is to be found and how many men thoroughly understand the trade and what they are doing at the present time.

They had to discover how many bricks could be made in a year and how many will be required for the needs of which we are all so conscious.

They had to consider the possibility that the bricks might be directed from really urgent work to the service of those who could afford to pay heavily for luxuries.

Already they have taken steps to secure the brickmaker's release from the army so that he may return to his occupation without delay and the Government is now ready to deal with any attempt to use the bricks in any way contrary to the urgent needs of the nation.

Six thousand million bricks are wanted for the Government housing scheme and as apparently they have all to be made yet and as the men to make them have yet to be demobilized, national housing is likely to suffer considerable delay unless the newer materials of construction are extensively used.

These have been briefly referred to by the Government when they give those staggering figures with respect to bricks or they acknowledged that in any estimate which may be made there are a great many variable factors, such as the consideration of alternate methods of construction.

Clearly therefore the manufacturers of substitute building materials are now to have an opportunity to bring them before the notice of the Government control department, for they have become indispensable.

For the first time, if accepted, they will be free from local building by-laws and they will get a fair chance against the older building materials which were not always preferred on their merits but mainly used through habit and tradition.

As brickmaking is a comparatively slow process and a good deal depends on the vagaries of the weather, cement blocks which are independent of those things might be introduced. With this material included the Government's stupendous figures for bricks may be considerably reduced.

Following hard upon the signing of the armistice there has been in many directions a great renewal of activity in the housing movement of which the general trend is indicated in the following important circular entitled "Housing of the Working Classes," issued by the Local Government Board to Town Councils and District Councils throughout Britain, under date of Nov. 14, 1918.

**Building conditions in Europe will have their influence upon prices here. If the demand over there is anywhere near what it is expected to be, materials here will reflect that activity in the shape of higher costs.**

**Therefore this article telling how the English Government is preparing for a big building boom will prove of interest to every builder and dealer.**

"Sir:

"I am directed by the President of the Local Government Board to refer to their circular letter of March 18 last and to state that the question of housing apart from its vital importance in relation to public health must not be regarded as of extreme urgency in view of the cessation of hostilities and the problems which will arise in connection with demobilization and the setting free of labor and material for civil purposes.

"It is therefore essential that immediate steps should be taken to submit all housing schemes to the Board at the earliest possible date, and that every endeavor should be made to push on with their preparation.

"If, as is no doubt the case in many instances, the local authorities are suffering from a shortage of staff owing to enlistment, they should at once forward a list of those officers whose prompt return is necessary for effectually expediting the schemes with their full name, rank, regiment and official number, and the post which each holds under the Council.

"The President will then do his best to secure the early return of those men.

"The local authorities are already aware, from the terms of the circular letter above referred to, of the nature and the extent of the financial assistance offered by the Government, and the President desires to remind them of the statement made with the authority of the Government that the discretion vested in them is to be exercised generously.

"He desires to take this opportunity of stating that he will certainly be disposed to exercise that discretion liberally in the case of those local authorities who recognize the national gain which will accrue from an early submission of suitable schemes.

"The process of demobilization may be expected to release a considerable amount of labor which can be utilized with advantage in putting the schemes promptly into execution.

"Your authority will no doubt have observed that suggestions have been made from various quarters that local authorities are not making sufficient progress with the submission of their scheme for housing after the war, and while the President is fully alive to the difficulty which local authority may have had to encounter during the past, he feels that looking to the present position as regards the war he must now press to know the precise intention of each local authority in regard to this matter, and how far he can count upon them to provide the houses which will be necessary to erect at the conclusion of the war.

"So far as public utility societies, employers, landowners or any form of private enterprise may prove willing to provide some of these houses at an early date the necessity for action by the local authorities would be reduced, but it would be well to realize that those agencies may not be able to do much in the early stage of demobilization, and may not therefore be effective in meeting the demands which may arise for the immediate putting in hands of schemes.

"It is essential that the President should be in a position to advise the Government as to whether the local authority can be relied upon to provide the necessary houses, or whether other measures may have to be taken to insure their provision.

"Sir Auckland Geddes would accordingly be obliged if a reply could be furnished to the following questions:

"(1) Are the local authorities prepared to provide any necessary houses for the working classes for their district so far as not otherwise provided at an early date?

"(2) Are they prepared to do so on the terms set out on Board Circular?

"(3) When will their scheme or schemes be ready for submission to the Government, and how many houses will they provide?

"(4) Have the necessary sites been (a) selected, (b) acquired?

"(5) Is there any work such as the development of the housing sites and the construction of roads, sewers, etc., which can be put in hand immediately when demobilization begins without waiting for the approval of the plans of the houses?

"A form for the supply of this information is inclosed. It should be filled up and returned to the Board without delay."

All this goes to show how anxious the Government is to provide houses for the working class in this country, and not only that, but the urgency of these schemes being started at once.

The Government have also decided that builders serving with the forces are to be released as soon as possible and in advance of general demobilization.

They also intend to release from Government occupation at the earliest possible moment the brick yards and premises now occupied for storage in order to allow of preparation and equipment for early resumption of work.

Standardization of all domestic fittings, especially for cottages, so that manufacture may proceed without delay.

Immediate steps are also being taken by H. M. Government for importation of a minimum quantity of 100,000 standards a month of soft wood during the first year after the war.

As an instance of the deficiency of material the committee say that the proposed erection of 300,000 houses in the first year after the war would require 6,000,000,000 bricks.

The average annual production during the last three years before the war was only 2,805,000,000 bricks, and the estimated maximum output with the existing plants, providing sufficient labor can be got, is 4,000,000,000.

The committee inquiry of railway companies, etc., of their needs shows an express demand for nearly 3,000,000,000 bricks for their own private needs during the first year after the war.

These figures possibly fall far short of the demand, as a great number of local firms and companies did not make a return.

# What Conditions Are in the Lumber Trade

## Outlook Is Optimistic—Factors That Show the Price Trend

The condition of the lumber market is, to say the least, "encouraging." Just now lumber interests are marking time, as there seems to be little disposition by any to "force the market." It is now practically a certainty, judging from the opinion of the trade, that prices will hold at or near their present levels until the spring demand begins. At that time there is every likelihood of an advance. This fact is being slowly realized by the building fraternity and its members are beginning to realize that the prices of labor and materials will keep to their present high level for quite some time. In the past few weeks there was a disposition on some dealers' part to express themselves as follows: "The future of the lumber market is bright; that is certain, but the present is a question." This is no longer the case. December is usually the dullest month, and this year is no exception; but as prices will hold up and the dealer who has much high-priced stock in his yard will be able to get his price. As to the future the lumber trade looks upon it with supreme confidence.

The only feature of the situation that tends to give the trade some concern is that lately quite some lumber from war plants has been "dumped" on the market. While this is discouraging, the amount so far, is not enough to influence the market. The danger is in continued practice.

To counteract this bit of distressing news comes the report that the lumber mill men are attacking the problems of readjustment systematically, and therefore with every prospect of success and prosperity of the industry. On account of the depleted conditions of stocks in the hands of manufacturers and dealers at distributing points, many mill men find it necessary for the dealers to anticipate the demand and co-operate with manufacturers. They do this by advising them of the stocks most urgently needed in their respective territories. This will enable the mills to manufacture only such stock as is in immediate demand. If this is not done the mills will not be able to take care of the demand during the next few months and will accumulate a large stock of sizes not in demand.

Only certain classes of construction work have the order of call, however. It is roughly classified as commercially necessary construction work. Costs are too high to give the speculative builder much of a chance to compete for the quantities of materials and labor at present available or which will be available next year.

Building material prices to-day are within the reach of the well-financed builder and will continue to be. It would not surprise some to find a slight decline in some lines before spring, with a further advance in April or June, probably to new high levels. The best advice obtainable in the trade is that which counsels against delay in contemplated construction.

The week past was a noteworthy period for the number of structural projects out for estimates aside from these to be built by the Government. The list of operations placed with the builders for estimates is widely diversified and represents a large potential expenditure for construction during the early spring and summer of 1919.

Architects and engineers throughout the country are busy on plans for buildings, aggregating millions of dollars, of the following character: residences, schools, business and office buildings, warehouses, apartments, public buildings and hotels. These operations will begin "just as soon as weather permits."

Building interests are practically undivided in the opinion that construction costs will not be lowered to any great extent during the period of reconstruction either by a decrease in material prices or by reduced labor costs. There are even those to be found who would not be surprised if structural costs were advanced a further notch before a recession to lower levels is possible. That fact that it is gnerally conceded that high construction costs will maintain for a year or so at least will in all probability hasten the start of many operations scheduled and which might better be built at existing levels while the demand for rentable space is strong and unsatisfied.

The markets for building materials are generally quiet, but wholly optimistic for the future. There have been a number of inquiries for materials in substantial amounts current during the past week or so, but dealers and producers are strongly of the opinion that the coming two or three months will be quiet as far as volume of actual business is concerned, but full with posibilities for next spring and summer. The intervening period will be used to advantage in perfecting plans for the expeditious handling of the tremendous amount of building material orders that are certain to follow the winter of preparation.

The lumber yards are, as a whole, confident that the coming spring will bring a marked increase of business from building sources and they are holding off ordering until the general conditions are more settled and the situation again near normal of pre-war times. During the past week orders and inquiries from the building trade have slowed down somewhat, but the demand from manufacturing consumers is firm. Lumber prices are almost without exception steady, and what tendency there may be is for changes upward. An advance price list is expected by the lumber fraternity in both Pennsylvania hemlock and Southern pine. On all shipments of Southern yellow pine lumber made after the several dates of expiration (Dec. 23 and 31) on Government orders placed subsequent to June 14, 1918, the agreed maximum prices shall not obtain, and prices shall be subject to negotiation. Pennsylvania hemlock Government prices will expire on Dec. 20 and will not continue. A boom in this item is expected as soon as the building season opens.

The export problem is being attacked systematically, as it is reported that Southern pine interests are contemplating forming an association. Many inquiries from foreign countries, including Italy and France, are reported. Mills are reported well booked with "biz."—A. C. S.

# THE EDITOR'S PAGE

## The New Year Brings Prosperity

For the first time in four years a smile instead of a frown came over the face of the new born year as it opened its eyes to a world that was gratefully settling down to the joys of peace.

War torn homes, staggering business —both unite in a welcome that will make this year a time of relief and joy long to be remembered.

But the new year is rapidly spaning its short life. Even now is felt the impulse to surge into the greatest activity the world has ever known.

The dark days are behind. Ahead, the glorious reflection of a dawning prosperity brings a warm glow to the hearts of us all.

And this prosperity will dawn on a world in which waste has been almost eliminated, in which the unfit and incompetent have been strengthened—or cast aside.

Rising costs in all lines have forced an increasing economy of operation.

The problem that faces every man to-day is the meeting of these higher costs by elimination of waste time and material. To those who solve this problem will accure the profits which only careful thought will bring to-day.

To-morrow, when the trail is blazed and a host follows the early seekers, the profits will be lessened. The rich claims will have been staked out, leaving only the claims that hardly pay day's wages.

Be among the first to stake out the big business in your town. The work, the profits, are there—if you go get them.

Let the new year beam its golden smile on a growing prosperity that includes you in its fruitful grasp.

## Create New Business in Your Town by Live Wire Methods

Big business waits for the man who can develop and handle it. Ford turned the automobile into dollars. Rockefeller made oil yield an enormous fortune, and Carnegie brought steel into its own.

Opportunities like this for developing business lie on every side of the man with vision. They exist, but remain unthought of and undeveloped until an active and imaginative mind seeks them out.

Vision sees a vacant lot. Imagination builds an imposing structure, fancy peoples it with thronging tenants—the vacant lot is turned into a steady stream of dollars.

It is this vision, this easy facility of imagination, that forms the foundation for the really big successes of to-day.

Applied to the building business, it makes work come from sources hitherto unsuspected. It reduces costs, it speeds up jobs, it sprints its possessor to the domination of his field.

Imagination will lead a man down the main street of his town. It will show him store fronts that can be made more attractive, vacant buildings that can be remodeled to meet current requirements, and other remunerative opportunities of a like nature.

Imagination will take him into the residential sections of the town. It will show him houses that would be ideal if a sun porch or sleeping porch were added, porches waiting to be enclosed, roofs in need of repair, frames that have started to rot from dampness.

He will be led to see vacant lots in sections where homes are quick selling,

> **"Deferred construction is really a part of our war debt. It should be one of the first accounts to be paid unless the country is to remain in a state of arrested development. Inasmuch as the building industry is regarded by many as the means of facilitating the general industrial transition from a war to a peace basis, it should have the encouragement of all interests."—Secretary of Labor Wilson.**

and will be enabled to interest investors; houses long vacant will be remodeled to meet to-day's demand, apartments will rise and slums turn into blocks that the town is proud of.

And the man who uses his imagination in this way will find himself becoming a power in his community, socially and financially.

Such a use of the imagination is creative—it makes two, even ten, jobs grow where but one grew before. It builds up villages into towns and towns into cities. It betters communities, improves transit service and furthers the progress of the world.

Such is the work of the truly high-class builder of to-day. Upon him rests the burden of carrying communities forward to meet the demand crystallized by industry.

With all this wonderful field opening wide its golden gates there is no need for any builder to find his pockets empty and his brain dulled by financial trouble.

Ideas, even the best created by imagination, are worthless and dead—but only until they are made live and productive by practical application. *Then* they yield an ever increasing profit to the user.

It is the plan of Building Age to put you in touch with the most remunerative ideas that are used by progressive builders. Naturally, these ideas will be of value to you only as you read and apply.

This issue, a business-planning number, will give you many such ideas. Turn these ideas into money by using them in the field of big profits offered you this coming year.

## Government Starts Campaign for General Resumption of Building

A campaign for the nation-wide resumption of building operations was inaugurated by Secretary of Labor Wilson in Boston on Jan. 2 at a conference of state officials and representatives of labor and industry.

Although prevented from attending personally, Secretary Wilson sent a telegram stating that: "Deferred construction is really a part of our war debts. It should be one of the first accounts to be paid unless the country is to remain in a state of arrested development. Inasmuch as the building industry is regarded by many as the means of facilitating the general industrial transition from a war to a peace basis, it should have the encouragement of all interests. For ultimately all industries must suffer and prosper alike.

"The main reason why civil construction is held up is because the public has been instinctively educated against it. Other factors which are retarding the recovery of the industry are difficulty of obtaining capital; the uncertainty of the market as regards supply and distribution of labor, and the problems of price, supply and irregular and expensive transportation of building material.

"May we not overcome these difficulties, in a measure at least, and through a definite re-education, shape mass public psychology throughout the country into a strong attitude which will favor public works, schools, ships and private construction of certain types at least?"

The direct purpose of the campaign will be to provide employment for the thousands of men returning to civil life after military service. In urging the expenditure of $3,000,000,000, for a million new private residences, the Secretary of Labor also will seek to promote 100 per cent Americanism and the lessening of unrest inspired by anarchistic doctrines, believing that there is no patriot like the man who has his own home to defend. In addition to the private building, Mr. Wilson believes the country would do well to expend $1,000,000,000 on roads and highways, and double that amount on other public works which make for the improvement of the living standard of the masses.

In order to help the work along, a

division for the conservation of building operations has been created by the Labor Department, and will be in operation soon after Jan. 1. Civic and trade associations have been flooding Washington with suggestions, and it is believed the campaign will prove one of the greatest readjustment factors initiated by the Administration.

Officials are unanimous that the nation's prosperity is best reflected by building operations. Since the armistice was signed economists have been anxiously studying the financial situation in an effort to determine the extent to which the country can resume the building program halted by the war.

It is understood that every trade association of the country will join in a gigantic advertising campaign to start the era of prosperity upon which the nation is about to embark. It is said that whatever legislation is needed to bring about financial aid and interest for those who seek to build will be forthcoming.

Frank Morrison, secretary of the American Federation of Labor, said of the plan recently:

"Unless the people of the United States awake to the necessity of at once encouraging building operations we will have headlines in our industrial centres before spring comes. Many men who plan new structures are holding back because of the difficulties of excavation processes in the winter months. They must be encouraged to take up the work at once."

## Elimination of Bidding Evil Will Bring Lower Costs

Perhaps the most widespread abuse in the building industry is the bidding evil. Plans are portioned out among competing builders, and hundreds of dollars are often wasted by unsuccessful bidders in preparing estimates.

No builder will deny the advisability of forcing clients to pay for bids—if it can be done successfully. The expense that big firms especially are put to in estimating on large jobs which are not secured is a very real factor in holding costs up. When five or six hundred dollars wasted in estimating on one job must be added ten times over and charged to overhead, overhead costs are kept unreasonably high on the jobs that are secured.

A few builders refuse to estimate on competitive work, basing their plea for business on quality and reputation. Others bid only when there is a good chance that the job will be secured. Still others will bid on any job offered, without fully realizing that they are conducting an unwarranted waste.

One builder alone, of course, can do but little to stop this evil. It is a matter for associations to take up.

When the time comes that clients are forced to pay for bids required, they will cut down on the number of firms they will ask to bid or even give the work to a contractor without taking competitive bids. Then, since useless bidding would have been greatly curtailed, costs to the owner would be less. And the industry itself would be on a sounder basis.

## Make Houses Livable as Well as Beautiful

Good design is an asset to any plan—an asset which is being more and more appreciated.

Even the cheaper class of house to-day is being made attractive because of the realization that first impressions count. Development companies especially realize this, and their designs are prepared with a view to catching the eye of passers-by.

For good design something, of course, must be sacrificed from the plan. Likewise, the design must be made to yield certain features in order to further the essential requirements of the plan.

Neither the livable house that looks like a shack nor the design that is all beauty outside with inconvenience inside, is wanted to-day. Beauty and livableness must be combined if the discriminating buyer is to be permanently pleased.

Of course, unsightly shacks sell in localities where architectural uplift has not yet begun. Naturally people there can only take the best of an undesirable selection.

It is amazing how rapidly the taste for good design will spread once it is introduced. The unbeautiful lodgings become harder and harder to rent or sell, their value depreciating with increasing rapidity as the standard is raised higher and higher.

Yet in this search for beauty there is danger that the chief function of a house may be lost sight of. That function is that a house is a place to live in the whole year round.

In speculative houses especially this fact is often lost sight of. It is surprising how many houses are built with no adequate provisions for housing the heating apparatus in the plan where it should go. Instead, the apparatus may be roughly indicated by the architect when he draws the basement plan, and then put in some other place when the house is built. Frequently, indeed, the apparatus is indicated in pencil on the blueprints after the house is well started, the heating being merely an incidental, with its ultimate function lost sight of.

Specifications will read "the contractor shall furnish all radiators of sizes shown on plans, and must further guarantee to heat the building up to 70° in zero weather." Such clauses are a joke.

Or again, the architect will specify "the contractor shall install suitable heating apparatus that will heat the building to a temperature of 70° in zero weather." Camauflaged ignorance!

A house should not merely be good design, it should not merely have a convenient plan. It should, above all, be made livable, winter and summer.

There are too many all-year-round houses suited only for summer use, with fair comfort in the colder autumn days. When winter comes, with a temperature hovering around zero, the outfit guaranteed to heat to 70° in zero weather roars and crackles its coal consuming joy as the family huddles around an oil stove.

Houses are meant to be lived in. Heating should be planned so as to make the house a really comfortable home.

It is the job of the architect to see that it is made so.

## Building Age Index for 1918 Ready

An index covering all the articles published in BUILDING AGE during 1918 has been prepared. This will be mailed free to all subscribers who request it.

The wealth of material published in BUILDING AGE causes many of our subscribers to bind their copies. To such especially will the index prove valuable. Others who save their copies but do not bind them will also find the index of decided help when it is necessary to study upon some particular problem.

Most of the material contained in BUILDING AGE is of such practical value as to be well worth preserving for reference. It is to facilitate this reference that the index is prepared each year.

# Building Activity Throughout the United States

November, during which Government restrictions were still in force, saw a loss of 58 per cent in the estimated value of construction for that month, compared with the same period during 1917. Of 165 cities reporting, 29 show gains, as against 136 reporting losses. The total volume of construction for the country was $18,612,818, as against $44,509,852.

The situation needs no explaining. With restrictions now entirely removed and the Government desirous of having the building trades take up surplus labor as demobilization takes place, the best can be expected.

Eastern cities report a loss of 56 per cent, Middle State cities a loss of 62 per cent, Southern cities a loss of 50 per cent, and the Western cities a loss of 47 per cent. This loss in every section was a result only to be expected.

Figures in detail follow (the star in front of cities indicates an increase over last year):

CITIES IN EXTREME WESTERN STATES

| | November, 1918 | | | | November, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Berkeley, Cal | 12 | $22,500 | 33 | $6,000 | 15 | $51,200 | 63 | $20,000 |
| Butte, Mont | 10 | 11,200 | 23 | 4,238 | 34 | 248,653 | 54 | 12,682 |
| Denver, Col | 26 | 38,300 | 75 | 58,450 | 57 | 178,050 | 82 | 60,100 |
| Colorado Spgs., Col | 3 | 355 | 8 | 1,745 | 3 | 300 | 9 | 2,536 |
| Eureka, Cal | ... | ......... | 2 | 1,500 | 4 | 75,500 | 4 | 2,500 |
| Fresno, Cal | 29 | 28,295 | 33 | 17,651 | 67 | 275,665 | 55 | 18,726 |
| *Long Beach, Cal | 139 | 151,250 | ... | ......... | 69 | 71,418 | ... | ......... |
| Los Angeles, Cal | 253 | 368,803 | 213 | 150,205 | 294 | 587,602 | 252 | 162,231 |
| *Oakland, Cal | 133 | 224,028 | 75 | 74,750 | 123 | 238,358 | 71 | 47,705 |
| Pasadena, Cal | 25 | 10,373 | 59 | 13,302 | 31 | 27,093 | 66 | 20,012 |
| Portland, Ore | 291 | 276,900 | 188 | 69,090 | 147 | 249,130 | 118 | 279,430 |
| Pueblo, Col | 33 | 11,055 | ... | ......... | 35 | 32,647 | ... | ......... |
| Sacramento, Cal | 36 | 103,140 | ... | ......... | 68 | 192,755 | ... | ......... |
| Salt Lake City, Utah | 29 | 41,110 | ... | ......... | 56 | 698,315 | ... | ......... |
| San Diego, Cal | 92 | 104,310 | ... | ......... | 133 | 109,472 | ... | ......... |
| San Francisco, Cal | 17 | 86,065 | 147 | 50,922 | 62 | 404,137 | 356 | 153,366 |
| *San Jose, Cal | 18 | 19,673 | ... | ......... | 30 | 13,378 | ... | ......... |
| *Seattle, Wash | 789 | 610,915 | ... | ......... | 652 | 503,220 | ... | ......... |
| Spokane, Wash | 23 | 1,437 | 32 | 18,840 | 41 | 16,175 | 34 | 12,230 |
| Stockton, Cal | 51 | 31,362 | ... | ......... | 73 | 500,634 | ... | ......... |
| *Tacoma, Wash | 141 | 111,506 | 109 | 33,050 | 45 | 69,325 | 47 | 24,200 |
| Oklahoma City, Okla. | 34 | 30,895 | ... | ......... | 43 | 170,665 | ... | ......... |
| | 2184 | $2,283,472 | 997 | $499,743 | 2206 | $4,513,692 | 1211 | $815,718 |

CITIES IN EASTERN STATES

| | November, 1918 | | | | November, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Albany, N. Y | 117 | $128,010 | ... | ......... | 144 | $137,040 | ... | ......... |
| Allentown, Pa | 4 | 3,850 | ... | ......... | 17 | 61,420 | 7 | $6,280 |
| Altoona, Pa | 27 | 5,422 | ... | ......... | 4 | 11,600 | 24 | 15,514 |
| Atlantic City, N. J | 3 | 1,575 | 53 | $14,630 | 12 | 34,295 | 88 | 34,383 |
| *Auburn, N. Y | 8 | 2,660 | ... | ......... | 5 | 1,860 | ... | ......... |
| Bayonne, N. J | 2 | 425 | ... | ......... | 15 | 41,685 | ... | ......... |
| Binghamton, N. Y | 33 | 27,323 | 59 | 6,186 | 51 | 73,891 | 142 | 39,448 |
| Boston, Mass | 23 | 83,690 | 271 | 205,053 | 60 | 525,430 | 289 | 239,935 |
| Bridgeport, Conn | 33 | 65,489 | ... | ......... | 112 | 196,320 | ... | ......... |
| Brockton, Mass | 6 | 965 | 7 | 1,600 | 15 | 10,885 | 17 | 22,645 |
| *Buffalo, N. Y | 191 | 589,500 | 42 | 79,200 | 254 | 504,000 | ... | ......... |
| East Orange, N. J | 15 | 8,698 | ... | ......... | 39 | 54,982 | ... | ......... |
| Elizabeth, N. J | 15 | 21,673 | ... | ......... | 26 | 24,204 | ... | ......... |
| Erie, Pa | 49 | 34,410 | ... | 29,030 | 81 | 207,626 | ... | 4,344 |
| Harrisburg, Pa | 7 | 16,500 | ... | ......... | 15 | 46,530 | ... | ......... |
| Hartford, Conn | 30 | 51,955 | 17 | 44,170 | 54 | 179,350 | 12 | 10,925 |
| Hoboken, N. J | 3 | 4,100 | 9 | 5,635 | 3 | 8,180 | 9 | 7,065 |
| Holyoke, Mass | 2 | 1,900 | ... | ......... | 5 | 18,450 | ... | ......... |
| Jersey City, N. J | 25 | 49,190 | ... | ......... | 55 | 187,610 | ... | ......... |
| Lawrence, Mass | 1 | 300 | 9 | 4,135 | 9 | 26,700 | 5 | 4,600 |
| Manchester, N. H | 10 | 13,085 | 25 | 4,334 | 16 | 10,585 | 27 | 20,530 |
| Mount Vernon, N. Y. | 6 | 19,250 | ... | ......... | 16 | 83,020 | 7 | 5,660 |
| Newark, N. J | 78 | 224,897 | ... | ......... | 182 | 672,026 | ... | ......... |
| *New Bedford, Mass. | 24 | 104,850 | ... | ......... | 28 | 81,200 | ... | ......... |
| New Britain, Conn | 4 | 31,100 | 11 | 3,900 | 9 | 26,550 | 23 | 20,965 |
| New Haven, Conn | 54 | 63,030 | ... | ......... | 89 | 157,306 | ... | ......... |
| New York: | | | | | | | | |
| Manhattan | 7 | 117,950 | 111 | 465,325 | 11 | 1,892,800 | 213 | 588,764 |
| Bronx | 6 | 32,000 | 104 | 50,145 | 26 | 462,725 | 204 | 142,282 |
| Brooklyn | 72 | 544,137 | 364 | 173,845 | 128 | 1,619,300 | 747 | 380,150 |
| Queens | 269 | 205,547 | ... | ......... | 396 | 787,168 | ... | ......... |
| Richmond | 37 | 91,129 | 59 | 99,460 | 68 | 216,462 | 18 | 6,925 |
| Niagara Falls, N. Y | 33 | 110,798 | ... | ......... | 58 | 174,190 | ... | ......... |
| Nutley, N. J | 4 | 560 | 5 | 1,084 | 13 | 29,725 | 6 | 1,250 |
| Passaic, N. J | 5 | 4,825 | 2 | 1,575 | 10 | 22,560 | 5 | 1,140 |
| Paterson, N. J | 30 | 6,636 | ... | ......... | 72 | 144,104 | ... | ......... |
| Philadelphia, Pa. | 175 | 365,690 | 169 | 201,570 | ... | ......... | ... | ......... |
| Pittsburgh, Pa | 55 | 216,442 | 81 | 113,776 | 194 | 585,331 | 83 | 115,297 |
| Portland, Me | 7 | 11,800 | 9 | 13,210 | 13 | 28,050 | 13 | 17,820 |
| *Quincy, Mass | 62 | 281,890 | ... | ......... | 56 | 126,265 | ... | ......... |
| *Reading, Pa | 18 | 17,925 | 99 | 21,500 | 17 | 13,450 | 86 | 17,400 |
| Schenectady, N. Y | 28 | 19,460 | 9 | 37,430 | 36 | 61,910 | 45 | 23,856 |
| *Scranton, Pa | 7 | 56,987 | ... | ......... | 19 | 24,355 | ... | ......... |
| Springfield, Mass | 41 | 82,845 | ... | ......... | 72 | 102,948 | ... | ......... |
| Syracuse, N. Y | 25 | 36,885 | 38 | 25,675 | 81 | 159,806 | 38 | 65,345 |
| *Trenton, N. J | 26 | 51,445 | ... | ......... | 43 | 38,170 | ... | ......... |
| Utica, N. Y | 16 | 41,960 | 1 | 400 | 29 | 215,150 | 4 | 8,500 |
| Wilkes-Barre, Pa | 26 | 9,178 | ... | ......... | 29 | 44,588 | ... | ......... |
| York, Pa | 3 | 620 | 16 | 1,738 | 6 | 2,120 | 25 | 10,063 |
| Camden, N. J | 28 | 35,235 | ... | ......... | 54 | 680,491 | ... | ......... |
| *Fitchburg, Mass | 54 | 13,897 | 7 | 1,580 | 10 | 10,195 | 3 | 735 |
| Lowell, Mass | 12 | 5,525 | 16 | 14,845 | 5 | 10,800 | 19 | 16,303 |
| Lancaster, Pa | 5 | 4,150 | ... | ......... | 6 | 34,150 | 9 | 3,650 |
| Newport, R. I | 10 | 5,360 | 21 | 15,536 | 13 | 23,850 | 11 | 3,618 |
| Providence, R. I | 14 | 7,500 | 217 | 80,700 | 80 | 154,000 | 243 | 232,400 |
| Rochester, N. Y | 26 | 18,335 | 19 | 20,740 | 92 | 547,930 | 48 | 27,790 |
| Worcester, Mass | 27 | 23,682 | 28 | 29,825 | 55 | 94,423 | 47 | 81,275 |
| Stamford, Conn | 7 | 3,500 | 16 | 11,240 | 9 | 21,000 | 17 | 10,650 |
| Wheeling, W. Va | 33 | 89,750 | 435 | 310,112 | 63 | 243,940 | 584 | 430,584 |
| *Chelsea, Mass | 10 | 109,200 | ... | ......... | 15 | 25,650 | ... | ......... |
| *Salem, Mass | 36 | 9,535 | ... | ......... | 45 | 6,358 | ... | ......... |
| West Hoboken, N. J | 1 | 200 | ... | ......... | 3 | 1,100 | ... | ......... |
| Yonkers, N. Y | 5 | 5,200 | ... | ......... | 13 | 26,800 | ... | ......... |
| | 2019 | $4,197,655 | 2340 | $2,093,678 | 3156 | $12,014,609 | 3128 | $2,582,466 |

CITIES IN MIDDLE STATES

| | November, 1918 | | | | November, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Akron, Ohio | 77 | $83,260 | 33 | $21,550 | 207 | $810,890 | 54 | $40,640 |
| *Bay City, Mich | 13 | 21,065 | ... | ......... | 15 | 13,075 | ... | ......... |
| Canton, Ohio | 38 | 38,820 | ... | ......... | 45 | 111,400 | ... | ......... |
| Cedar Rapids, Iowa | 2 | 31,000 | 8 | 8,000 | 15 | 66,000 | 10 | 15,000 |
| Chicago, Ill | 76 | 1,223,400 | 395 | 7,905 | 392 | 4,740,100 | ... | ......... |
| Cincinnati, Ohio | 596 | 176,000 | ... | ......... | 831 | 516,050 | ... | ......... |
| Cleveland, Ohio | 39 | 363,000 | 293 | 181,950 | 209 | 1,625,200 | 532 | 217,740 |
| *Columbus, Ohio | 53 | 87,150 | 49 | 230,405 | 98 | 234,615 | 60 | 38,770 |
| Davenport, Iowa | 40 | 3,450 | ... | ......... | 52 | 50,035 | ... | ......... |
| Dayton, Ohio | 59 | 110,525 | 24 | 16,296 | 63 | 275,973 | ... | ......... |
| Decatur, Ill | 16 | 10,408 | ... | ......... | 24 | 55,425 | ... | ......... |
| Des Moines, Iowa | 18 | 33,000 | ... | ......... | 90 | 340,905 | ... | ......... |
| Detroit, Mich | 273 | 673,940 | ... | ......... | 627 | 2,330,355 | ... | ......... |
| Dubuque, Iowa | 1 | 125 | ... | ......... | 1 | 5,500 | ... | ......... |
| Duluth, Minn | 68 | 41,706 | ... | ......... | 70 | 101,039 | ... | ......... |
| East St. Louis, Ill | 12 | 25,600 | 5 | 4,450 | 36 | 139,865 | ... | ......... |
| Evansville, Ind | 23 | 4,223 | ... | ......... | 52 | 32,340 | ... | ......... |
| *Ft. Wayne, Ind | 12 | 219,235 | 6 | 6,675 | 8 | 16,100 | 6 | 4,450 |
| Grand Rapids, Mich | 35 | 8,511 | ... | ......... | 38 | 64,445 | 82 | 25,780 |
| Indianapolis, Ind | 246 | 203,702 | ... | ......... | 311 | 400,200 | ... | ......... |
| Joplin, Mo | 5 | 2,775 | 2 | 165 | 24 | 31,375 | 11 | 5,535 |
| Kansas City, Kan | 11 | 8,825 | ... | ......... | 36 | 58,425 | ... | ......... |
| Kansas City, Mo | 161 | 330,125 | ... | ......... | 167 | 1,374,200 | ... | ......... |
| Lincoln, Neb | 7 | 9,135 | ... | ......... | 27 | 85,292 | ... | ......... |
| Milwaukee, Wis | 46 | 144,749 | 36 | 70,873 | 146 | 605,375 | 70 | 29,428 |
| Minneapolis, Minn | 172 | 222,710 | ... | ......... | 316 | 967,640 | ... | ......... |
| Omaha, Neb | 28 | 89,375 | ... | ......... | 72 | 769,700 | ... | ......... |
| Peoria, Ill | 7 | 12,650 | 10 | 7,182 | 31 | 92,515 | 14 | 7,285 |
| *Richmond, Ind | 1 | 700 | 14 | 6,900 | 2 | 1,750 | 5 | 2,900 |
| *Saginaw, Mich | 53 | 73,817 | ... | ......... | 15 | 17,220 | ... | ......... |
| St. Louis, Ill | 88 | 135,285 | 183 | 126,310 | 203 | 265,243 | 305 | 149,310 |
| St. Paul, Minn | 73 | 717,473 | ... | ......... | 241 | 723,746 | ... | ......... |
| *Sioux City, Iowa | 6 | 1,010,200 | 3 | 950 | 10 | 77,700 | ... | ......... |
| South Bend, Ind | 49 | 53,380 | ... | ......... | 98 | 66,507 | ... | ......... |
| Springfield, Ill | 3 | 5,430 | 20 | 23,475 | 13 | 113,375 | 23 | 20,560 |
| Superior, Wis | 39 | 5,950 | ... | ......... | 94 | 56,205 | ... | ......... |
| Terre Haute, Ind | 18 | 11,605 | 10 | 4,335 | 11 | 98,020 | 7 | 1,590 |
| Toledo, Ohio | 105 | 81,415 | ... | ......... | 141 | 272,092 | ... | ......... |
| Topeka, Kan | 6 | 2,000 | 2 | 1,200 | 3 | 13,075 | 4 | 5,625 |
| Wichita, Kan | 21 | 23,795 | ... | ......... | 55 | 251,480 | ... | ......... |
| Youngstown, Ohio | 62 | 115,610 | 15 | 7,275 | 152 | 358,055 | 15 | 15,000 |
| Bloomington, Ill | 14 | 38,900 | ... | 22,000 | 24 | 60,900 | ... | 9,000 |
| *Jackson, Mich | 41 | 36,545 | ... | ......... | 27 | 16,276 | ... | ......... |
| Lansing, Mich | 11 | 8,575 | 9 | 7,225 | 14 | 22,725 | 7 | 2,200 |
| Joliet, Ill | 1 | 5,000 | ... | ......... | 5 | 89,000 | ... | ......... |
| *Hamilton, Ohio | 1 | 3,500 | 3 | 1,195 | 1 | 1,800 | 7 | 2,210 |
| Springfield, Mo | 4 | 2,475 | 2 | 4,950 | 1 | 2,000 | 16 | 12,975 |
| Joliet, Ill | 1 | 5,000 | ... | ......... | 5 | 89,000 | ... | ......... |
| | 2731 | $6,515,919 | 1122 | $733,241 | 5065 | $18,534,230 | 1228 | $605,988 |

CITIES IN SOUTHERN STATES

| | November, 1918 | | | | November, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Atlanta, Ga | 69 | $54,846 | 92 | $35,253 | 50 | $229,874 | 150 | $42,712 |
| Baltimore, Md | 21 | 225,585 | 361 | 95,625 | 104 | 828,925 | 487 | 134,680 |
| Beaumont, Tex | 25 | 18,650 | 18 | 4,517 | 41 | 96,672 | 35 | 7,196 |
| Birmingham, Ala | 30 | 15,585 | 242 | 29,095 | 34 | 139,617 | 378 | 68,681 |
| *Charlotte, N. C | 9 | 72,575 | 3 | 2,852 | 15 | 23,576 | ... | ......... |
| Chattanooga, Tenn | 123 | 14,571 | ... | ......... | 152 | 28,745 | ... | ......... |
| Corpus Christi, Tex | 5 | 615 | ... | ......... | 11 | 3,770 | ... | ......... |
| Dallas, Tex | 7 | 3,600 | 13 | 21,610 | 18 | 64,650 | 23 | 54,786 |
| *Jacksonville, Fla | 35 | 152,315 | ... | ......... | 33 | 136,190 | ... | ......... |
| Houston, Tex | 25 | 24,616 | 123 | 13,822 | 58 | 119,540 | 131 | 22,114 |
| Huntington, W. Va | 8 | 1,112 | ... | ......... | 51 | 242,630 | ... | ......... |
| Lexington, Ky | 35 | 11,470 | ... | ......... | 12 | 39,200 | ... | ......... |
| Louisville, Ky | 46 | 144,210 | 15 | 5,365 | 46 | 239,910 | 36 | 26,980 |
| *Memphis, Tenn | 33 | 329,800 | 9 | 7,175 | 163 | 127,130 | 32 | 36,760 |
| Miami, Fla | 31 | 21,700 | ... | ......... | 71 | 54,600 | ... | ......... |
| Montgomery, Ala | 7 | 185 | 104 | 10,100 | 10 | 40,000 | 120 | 23,000 |
| New Orleans, La | 3 | 6,400 | 10 | 8,580 | 21 | 46,082 | 24 | 32,731 |
| *Norfolk, Va | 33 | 257,695 | 4 | 17,300 | 28 | 53,338 | 10 | 16,765 |
| Richmond, Va | 5 | 96,550 | 30 | 49,446 | 24 | 151,236 | 59 | 46,946 |
| San Antonio, Tex | 139 | 98,485 | ... | ......... | 288 | 264,165 | ... | ......... |
| Savannah, Ga | 2 | 1,200 | 13 | 18,190 | 4 | 25,350 | 16 | 15,650 |
| Shreveport, La | 9 | 3,160 | 27 | 12,750 | 9 | 6,175 | 29 | 6,635 |
| Tampa, Fla | 39 | 4,545 | ... | ......... | 67 | 15,105 | ... | ......... |
| Washington, D. C | 41 | 163,070 | 155 | 60,745 | 73 | 1,350,500 | 216 | 166,150 |
| Wilmington, Del | 8 | 17,808 | 21 | 18,250 | 70 | 122,183 | ... | 56,454 |
| Roanoke, Va | 18 | 3,210 | ... | ......... | 20 | 26,930 | ... | ......... |
| Knoxville, Tenn | 55 | 13,705 | 55 | 13,705 | 12 | 74,948 | 123 | 17,843 |
| Galveston, Tex | 36 | 1,008 | 61 | 1,885 | 72 | 4,573 | 269 | 7,056 |
| Fort Worth, Tex | 9 | 7,125 | 14 | 8,220 | 9 | 21,742 | 14 | 7,060 |
| Pensacola, Fla | .. | ......... | 98 | 24,212 | 2 | 4,000 | 325 | 22,640 |
| Augusta, Ga | 79 | 13,151 | ... | ......... | 113 | 42,664 | ... | ......... |
| *Covington, Ky | 20 | 9,150 | ... | ......... | 2 | 1,300 | ... | ......... |
| *Portsmouth, Va | 17 | 32,916 | ... | ......... | 7 | 4,540 | ... | ......... |
| | 1044 | $1,820,613 | 1468 | $468,697 | 1670 | $4,629,810 | 2476 | $812,839 |

*Indicates a gain over last year.

# What a Big Builder Thinks of the Outlook for 1919

## All Types of Buildings Needed—Reconstruction Abroad Will Influence Conditions Here

*By Noble Foster Hoggson**

Despite the unusual and varied factors affecting construction work at this time, indications point to the greatest building revival during 1919 which this country has ever experienced. This is true largely because certain classes of structures must be erected almost at once to provide for actual demand.

First of all, in the larger cities, apartment houses and dwellings will lead the way, but closely following will be office buildings, lofts and industrial structures. Then there will be a tremendous amount of bank building. All over the country our financial institutions have been carrying on their work in their old homes, in crowded, inadequate quarters, waiting for a favorable time to erect new buildings or modernize their quarters by remodelling. Banks have never been more prosperous, and the bankers seem to feel that not only will they be meeting an economic need by building now, but that their action in this regard will set a precedent in their communities and encourage other owners to build. It is the specified wish of the Government that, in order to provide employment, construction work be put under way at the earliest possible moment.

In the industrial as well as in the domestic and commercial fields, building should see a large and healthy increase in volume. New factories must be built; plant extensions are an economic necessity, war plants, instead of being scrapped or abandoned, will in many instances be altered for peace work.

Housing for employees, which received such an impetus during the past two years, will be carried out on a vaster scale than we had ever thought possible. Employers have recognized the actual money-value return of providing good housing accommodations for their employees. It is fatuous to believe that the employers have not profited by the lessons of the war. They have learned that contented workmen are the best possible asset, that high labor turnover is wrong and expensive, and that proper housing is one of the greatest, if not the greatest factor in reducing labor turn-over and keeping employees happy on the job.

The immense amount of reconstruction work to be done in France and Belgium is going to affect building conditions in this country more than is generally realized. This is true particularly in regard to prices for materials. The excessive demand for certain materials for use abroad, is most likely to keep prices in this country up to the present high level. Steel, so far, has been the only material which has shown any tendency to decline in price, but, with the great number and kinds of buildings needed, the matter of cost will probably not enter into colculations as much as under ordinary conditions. It should be remembered that since 1914 this country, except for a short period in 1916, has been underbuilt.

Building must cease being a gambling proposition, the owner taking a long chance on getting his structure erected for a sum of money which he sets aside in the beginning. In the future, there must be a closer and fairer relationship between the owner and the builder. The builder must gain the confidence of the owner, and, in turn, the owner owes certain duties to the builder. Under the usual building procedure, the builder is a gambler, too; taking a job on a low competitive bid, and hoping by some hook or crook to make money on it. The formation of the Associated General Contractors of America recently worked a great step forward in raising the building industry to a higher level, and it is through movements of this kind that the investor will feel free to put his money into building operations.

*President, Hoggson Brothers, Builders.

# New Goods That Will Interest Builders

A new type of portable motor operated bench planer for light woodwork operation, known as the Wallace Bench Planer, illustrated in Fig. 1, has just been put on the market by J. D. Wallace & Co. of Chicago. This bench planer is said to eliminate practically all of hand planing and saves many time-consuming trips to the big stationary jointer, for the Wallace Bench Planer is portable and can be taken to the work anywhere in the shop or on work outside. It is so devised that it can be turned to practically any angle. The device and motor are a single unit with direct drive through a flexible coupling. This delivers approximately 100 per cent of power to the cutterhead, thus rating the sturdy little machine as having more power per inch of knife than the 2 to 5 hp. big jointers. An interesting mechanical feature of this machine is that three knives are operated in an alternating-current equipment, while two knives are used on a direct-current equipment. This is due to the fact that 4000 revolutions per minute are required to do planing satisfactorily, while only 360 revolutions per minute can be had in an alternating-current motor. Fractional horsepower motors are used.

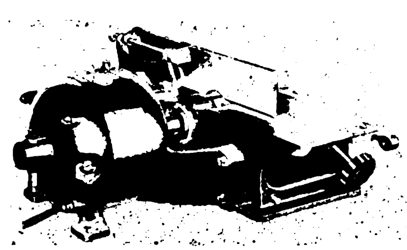


Fig. 1—The Wallace portable bench planer

A new design in door hardware has been added to the line of P. & F. Corbin, New Britain, Conn., in a 1¾ in. brass or bronze knob with slender shank and 2 in. rose, made in the same outline as a hand wrought knob and rose which were high in favor in the early Colonial days. The number of this knob is 1963. It is especially suited for the inside doors of Colonial and Dutch Colonial homes. The screws which attach the rose to the door are concealed in a recess beneath the end of the knob shank. The spindle is 3/16 in. in diameter and is not adjustable. The thickness of the door must be stated in ordering.

Fig. No. 3 shows the application of Rex construction roofing on a sloping roof. This item is being put on the market by the Flintkote Company, 98 Pearl St., Boston, Mass. The advantages of the built-up type of roofing, which has been in successful use for more than fifty

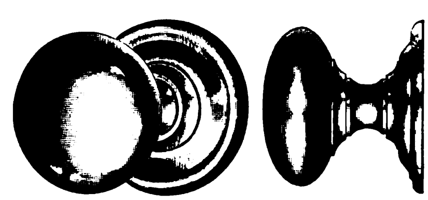


Fig. 2—A new design in door hardware added to the line of P. & F. Corbin

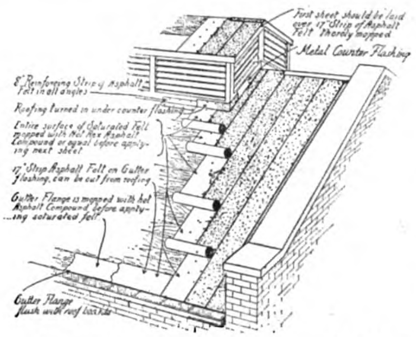



**Fig. 3—Application of a new style of Rex construction roll roofing**

years, are very generally known and recognized. Rex Construction Roofing is "built up." It provides five distinct layers of material over the entire roof, with all seams reinforced by an additional thickness of felt and of compound. The width of the sheet is 32 in., of which 15 in. lengthwise is saturated, asphalt coated and late surfaced, and 17 in. lengthwise is saturated only. The roofing comes only in red. The material is furnished as one square, 213 1/3 sq. ft., totalling 80 lin. ft. The shipping weight is about 100 lb. and applied weight about 130 to 135 lb. per square. The asphalt compound is supplied in 350 to 450 lb. drums.

no furring and is said to be especially adapted for stucco work.

**Self-Sentering.** General Fireproofing Co., Youngstown, Ohio. Booklet describing and illustrating economical system of concrete construction without form work for roofs, ceilings, partitions, etc. Contains tables of loads for slabs and thickness for various spans.

**Bayonne Roof and Deck Cloth.** John Boyle & Co., Inc., 112-114 Duane St., New York City. Booklet giving texture, prices and directions for laying this type of covering for low-pitched or flat roofs, verandas, sleeping porches, sun parlors, conservatories, and all floors exposed to the weather or to constant wear.

**Slate Roofing.** Vendor Slate Co., Bangor, Pa. Booklet describes quality and advantages of Vendor Roofing Slate.

**Space and Speed in Steel Building.** Milliken Bros. Mfg. Co., New York, N. Y.—Catalogs describe in detail the standardized truss unit system, which must not be confused with "ready-built" or "sectional" buildings, which are confined rigidly to a predetermined size and shape. Testimonials from various users are included.

# New Catalogs of Interest to the Trade

**Catalog.** Pullman Mfg. Co., 8 Industrial St., Rochester, N. Y. Illustrated by blue prints showing how these sash balances are installed, general information pointing out the time saving features.

**Pamphlet B.** Warren-Knight Co., 136 No. 12th St., Philadelphia, Pa. Illustrates a complete line of surveying instruments. Accompanied by vest pocket manual of adjustments.

**"Almetl."** Merchant & Evans Co., Dept. 37, Philadelphia, Pa. Catalog describing Star ventilators, fire doors and shutters, roofing plates, metal Spanish tiles and shingles.

**Samson Spot Sash Cord.** Samson Cordage Works, Boston, Mass. Booklet describing Samson Spot Sash Cord, accompanied by sample of the cord and souvenir pencil.

**Service Sheets, 1, 2, 4 and 18.** N. & G. Taylor Co., Philadelphia, Pa. These Service Sheets give valuable working drawings showing how tin roofing is applied.

**Eyston One Pipe Warm Air Furnace.** Tubular Heating & Ventilating Co., Philadelphia, Pa. Booklet describing the Eyston One Pipe Warm Air Furnace. Said to burn hard or soft coal, coke or wood.

**Woodworker Bulletin, No. 67.** American Saw Mill Machinery Co., 1362 Hudson Terminal, New York City. Describes and illustrates American variety woodworker with a separate gasoline engine built in. Describes construction of the machine.

**Hoist Bulletin, No. 10.** American Saw Mill Machinery Co., 1362 Hudson Terminal, New York City. Booklet illustrating and describing the special features of this type of hoist.

**Out-of-the-Ordinary Roof Slate.** Knickerbocker Slate Corp., 19 West 44th St., New York City. Booklet describing this brand of slate made in purples, greens, reds, browns, greys and yellows.

**Sash Chains.** Thomas Morton, 245 Center St., New York. Booklet illustrating and describing the advantages of chains for heavy doors, gates, sashes, etc.

**Booklet X.** Wright Wire Co., Worcester, Mass. Illustrated booklet describing Excelsior Wire Lath.

**Andes Furnaces.** Phillips & Clark Stove Co., Geneva, N. Y. Catalog illustrating the various types of furnaces and pipeless furnaces manufactured by this concern, also garage heaters.

**Catalog No. 21P.** L. S. Starrett Co., Athol, Mass. Catalog illustrating and describing the line of tools manufactured by this concern.

**Any of these catalogs will be furnished by the manufacturers. Or, if you prefer, we will see that you receive any that you desire. Just check the catalogs you want, tear out the page, and mail it to Building Age, 243 West 39th Street, New York.**

**Sash Chains.** Smith & Egge Mfg. Co., Bridgeport, Conn. Booklet illustrating and describing sash chains. Points out the value of substituting them for cords.

**Univarnish.** Murphy Varnish Co., Newark, N. J. Booklet describing advantages of Murphy Varnish.

**Murphy Building Bulletin.** Murphy Varnish Co., Newark, N. J. Monthly bulletin giving interesting information on varnishing, etc. Sent monthly to architects, contractors and builders who request it.

**Elevators.** J. D. Speldei, Reading, Pa. Booklet describes hand belt and electric service elevators for use in solving storage problems. Also describe dumbwaiters and sidewalk lifts.

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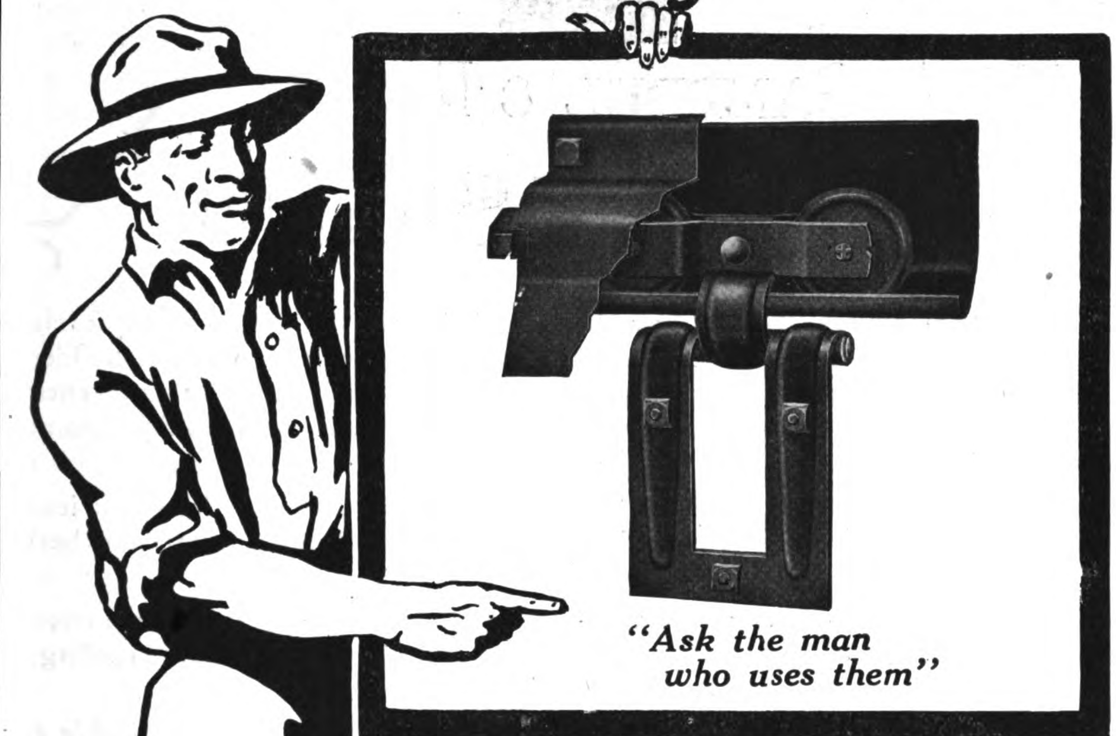


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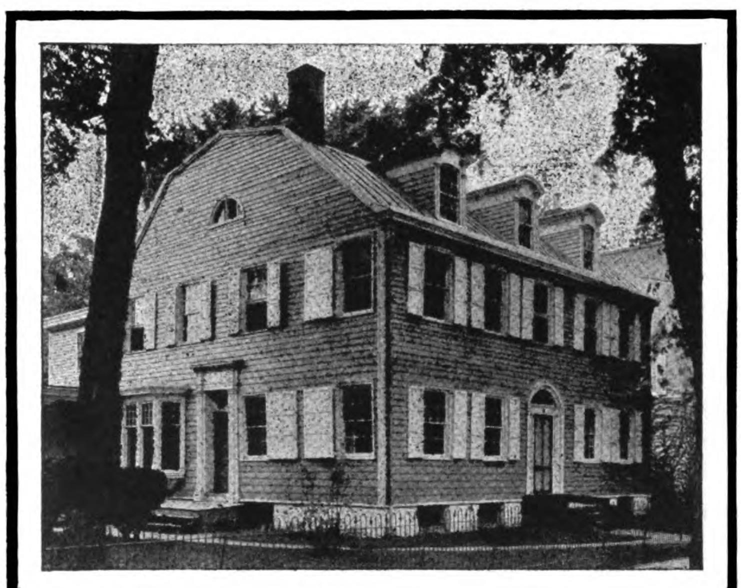

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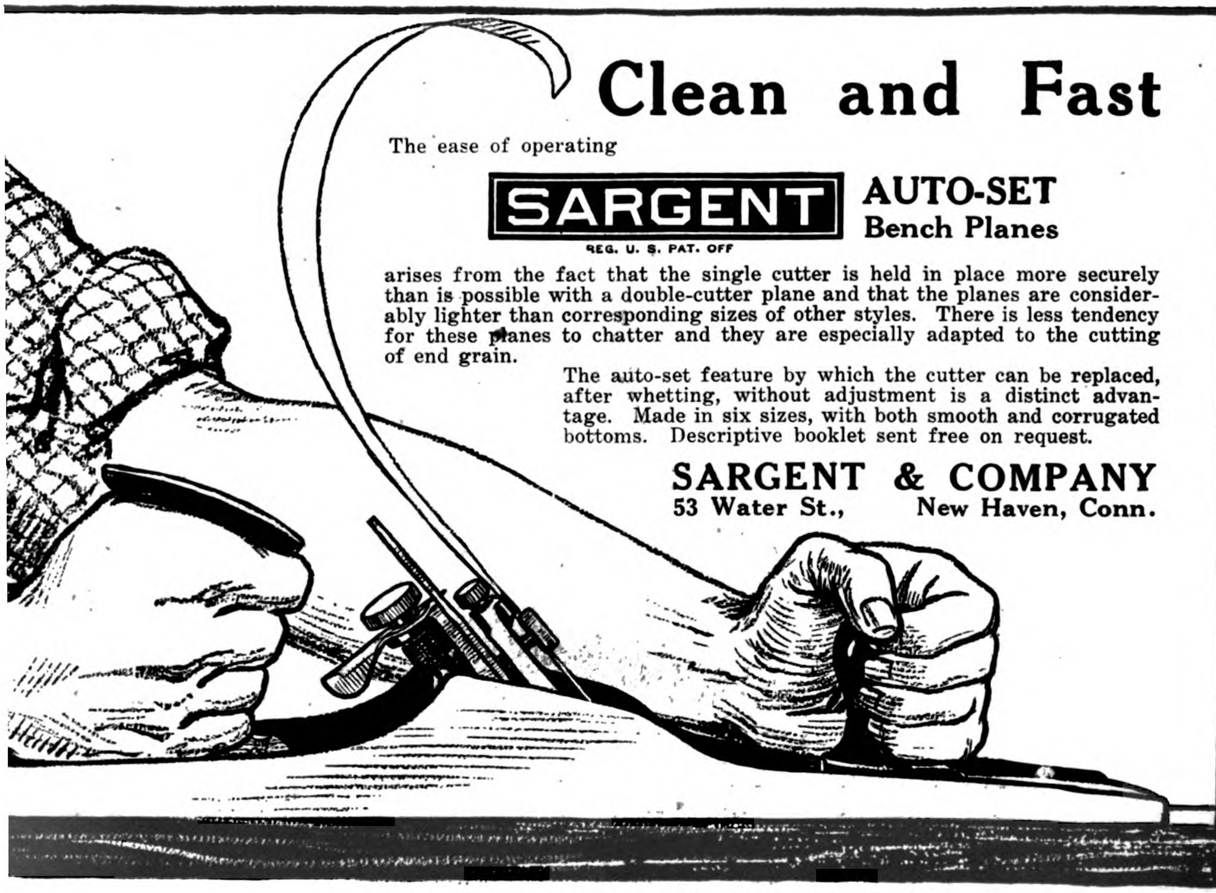

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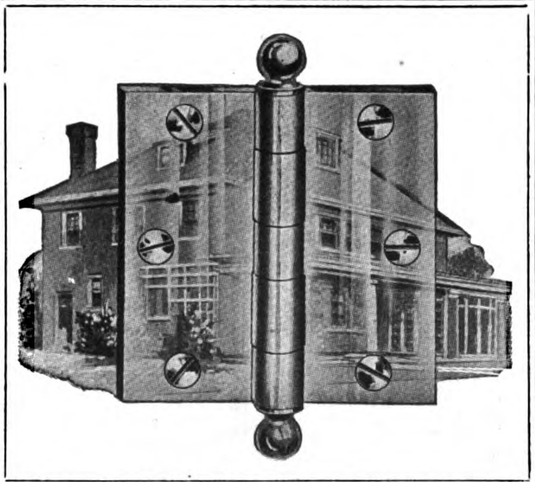

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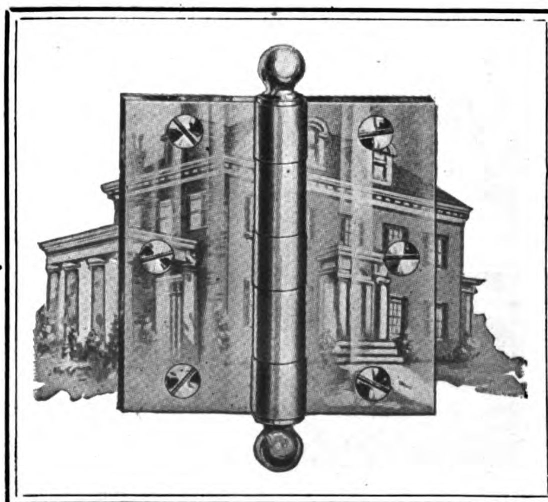

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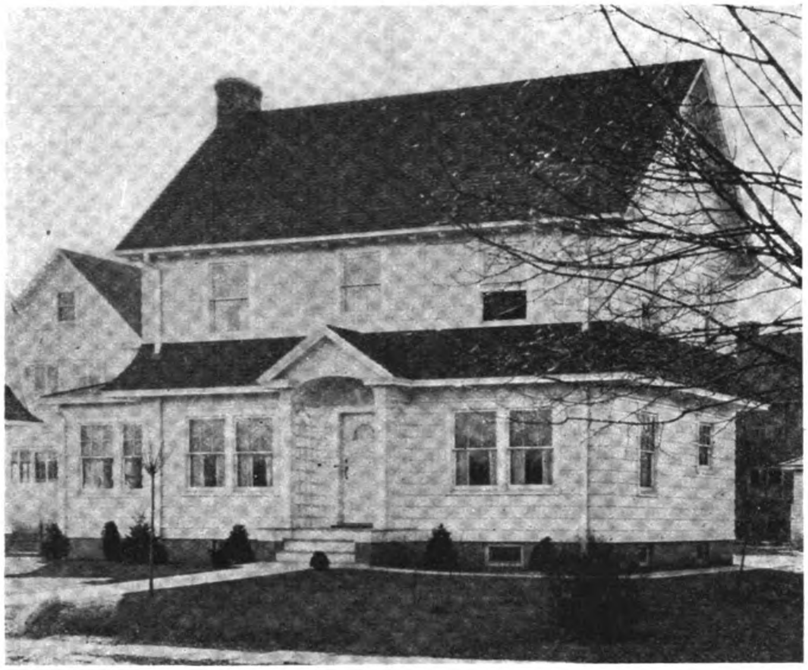
BUILDING AGE
New York, February, 1919

# A Colonial House That a Builder Erected for Himself

## Plan Is Well Laid Out with Exceptionally Economical Stair Arrangement



The house is of the plain colonial type so popular in many localities

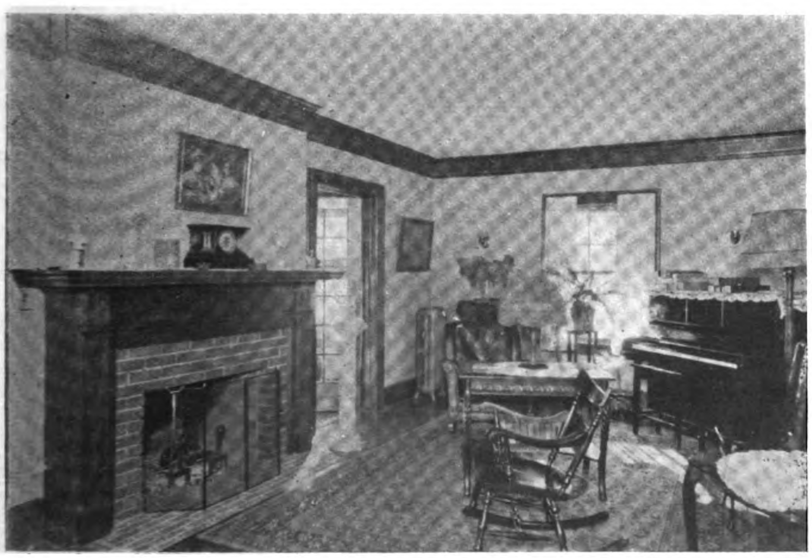
One of the reasons why the colonial house is so popular to-day is because the general tendency of home owners is toward simplicity and plainness. Fancy brackets and jig-saw work are in many localities now entirely out of style. Such localities especially turn to the severe colonial type, welcoming it for its plain unostentatiousness.

An excellent example of the severely plain colonial house is illustrated in this article. The familiar combination of white clapboards and green shingle roof is, of course, used. A shingled hood, pleasingly curved, is carried around the house; this aids to relieve an outline which might otherwise be too plain.

An inspiration from the Greek cornice is seen in the brackets placed under the overhang of the mainroof.

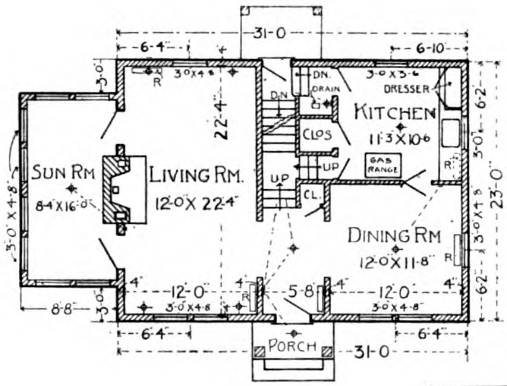
The doorway is well designed, being

The dining room. Trim throughout is simple, an effort having been made to keep down crevices where the dust might collect.



The living room is of pleasing proportions. At each side of the fireplace is a door leading to the sun porch

The hood is carried all around the house, being broken only above the rear entry porch.




typically colonial and well in keeping with the general style of the house. An important feature is the lattice at each side of the porch, with curved head to harmonize with the soffit of the porch roof.

The interior is well planned, with exceptionally economical use of space.

Entrance is had directly into a hall. Many small houses follow the bungalow style and omit the entrance hall altogether. In cold climates, however, the tendency is still to cling to the convenience offered by a hall; this is especially true in the colonial plan which makes a feature of the central hall. Certainly it is a bit more formal and private, for chance visitors are not then inducted directly into the living quarters where the family may be enjoying themselves. In such a hall, a coat closet is always desirable, for visitor's wraps can then be conveniently placed.

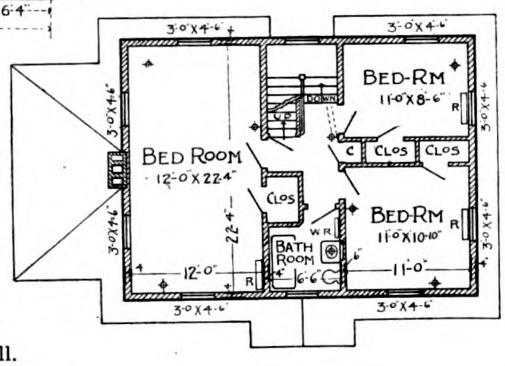
The arrangement of the stairs is well thought out, being based upon the combination front and back stairs plan. Frequently the stair door, instead of being placed in the kitchen, is placed so as to open on to the stairs swinging toward the front of the house. This enables the housewife to open the door and slip upstairs unobserved, being screened by the door.

The stairs to the cellar open on to grade, making it unnecessary to go through the kitchen when it is desired to reach the cellar from outside.

The feature of the living room is a brick fireplace, with wooden pilasters and mantel. On either side of the mantel is a door opening to the sun room.

On the second floor are three bed rooms. None of these, it will be noted, are separated by adjoining partitions. The two smaller bedrooms carry closets in the partition, and the large bed room is separated from the others by the bath room. This tends to keep noises communicating from one room to the other.

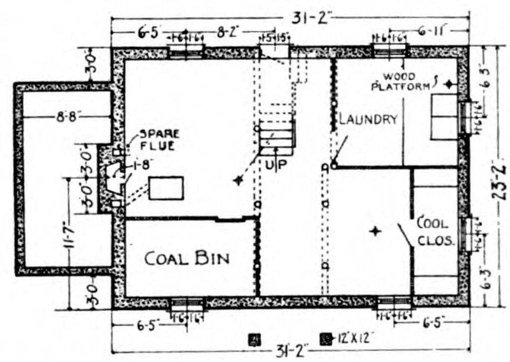
The trim throughout is simple. Indeed, plain, simple trim is especially desired by the housewife of to-day, for it keeps cleaning troubles at a minimum.




Elaborate moldings and ostentatious trim are regarded as dust collectors.

A spare flue is carried in the chimney. It is the architect's practice to place this wherever possible as his experience has proved that it generally comes in handy later when an extra fireplace, stove, etc., may be desired.

Plans and elevations, scale 1/16—1 ft. Note the economical stair layout. The three bedrooms on the second story are all so separated as to minimize passing from one bedroom to another.




This house has proved to be very popular. The building contractor who put it up for his own use and sold it before completion, is putting up a duplicate for himself.

This house is located at Montclair, N. J., and was designed by H. Messenger Fisher, architect, 483 Bloomfield Avenue, Montclair, N. J. The contracting builder was Berger Melin, 43 Brookfield Avenue, Montclair, N. J.

# How to Design a Flitch Plate Girder

## Only Simple Arithmetic is Used in This Article — Clear Explanation of How to Use Easily Understood Formula

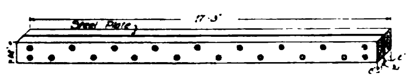
*By E. Reber*

Frequently in smaller work it is necessary to carry a fairly heavy load over a comparatively large span. This can be done in several ways, by a steel I-beam, by a wooden truss, or by a flitch plate girder. Often local conditions render the latter the best to use.

A flitch plate girder is built up of two wooden beams between which is placed a wrought iron or steel plate.

The three members are bolted together, usually by two ¾-in. bolts. These bolts are placed about 2 ft. on centers, and staggered as shown in the illustration. At each end of the girder are placed two bolts in the same vertical line, as shown.

The width of the steel plate is approximately 1/16 of the combined width of



A flitch plate girder for 17′ 3″ span.

the two wooden beams. The exact width of the wood beams depends, of course, on the kind of wood used.

In designing a flitch plate girder, it is necessary to proportion the wood and steel so that they will deflect or bend together. The thickness of steel must not be too great, as this would result in the steel carrying all of the load under certain conditions. Likewise, the wooden members must be designed so as not to take up that part of the load which the steel should bear.

The strength of a flitch plate girder, properly designed, is equal to the combined strength of the steel plate and the two wooden members. The steel plate is the same depth as the wood.

In designing a flitch plate girder, the size of the steel plate is generally assumed first. Then the load that the steel plate will carry is subtracted from the total load necessary. The remainder shows the load that must be carried by the two wooden beams.

In designing girders, it is convenient to make use of a formula. A formula is merely a kind of mathematical shorthand, easily understood. The formulas used in this article need no mathematical knowledge outside of ordinary arithmetic, and can readily be employed by any carpenter or builder.

We will use this formula to design a flitch plate girder to meet conditions outlined later.

$$W = \frac{r \times b \times d^2}{L^2}$$

The key to the letters used in the formula is:

$W$ is the load per lineal foot that the beam will carry.

$r$ is a constant from the table given below. The number substituted for $r$ depends on the kind of wood used.

$b$ is the depth of the beam in inches.

$L$ is the total length of the beam in inches.

The table giving the values to substitute for $r$ is as follows:

steel 256,000.
white oak 9710.
southern long-leaf or Georgia pine 15,007.
hemlock 7945.
douglas fir 12,359.
northern or shortleaf yellow pine, spruce, eastern fir 10,593.
redwood 6179.

*Example:* Assume that a beam is required to carry a safe load of 1000 lb. per lineal foot. The span is 17 ft. 3 in.

In designing a flitch plate girder it is usual to assume the size of the steel plate first. We will assume a ¾ in. x 12 in. steel plate.

We must now find the load that this steel plate will carry.

Use the formula $W = \frac{r \times b \times d^2}{L^2}$. Substitute the values given in the assumed conditions and table for the letters in the formula.

$r$ for steel is 256,000.

$b$, the breadth of the steel plate is ¾ in.

$d$, the depth of the steel plate is 12 in.

$L$, the length of the beam in inches is 17 ft. 3 in. x 12 or 207 in.

Knowing these values, the formula works out thus:

$$W = \frac{256{,}000 \times \frac{3}{4} \times 12^2}{207^2}$$

$$W = \frac{256{,}000 \times \frac{3}{4} \times 144}{52{,}849}$$

$$W = \frac{27{,}648{,}000}{52{,}849}$$

$W$ = 523 lb. in round figures.

Therefore the load that the ¾ x 12 in. steel plate will carry per lineal foot on the given span is 523 lb.

Now the total load to be carried is 1000 lb. As 523 lb. are carried by the steel plate, 1000 — 523 or 477 lb. must be carried by the wooden members. This is the total load to be carried by the two wood members. Assume that southern pine will be the timber used.

Use the same formula as before. All of the values are known except the breadth of the timber.

$$W = \frac{r \times b \times d^2}{L^2}$$

$W$ is 477, the load to be carried by the wood.

$r$ is 15,007, constant given by the table for southern pine.

$b$, the breadth of the timber, is not known.

$d$ is 12 in., since this was the assumed depth of the steel plate and the wooden members must be the same depth.

$L$ is 207, the length of the span in inches.

After substituting, the values are as follows:

$$477 = \frac{15{,}007 \times b \times 144}{52{,}849}$$

To find the value of $b$, transpose as follows:

$$b = \frac{477 \times 52{,}849}{15{,}007 \times 144}$$

Note how this transposition is done. The $b$ is brought to the left side of the equal sign, the 477 and present denominator of the fraction are put into the numerator, and the present numerator becomes the denominator.

$$b = \frac{25{,}208{,}973}{2{,}161{,}008}$$

$b$ = 11.66 or, in round numbers, 12.

Therefore the required total thickness or breadth of timber is 12 in. Since there are two timbers, each timber will be ½ of 12 in. or 6 in.

Therefore the flitch plate girder will consist of a ¾ x 12 in. steel plate bolted between two 6 x 12 in. southern pine timbers.

This result can be roughly checked up by remembering that the width of the steel plate is approximately equal to 1/16 the width of the beams.

Conditions on the job and local costs might render the designed size inadvisable. Then it would be necessary to assume a different size steel plate, which would require a different thickness or depth of wood.

In designing girders like this, it is advisable to consult the local market and see just what size steel plates are available, and the relative cost. Of course, the size should be calculated so as to be not only economical of material, but also that the result will be gained at lowest cost.

# Big Profits in Bringing Old Houses Up-to-date

## Unrentable Houses can be Remodeled Into Beautiful Comfortable Homes—Help Make Property More Productive

*By Bricksand Mottor*

**The house above can be remodeled into any of the three beautiful designs shown at the right. Scaled plans and elevations in this article show just how these alterations can be made.**

"I saw a mighty clever stunt put over in New Jersey," said Jameson as he and Jones were talking over ideas for booming new business. "A builder there has put over one of the most profitable remodeling ideas that I have seen in a long time.

"What was it?" Jones the builder has learned that Jameson was always getting in touch with new live-wire business methods. Jameson was traveling salesman for a big material concern, and had plenty of opportunity to pick up good ideas from the country architects and builders he visited.

"This chap, his name was Collins, had built up quite a remodeling and repair business during the war. In fact, he found this sort of business so profitable that he decided to devote quite a bit of his time to securing remodeling work.

"You see, the big feature of that is that there is but little competition for the man with ideas. When Collins suggested an idea showing how an old building could be brought up-to-date, he found that he could charge a price that made a nice profit on the job itself and could also tack on something for the value of the idea itself. As for all practical purposes his ideas were original, he had built up somewhat of a reputation for being a good man to consult when properties were not bringing in as much money as they should.

"Of course Collins began to have competition as soon as other builders saw the value of his ideas, but he has established himself well enough for that to affect him very little."

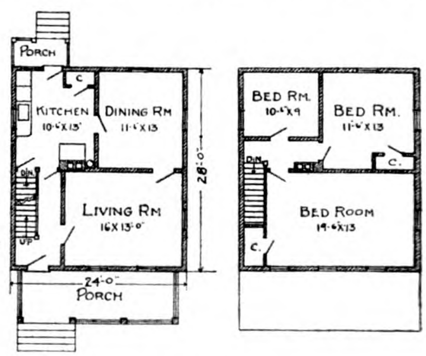
"I can see that if a man has ideas he can sell them," said Jones. "I've proved that to my own satisfaction. But I don't see just how you can get an owner to do expensive remodeling."

"Jones, you know something about architecture. Most builders do. In fact, I've had more than one architect tell me that some of the best of his ideas have come from speculative builders. Now you must put that knowledge to practical use.

"I'll tell you how Collins handled one of his best remodeling jobs. You can use the same idea here in your own town and make just as much profit as Collins did.

"Now Collins always keeps his eyes open when he goes through town. When he sees an opportunity for business he makes a note of the spot, and collects enough data for him to work up some ideas. He gets the owner's name, learning his financial standing and procures as much general information about the proposition as possible.

"One day he saw three of these old houses that curse pretty nearly every




**Plans and elevations of the original house. This is just an ordinary type of dwelling found in large numbers in most parts of the country. They are a drug on the market in many localities and can only be made remunerative by remodeling along lines suggested in this article.**

town. They were in a row and occupied one side of a short block. The houses were undesirable, hard to rent and tenants would not stay long.

"Collins decided that if he could show the owner how these houses could be turned into attractive, rentable homes, he would secure a good contract.

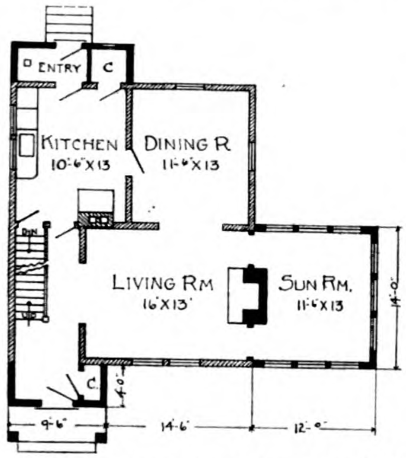
"So Collins laid out three ways in which the houses could be remodeled. Then he worked these elevations up into a perspective sketch which showed just how the three houses would look when remodeled. With a small camera he took a picture of the old houses. His idea was to contrast the photographs and the hard to rent and, worse than that, the tenants won't stay. Am I right?"

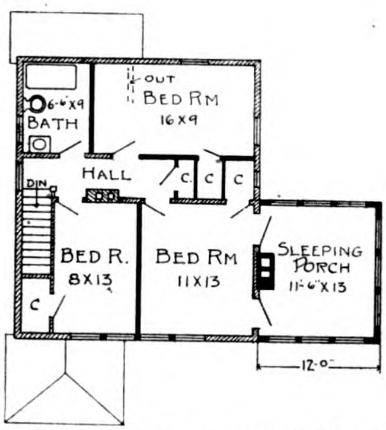
"Pretty much, Mr. Collins."

"Now when I saw those houses of yours, I was lucky enough to think of a way in which they could be made mighty attractive to renters in this town. The trouble with those old houses is that they are not much for looks and the plan hasn't got any of the features that people here are demanding.

"Now just look at the sketch which I've drawn up, showing how the houses will look when remodeled. Then contrast it with this photograph of the houses as they now are. the average rental of these houses for the last year with the rentals that can be expected when the alterations are made. Mr. Hawkes, the real estate man, tells me that you can rent them for even more than I say.

"But take my conservative estimate on





Plans and elevations of one way in which the house can be remodeled. The black lines in this and other plans represent new work, shaded lines represent untouched parts of the plan. Note how the addition of a sun room, fireplace and sleeping porch bring to this house the popular features of today

sketch so that the owner would readily visualize the improvement.

"Then he went to see Blake, the owner.

"Mr. Blake, those three houses down on William Street must be a drain on your pocket book," Collins said after having been invited into Blake's house. "They're

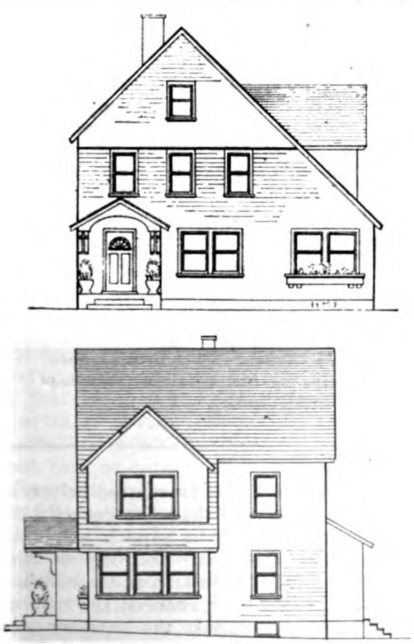
"Wouldn't these houses in the sketch rent quicker and at a higher rent than those in the photograph?"

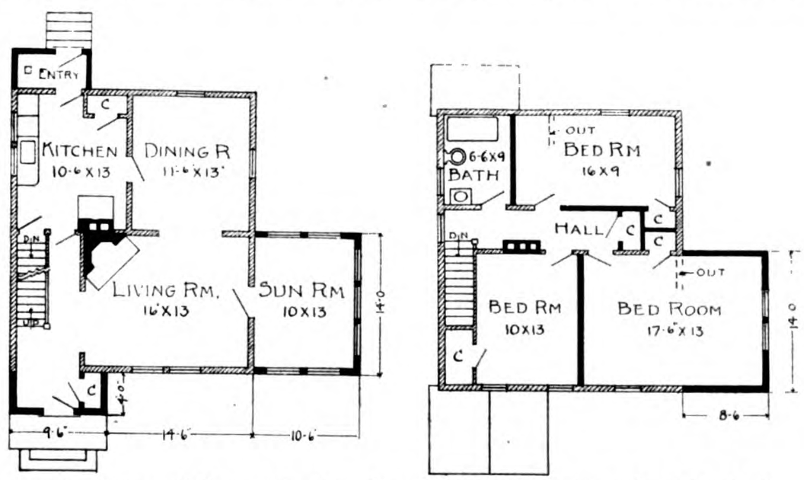
"It seems probable that they would," slowly replied Blake.

"And in addition, look at these plans. Do you notice how we can add a sun porch and a sleeping porch? These will bring the houses right up-to-date, especially with the bath room and the other alterations which I've sketched out.

"All of these alterations can be done very reasonably. Here is my contract price for the job. Now I've compared the rentals, compare it with the cost of the alterations, and you see that you can turn a proposition in which you are losing money into one which will pay you at least 20 per cent on your money. That is pretty good, isn't it?"

"Well, Collins talked a while longer after Blake checked up his rental figures. Collins was given the job. It netted him nearly $1,000 profit. That't a big profit on one job of that size. Collins made it because he cut down waste, used a bit of labor saving equipment that was suited to the work, and had developed several



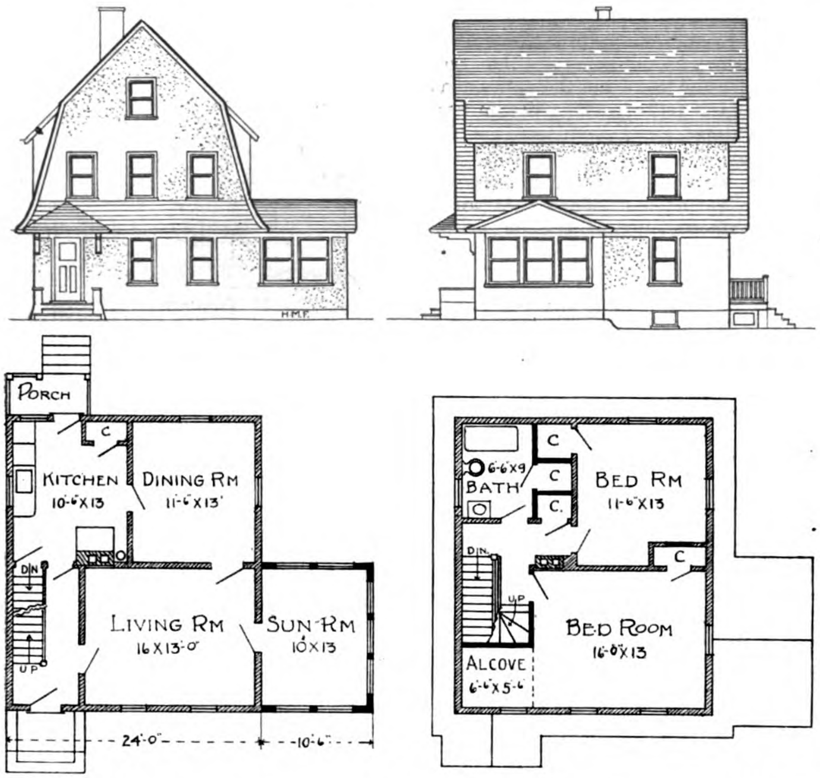



The house remodeled so as to present the popular long roof lines of to-day. By adding a sun room and another bedroom, and a fireplace in the living room, the house is brought up-to-date and made desirable.

men who were fast at remodeling work. Collins kept the same man at the same jobs as far as possible. This made every man thoroughly familiar with his particular specialty, and he naturally could work faster. Get the idea?"

"You bet I do. And it's a good one. There ought to be some of that kind of work in my town if I can locate it."

Jameson laughed. "There's plenty of work for the man with ideas, provided they are practicable. Work out selling ideas like those of Collins and you'll get quite a reputation in this section of the country. The man with ideas is never in need of a job."




**Rafters are planted on to give a gambrel roof effect and a sun-room is added. Note how the alcove of the second story front bed-room and the bath-room are treated. This is a cheap way of bringing this type of house up-to-date. The house can be left sided, or stuccoed over as shown.**

# How Heating in Bungalow Illustrated in Nov. Issue Should Have Been Installed

*By Frank K. Chew*

The cost of one extra ton of coal every year and the expense of an early replacement of the heater is entailed on whoever occupies or whoever owns the colonial bungalow shown on page 528 of the November issue, and all because of failure to realize the absolute importance of the heating equipment that has bearing for one-half of the year on the health and comfort of the occupants.

When the average man starts to build, he does not know that the essential features of the heating equipment assume equal importance with the foundation, which he knows must be secure. He knows that the roof must not leak, but apparently he does not know, and the architect and builder never realize, find out or tell him that the whole building scheme is a failure for six months of the year if the heating arrangements are not so designed and installed as to accomplish their work with the least possible hindrance.

In looking at the picture of the house and the plans, it will be recognized by the heating expert that the heating of it is not a matter of great magnitude, and yet the job is not economical or satisfactory. He will note from the basement plan that the portion under the large bedroom and bathroom is not excavated. He will notice that the wall around the cellar at the foot of the stairs offsets over to the right, possibly to avoid the expense of excavating a little more earth and to save the cost of larger joists that would have to be carried over to the girder under the bedroom partition or the price of an extra girder run under the living room-hall partition. The expense of the excavation and the extra cost for lumber would have been paid for in two or three years at the most by the extra coal that it will now be necessary to burn if the house is to be kept at a comfortable condition of temperature with the outfit that has been installed.

### Less Pipes and Larger

There are more pipes on the furnace than is necessary. There is only need for one pipe each to heat the living room and the larger bedroom, but each should be ample in size to maintain a comfortable temperature in these two large rooms. Some might use a 12-in. pipe because it would be short, but a 13- or 14-in. pipe might be considered better if the heater provided had the capacity to supply them. An 8-in. pipe is ample to heat either the small bedroom or the bathroom. This reduction in the number of pipes would have reduced the cost of installation, reduced the number of registers, and reduced the amount of pipe surface exposed which would lose

**Architects, even the best of them, do not give the heating equipment the careful attention it deserves. The colonial bungalow illustrated in the November issue was a remarkably fine specimen of architecture, unquestionably. The architect is one of the best known in the profession, and highly respected for his attainments. Yet the justness of the remarks of the author of this article are laid upon a firm foundation.**

**Mr. Chew is a member of the American Society of Heating and Ventilating Engineers, National District Heating Association, National Warm Air Heating and Ventilating Association, American Society of Sanitary Engineers, etc. He is also Editor-in-Chief of Metal Worker, Plumber and Steam Fitter, perhaps the leading publication in the heating field.**

**Considering the high standing of Mr. Chew, his remarks are worthy of being taken to heart by every architect and builder of small homes. They are uttered in the hope that they will aid in disseminating authoritative information on proper heating of the small home.**

**We expect to publish more articles by Mr. Chew on heating the small home.**

heat from the air raveling from the heater to the register. It would have enabled a return air duct to be taken from the corridor into the base of the heater, so that the outside air could be shut off entirely in severe winter weather, and the air provided the house would be circulated, which would further reduce the coal consumption. In addition to the plans previously mentioned, a little diagram is given to show the furnace correctly located almost directly opposite the base of the cellar stairs, and showing the run of the pipes to do the heating of the different rooms.

### Why Do Architects and Builders Neglect Heating?

Now the question of importance is: Why did the architect or the builder fail to realize the importance of the heating outfit? Why is it that the whole building profession generally looks upon the heating as an adjunct instead of as an essential feature that must have consideration from the time the first scratch of the pencil is made in the preliminary plans? Houses are occupied all the year round. There is absolutely no pleasure when they are not as comfortable for one six months of the year as they are for the other six months of the year.

There is nothing in building construction that should be allowed to interfere with the proper heating. The building construction could be arranged to facilitate the heating and to remove every possible hindrance so that comfortable house heating can be accomplished with the smallest amount of fuel. After the war, in the newer housing operations, both under Government jurisdiction and under private supervision, that advancement will not be made for which there is an exceptionally good opportunity unless better-planned heating installations are a feature of more widely recognized importance. From information which has come under notice, the Government has not been as careful in the installation of the warm-air heating plants which it has had installed in residences for working men as it has been for heating the various large buildings and other plants which it has erected. To fail to do this is to rob the family who is occupant of the house of its money and its comfort.

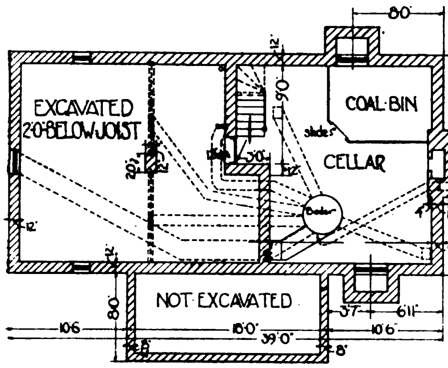
The assertions made about the heating of this colonial bungalow may be questioned unless some further explanations are given with reasons therefor.

The flow of air in all buildings (due to porosity of walls, leakage around doors and windows) is from the north and west toward the south and east. Consequently the heat should enter at the northwest of the center. Any room with two registers in it is likely to have the air from the room go down one register and mix with the warm air in the top of the furnace and reduce the temperature of the air coming out of the other register, and thus hinder the heating.

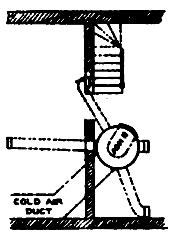
The warm air delivered into the northwest bedroom will hustle into the hall as soon as it can get there, and the room will not be well warmed with the register that happens to be working, so a larger volume of warm air from the larger pipe should be pouring in. With the larger and shorter pipes, there will be a sharper upward pitch, and the hot air must move. The heater will have the heat it develops absorbed and carried away, so it will not overheat. Consequently it will last longer and use less coal to do its work.

As stated at the outstart, it will save one ton of coal a year and last twice as long. That means in a period of 20 years, with coal at $8 per ton, an expense of $160 would be avoided, and, if the furnace cost $100 and had to be replaced every 10 years, the expense would be reduced to $50 for each period of 10 years, assuming that the furnace had to be replaced in 20 years, which is not necessary, as the Thatcher furnace in my house is still working, and it has served for 23 years without repairs to essential parts, only appurtenances like the smokepipe being replaced.

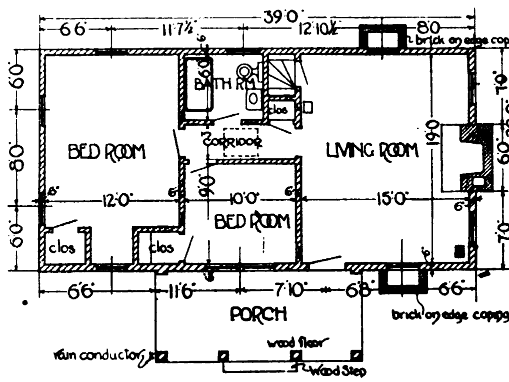
Build the house to be heated. Give the heater a show. Then whoever occupies it will save coal and money, and our national coal resources will serve longer and whoever owns the house will not have to make further expenditure to fire the heater. If it costs something more at the outstart to make the necessary provisions in the building, the cost will be insignificant and the interest on the cost far short of the cost of the enormous aggregate waste going on in a vast majority of so-called homes or bungalows that may please the eye but tax the financial and physical resources of the occupants.



The original heating layout



Effective economical layout



The room arrangement

# Stippling Interior Woodwork and Plastered Walls

A painter in Pennsylvania writing for information in regard to methods used in stippling interior woodwork and plastered walls in flat and gloss finish was answered through the columns of the Painters' Magazine as follows:

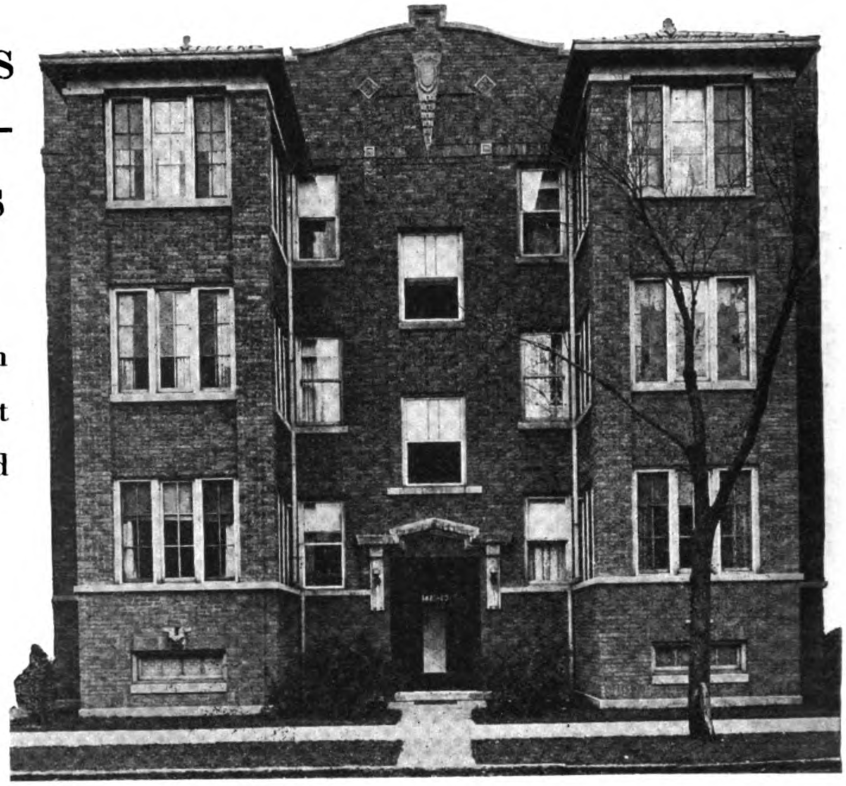
"The term 'stippling' in painting indicates a more or less rough but uniform effect rather than a perfectly smooth surface. It can be done in both flat or gloss finish, although the gloss finish will not be as high as it would be in the ordinary way of painting without stippling. In preparing the surface for this on unpainted woodwork or walls of plaster, at least two coats of lead and oil should be applied, with enough drier and turpentine in the second coat to make it dry half flat, whether the finish which is desired is going to be flat or in gloss.

"The paint for the stipple must be held rather stout in either case and contain enough drier to make it set within a few hours and must not show a tendency to run. The paint is applied in the ordinary way with round, full, bristle brushes to the woodwork and with 4-in. flat brushes to walls. While two men apply the paint on large jobs, one man uses a large stippling brush, oblong in shape, on the paint, when nearly set, in the same fashion as a pouncing bag is used in marking the letters on smalted sign.

"The idea of stipping is to obtain a more uniform surface that will not show brush marks. The stippling will show up to best advantage when the work is done quickly."

# Apartment Houses Are in Demand—Interest Investors in Your Locality

## Big Business Offered to the Man Who Can Build Apartments That Rent Quickly and Stay Rented



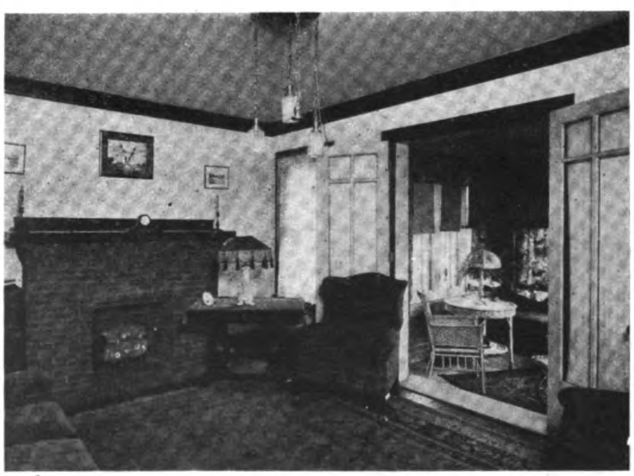
A six family apartment house that is popular with its tenants.

The apartment house appeals to a peculiar class of tenants, a class that is different in many respects from the ordinary house renters.

Apartment house tenants want comfort, style, convenience and freedom from household worries. Structures designed to meet their needs must take these considerations into account.

The outside of the building must be designed so as to make visitors think that the rentals are higher than they really are. Visitors, as well as prospective tenants, must feel that the structure is high class. This holds true even if comparatively poor people are to be appealed to.

In order to help create this impression, the front elevation is often faced with wire cut or mottled color brick, with as good a texture as possible.



Looking toward the living room fireplace, with a view of the porch beyond.

The entrance need not be large, but it should convey an appearance of richness. Stone of some attractive kind is often used to gain this effect.

Often the central part of the building is sunk back, as in the apartment house illustrated, evergreens or shrubs being planted in the set-back to help give the building an appearance of hominess.

As a general rule, it is a mistake to crowd the stairs close to the front entrance, unless the stairs lead directly away so as to give an appearance of spaciousness; a stairway starting at right angles to the entrance gives a bad impression in a small hall.

The upper halls, although usually finished much less expensively, should convey some feeling of self-respect, so the high class quality be maintained throughout the house.

In laying out the plan it is advisable to keep the apartment halls close to partitions dividing the apartments from each other. This helps to make each room quieter, and tends to avoid noisy apartments.

The living room should generally be at the front of the house and near the apartment entrance. If porches are possible, so much the better.

Fireplaces are popular, and if they are bona-fide, help to rent an apartment. Shams are to be condemned, as they are generally not used.

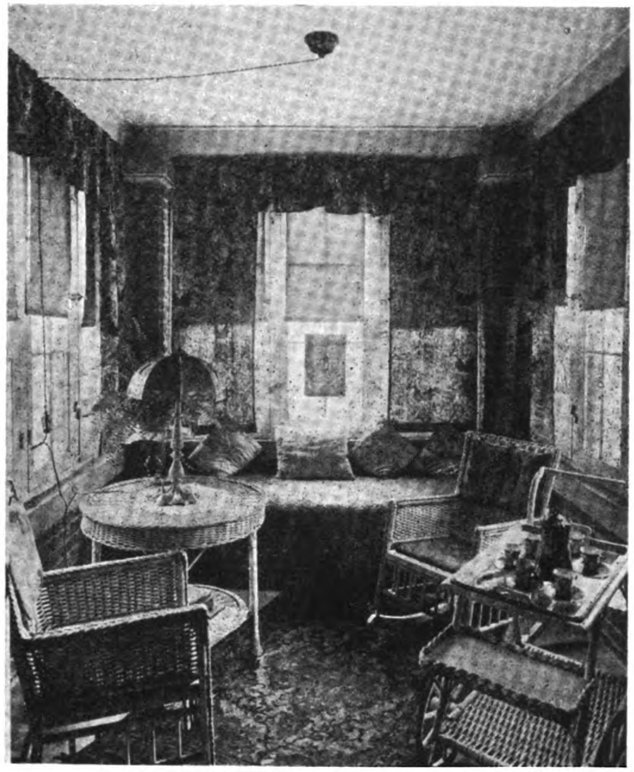
**Apartment houses are profitable. They generally bring a higher class of tenants to a district, thus tending to build up rundown localities.**

**Busy people of to-day often do not want the care of a house. The apartment affords an ideal solution of the home problem for such people. They have no care of furnace nor upkeep for repairs, and none of the little incidentals that frequently vex house owners.**

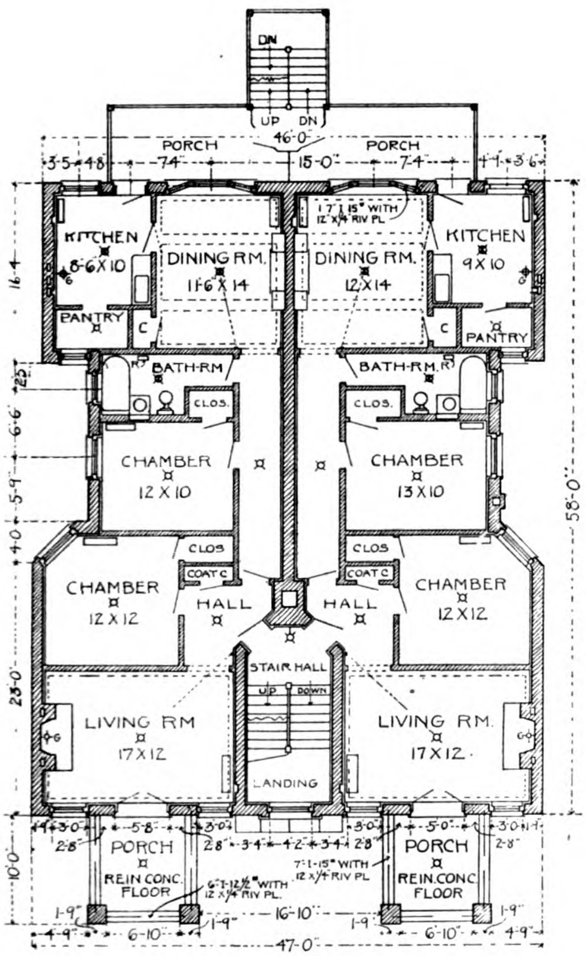
**For these reasons, apartments are popular with investors. If apartments have not yet invaded your locality, it is because the strength of their appeal to a certain kind of people has not yet been realized.**

**See what you can do to build business for yourself by interesting capital in such a venture. It will bring profits to you both.**

The back of the house. Each apartment has a rear porch.

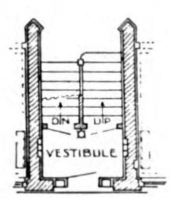


The porch is always a popular feature.




Typical floor plan, scale 1/16" = 1'

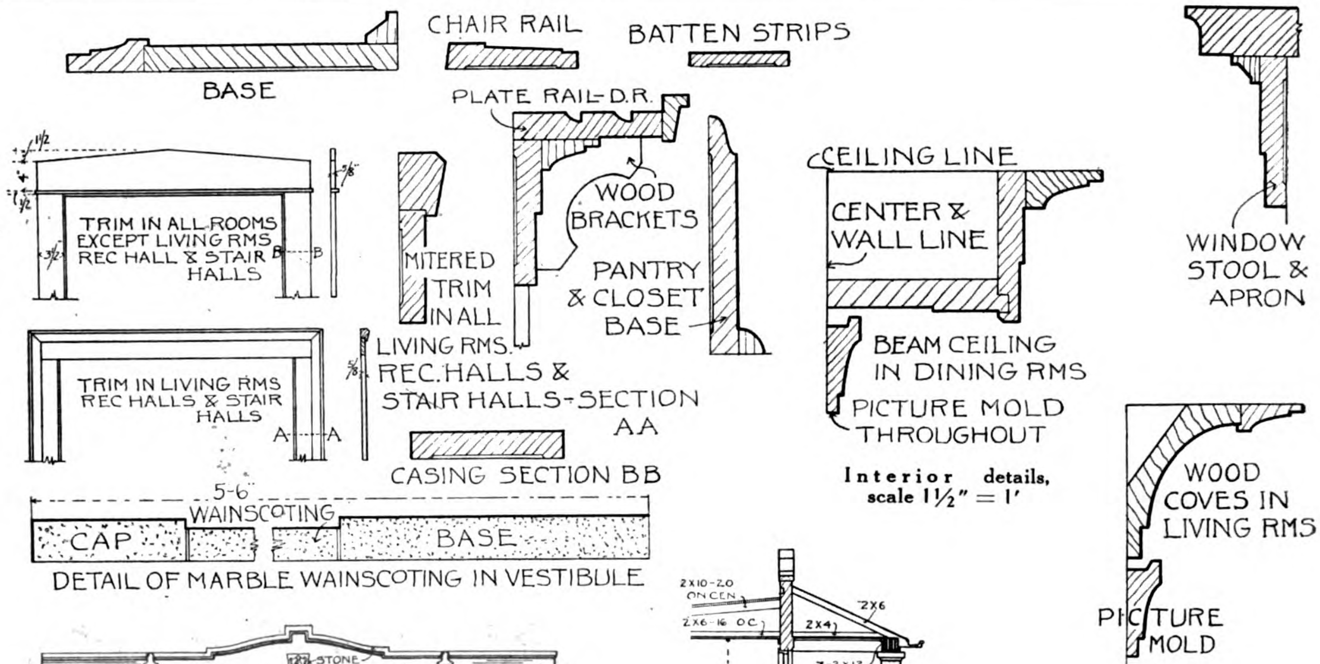
The dining room contains a built in china closet, and is attractively paneled.



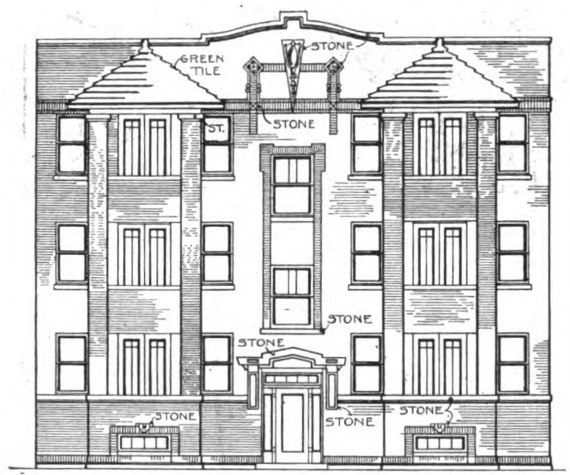

Plan of the entrance on the first story.

The living room, porch and coat closet in the hall are features that will attract and interest. The hall is shut off by a door from the front portion of the apartment, lending added privacy to the more secluded portions.

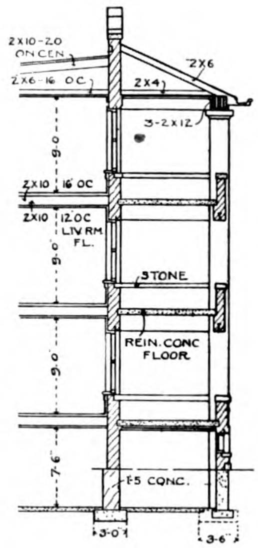
In keeping with the spirit of the small



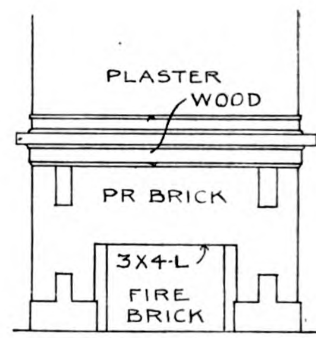

**Interior details, scale 1½" = 1'**




Front elevation, scale 1/16" = 1'




Cross section through front, scale 1/16" = 1'




Elevation of typical fireplace, scale ½" = 1'.

home, the kitchen communicates directly with the pantry, thus avoiding needless steps.

The trim is of birch. Floors are hardwood.

The roof is of composition, the porch roof of Spanish green glazed tile.

The front of the building is faced with pressed brick set in stained mortar.

This apartment house is located on Rosemount Avenue, Chicago, Ill., and was built for Wm. Ross in accordance with plans and specifications prepared by Andrew E. Norman, Architect, 1560 Beacon Avenue, Chicago, Ill.

# Industrial Housing in England

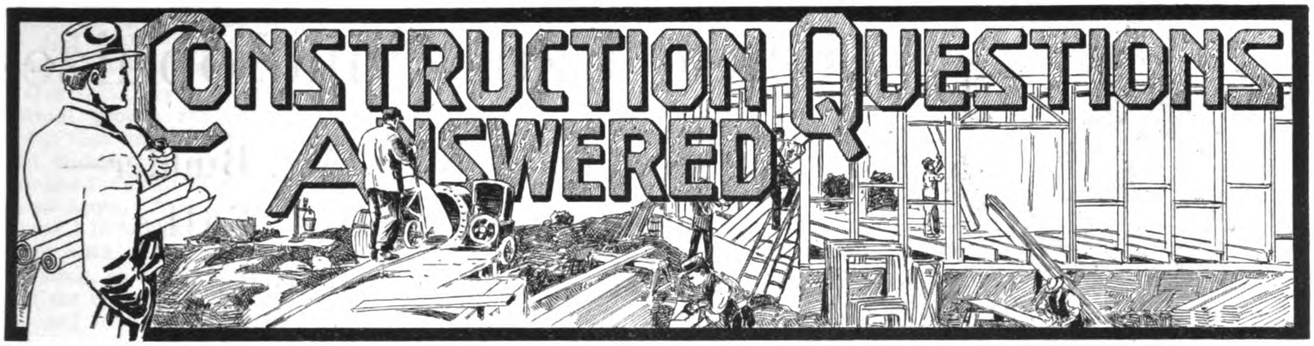
In England, as in this country, there is wide divergence of opinion as to just exactly the type of house and plan that will best meet the conditions of labor

*The Architects' and Builders' Journal* of London devotes considerable space in recent issues to the topic of industrial housing, and the standardization—if it may be so called—of a universal type of house.

In a recent article in that journal the following appears:

Then there are the people who do not worry about plans but go straight for detail—talk learnedly of the position of the scullery copper, and remind you how that useful domestic engine generates steam in the home on washing days, and implore you to banish the copper. There is the parlor school, who want to elevate the workingman by giving him a sanctum for the family gods, and their sternly utilitarian rivals who say, "No," that parlors are never used, and being dedicated to stuffy, solitude, spell waste, and so weaken the moral fiber of the workingman. There is the political school, which holds out hopes of cottages to men who vote blue, black or purple. "Small Owners," "Small Holdings," "Three Acres and a Cow," "The Big Loaf," "Back to the Land," are more reminiscent of electioneering than work accomplished. In the skillful hands of the politicians promises are freely made and used as narcotics, or a camouflage of their own evil intentions.

And now that the work must be done, and 300,000 cottages built, what are the proposals? The latest idea is the standard plan. All those in authority feel that somewhere or other there must be hidden a stock pattern plan of the ideal cottage, which, once discovered, can be used as a sort of stencil plate, and copies rubbed off and supplied gratis to all the authorities who want to build.




## How to Figure Board Measure

I wish to say in answer to the question which occurred in the November issue of the BUILDING AGE, with reference to lumber measure, that the shortest and easiest method I think is by cancellation and is performed in this way: Set down the number of pieces and the dimensions

| | |
|---|---|
| ~~12~~ 3 | 100 x 2 x 16 = 3200 ÷ 3 = 1066 2/3 ft. |
| | 2 |
| | ~~4~~ |
| | 16 |

underneath, and the length under the dimensions, draw a vertical line to the left and set 12 to the left of the line, and cancel all the factors as in other cancellation as shown by enclosed illustration.—J. N. SARTAIN.

## Putty for Wood and Steel Sash

**From G. L. E., New Mexico**—Kindly publish through your correspondence column the formula for the making of putty for setting of glass in both wood and iron.

**Answer—**

*Glaziers Putty for Wood Sash:*

Putty for wood sash is composed of seven parts whiting by weight to three parts of boiled linseed oil. After mixing, work thoroughly until of uniform consistency.

*Glaziers Putty for Steel Sash:*

Steel cash putty is composed of 70 per cent of calcium carbonate; 14 per cent of white lead; 14 per cent of extra heavy boiled linseed oil; 1.81 per cent of red oil; 19 per cent of lamp black in oil.

The above mixture when worked to a proper consistency makes a fine elastic iron cement.—W. G.

## Making Weather-Tight Roof Sash

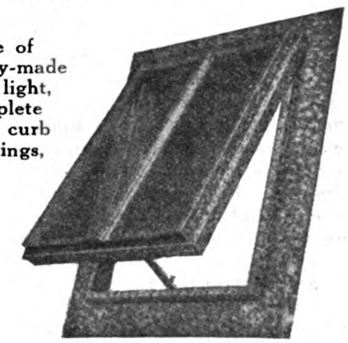
**From O. H. C., Idaho.** I have a building 50 ft. x 30 ft. to build in the spring to be used to pack apples in. As there will be a platform on each side and a shed on one end, all roofed over, so that windows can not be used in the walls, I would appreciate some information in making roof-lights or casings water-tight.

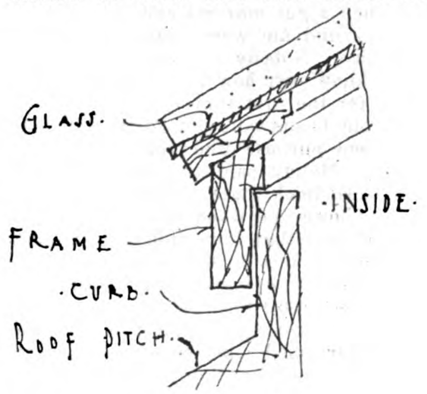
**Answer.** The type of roof lights you can use when you build your apple house and shed is what is known as a roof ventilating sash. This not only gives the maximum amount of protection against inclement weather but it also can be arranged to open and ventilate should that be desired or necessary for any reason.

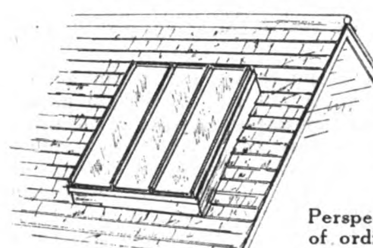
Ventilating roof sash may be constructed either of wood or sheet metal, and are generally set over a properly flashed wood curb which usually has the same pitch as the roof. The complete arrangement is very simple and entirely similar to roof scuttle construction, with the details of which you are no doubt quite familiar.

To give an idea of what would be considered a typical construction and the manner in which roof sash should be built, a few illustrations are given showing details of the construction in both wood and metal, also an illustration of a type that may be procured ready-made, curb flashing and all, the setting being the only requirement for installation.—W. G.

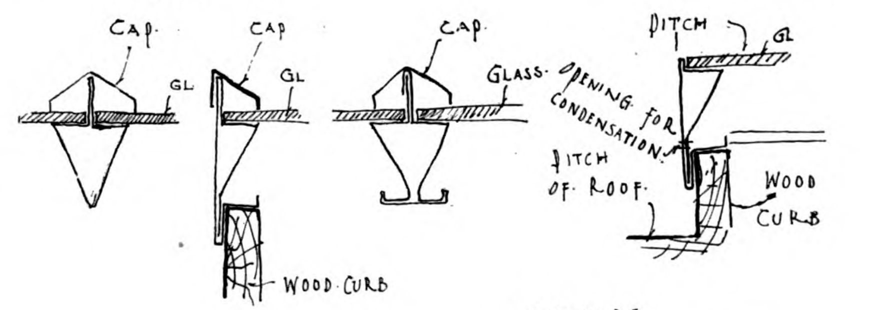
Type of ready-made roof light, complete with curb flashings, etc.

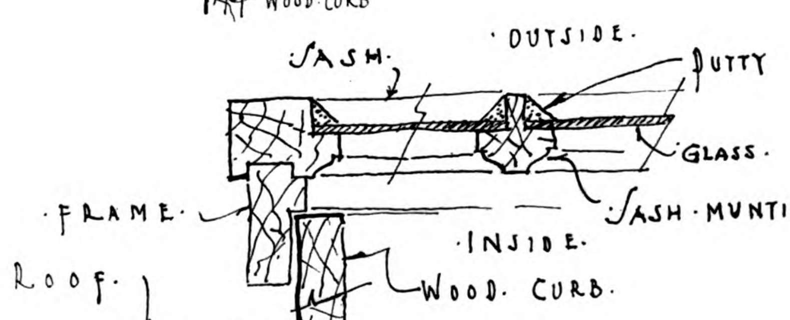




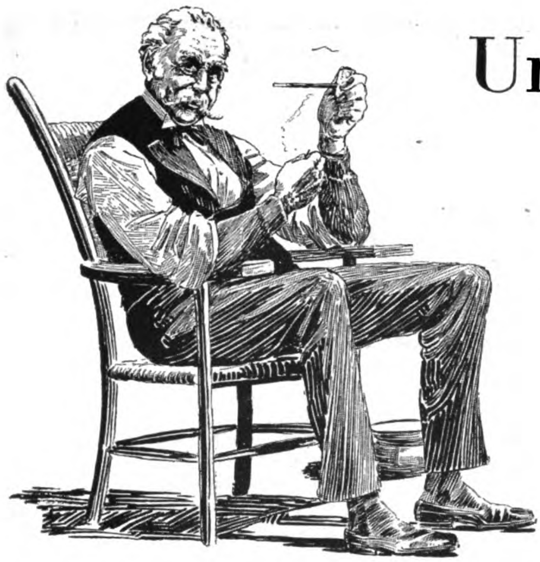



Perspective of ordinary roof sash.




Details Showing How to Construct Weather-Tight Roof Sash



# Uncle Ezra Philosophizes

## Meet Uncle Ezra, Mr. Builder—You'll Enjoy His Talks on His Trials and Tribulations in the Building Game

*By D. P.*

Somebody said a long time ago, and it must have been a right smart while, for I've heard it all my life, "that everything comes to him who waits." Somehow the saying never appealed to me, for I'm not one of those fellows to wait for anything to happen. I've found in a good long experience that the fellow who waits too long is the one who holds the bag while the other fellows are eating Malaga grapes for breakfast. My way has always been to go after things, and if nothin's doin' to start somethin'. And while I'm no scrapper I've found that's the best way to get along in this vale of tears.

But to get back to the waitin' game. I don't know but that in *some* things it is just as well to wait, for sometimes things do come your way. What I'm trying to get at is this: I've been waitin' ever since Hec was a pup for a chance to tell some of these fellows a few things and just what I thought of them, and here comes along the BUILDING AGE and gives me the chance I've been waitin' for.

Mind you I don't want to say nothin' mean about anybody, for that ain't my way of doin' things, but just to explain a few things in a fatherly and beneficent way that apparently has pestered a whole passel of folks. And the milk of human kindness is oozing out of every pore in my hide.

### There's no Such Thing as Luck—It's Hard Work That Counts

I've got on in a wordly way, and I've got on good, too, if I do say it myself, but what's always got my nanny, as my grandson says, is that people have always been talking of old Ezra Brown's luck. Now young man let me tell you something, and you can carve it on a tombstone or print it in a book: There's no such thing as luck in business. Don't be bamboozled by any street corner loafer or gin mill philosopher as he cocks one leg over the other and squints at you knowingly and says: "Oh, it was just a matter of luck that he got through with that deal; many a better man has fallen down on a much more promising proposition." This so-called luck in business, freely translated means just this: A little foresight, the exercise of the God-given faculty of common sense and plenty of hard work.

### I Figured That My Head Was Made to Use

When I got married and settled down Mandy and me were skatin' on mighty thin ice. Nobody but her and me will ever know just how thin it was. It was then for the first time it occurred to me that our heads were put on our shoulders for some purpose other than pure adornment. Mandy said that somewhere in the Good Book there was some reference to a "hewer of wood and a drawer of water" and that they didn't think much of such a fellow in the next world and I know myself he is a dead one in this incarnation. So I took stock of myself like this: I'm strong and healthy, I'm a good carpenter and I must be a pretty decent sort of fellow or Mandy wouldn't have married me. I had been a pretty steady going young fellow. I belonged to the church and several fraternal organizations and I had two shares of stock in one of our local banks, which the cashier had given me for a job I had done for him. I'll tell you about that bank stock later on.

### A Man Who Builds Houses Ought to Own the One He Lives In

Then it occurred to me that it didn't look just right for a man to start out to build houses for other people when he didn't own the one he lived in. So we talked it over. I got all my ready money together and Mandy chipped in hers and out we went to the suburbs of our little city and paid a good part on our new house with a vacant lot on each side of us and started in right. It was a big lot of money for us, but we decided not to worry but to dig in and do the best we could.

Did the thought ever come to you as you were walking along what you would do with a certain piece of property if you owned it and had the money to make the improvement you had in mind? That was my line of thought then and I asked Mandy what she thought we could do in the way of suggesting improvements to our neighbors. Quick as a flash she got the idea, and suggested that I go to see Mr. ——, the cashier of the bank who had sold me the stock, and tell him about a sun porch we were talking about the other night.

### New Ideas Build Big Business

Now a sun porch was a brand new thing in those days and there wasn't anything like it in the whole country around. I had always been a careful reader of my building magazine and Mandy said it was my Bible, but of course she was only joking me, because I did then, and do now, put a powerful lot of stock on magazines that bear on my business. Well, in the last issue of my paper some fellow had told about this newfangled porch. Now the banker was some pumpkin in our town and he had a young daughter who set things going for the other girls and was the last word in what to do and what not to do. So the next day I went to see the banker and told him I had something to show him that would interest him and his family. That night I went to his house and explained the proposition to him. He seemed half way willing to begin with and when he put it up to the women folks it was just like taking a stick of candy from a baby. Then the banker made me feel mighty good by saying he had his eye on me and that he wanted to see me get on. So we agreed on terms at once, and bless you he sprung another share of bank stock on me in part payment. I really didn't want the bank stock, as I needed money, but I figured it would be better to take the stock and trust to his example bringing me other trade. And it did too. I did a good job for him and when it was done I had half a dozen other orders for the same kind of a job for other folks.

### My Ideas Build Reputation

At the end of a year I was pretty well established as a jobber, and had done about every kind of a job that comes to a man who is handy with a hatchet and a saw. I had built barns, chicken houses, repaired porches and front steps, put a cupola on a church and built sidewalks. In fact I soon had a heavy business and had to hire help. But here's what pleased me most. For every job that I went out and got by soliciting, at least two came to my shop from my old customers or from new ones. Of course I soon began to feel pretty chesty and wanted to branch out into bigger work.

Our little city had had a steady and normal growth for several years, but about that time a couple of big factories had moved from a nearby city and the demand for small houses for workmen became acute. A little further out from where I lived there was an old run down farm with a few ramshackle buildings standing, or rather leaning on it. I had had my eye on it for some time and had mooned over its possibilities as an investment, but had never seriously contemplated buying the tract. But conditions at that time were promising for a building venture and I decided to make the plunge. There wasn't much difficulty in getting the land, but it took practically all the ready money I had or could borrow to make the first payments.

The workmen in the factories were well paid mechanics and I had figured on building ten one-family houses and selling them to these workmen. My plans in the rough were to get the property, arrange for the building loans, a certain amount of credit from the lumber dealers and trust to my ability to sell the houses off in a short time. Now all such plans are very rosy in your mind's eye, but when you put the figures down on paper, and meditate over them of an evening with your old pipe in your mouth, you are quite likely to get a jolt.

**How I Financed a Project**

There's no use in going into detail about how I figured—the older builders will understand what we were up against in those days and the younger ones have got new fangled ways of financing such propositions now. But the figures showed me that by the time I had finished paying interest I would have mighty little left for my work and the building material man would come nearer being the owner than me. So I had to get another bull by the tail. Remember this was my first venture and I wasn't as familiar with swinging such a proposition as I am now, and if worry and sleeplessness ever make men gray I ought to have been as gray as an old dominick rooster in the first six weeks.

But I got down to brass tacks after a while and this is what happened. I went to my banker friend and laid the whole proposition before him. He was a cautious man, but progressive enough along sane lines. I told him my story, how much I had paid for the land, showed him my figures and what was in my mind as to its possibilities. The upshot of it was that he told me to go ahead and the bank would see me through. I was a stockholder he said and the directors all knew me. Of course I thanked him, walked out of the door like a sane man and went home. But my actual feeling was that I was wafted out of the window on a gentle zephyr and sailed through a balmy atmosphere and was gently deposited at my door in a state of supreme exhileration.

My first venture seemed a big success to me and was the beginning of a number of successful operations. I played fair and everybody else played fair with me. Those first houses of mine are standing yet. I misrepresented nothing and the buyers were satisfied, and when a buyer is really satisfied, believe me, you have done something. But don't imagine for one minute that I've had clear sailing all these years. That is far from being a fact. There have been times when I didn't think I had any more chance of pulling through than a Chinaman has of getting his share of mixed ale at an Irish picnic. Of course things go wrong with all of us and its just what we've got to expect. If you've got to lose on a job, lose like a man but don't shirk the job. There'll be another one coming along soon and it won't do the least bit of harm to believe that you are going to make up what you've lost and then some. Just keep on plugging, keep a stiff upper lip, and after a while you'll see that things will be coming your way and there'll be a nice dish of Malaga grapes on the table when you go down to breakfast.

And now just another word before I'm through with this old man's talk. I know I haven't told you anything new, and I haven't tried to, for it's never been my business to write pieces for a building paper. I never was a Rollo boy and it goes to follow that I did not develop into one of those turn the other cheek men who trust implicitly in divine qualities slumbering in your fellow men. A man discovers this work-a-day world of ours is no Elysium the first day he buys his first razor. But at the risk of appearing something other than jist what I am I'll say there's a good deal more in the Golden Rule than is generally accepted and understood by most builders.

# Country House Details--V

## How to Frame Various Types of Cornices—Rafter Sizes in Relation to Spacing

*By A. Benton Greenberg, Architect*

Whatever type of cornice is used, whether box or open, the framing of the principal members is practically the same. A 4 x 4-in. or 4 x 6-in. plate is securely spiked to the top of posts and studding. Each rafter is then, in turn, spiked to the plate.

Rafters are of various sizes, depending upon their length and position. They are made as small as 2 x 4, but these are allowable only for roofs of small porches, and in no case should they exceed 8 ft. in length. For rafters up to 12 ft. in length, 2 x 6-in. should be the minimum. For the ordinary dwelling, 2 x 8-in. rafters are recommended. Every rafter should have a bearing on the wall plate of at least 3 in.

These rafter dimensions, however, are not absolute. There are many conditions which affect the size of these timbers. A Georgia pine rafter, for instance, will span a length about one-third greater than a hemlock rafter of the same size. Rafters that are spaced 20 in. on centers will not carry so much weight as those placed 16 in. on centers. Roofs that are plastered or those that have heavy covering, such as slate or tile, will require larger size or closer spaced rafters than roofs that are not plastered or have light covering, such as shingles or tin. The prudent builder, therefore, will carefully calculate the size of the rafters just as he would the size of joists or girders.

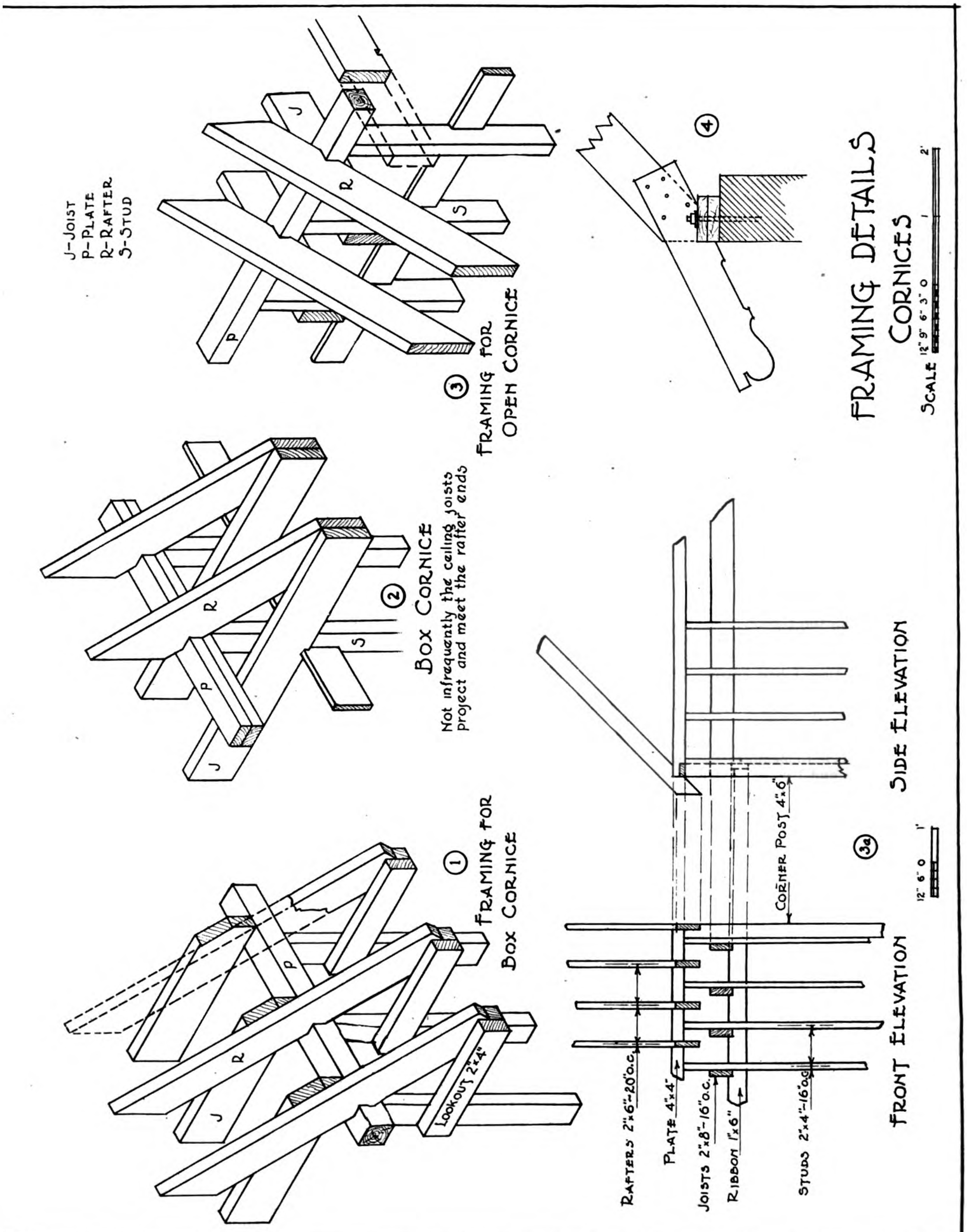
The use of long, heavy rafters should be discouraged. They add unduly to the weight and cost of the building. It is more advantageous to use a light rafter supported by purlins or partitions, thus reducing the unsupported span to about 10 ft., than to use a rafter of heavier dimensions unsupported along its entire length.

Rafters are spaced 16, 20 or 24 in. on centers. They are spaced 16 in. on centers in better class buildings. This spacing although increasing the number of rafters and consequently the weight of the roof, nevertheless permits of an economical cutting of wood laths, gives four nailings to each lath, and results in a good plastering job. However, since the walls and ceilings of the attic are never subjected to the same strain as are those of the lower floors, a satisfactory plastering surface will be obtained if the rafters are set 20 in. or even 24 in. on centers. A 24-in. spacing is preferable to a 20-in., for then there would be a minimum cutting of the wood laths, which are always 48 in. long.

If there are any rooms in the attic, 2 in. x 8 in. joists should be used. These joists rest either on the plate, in which case they are spiked to plate and rafters; or, on a ribbon, when they are secured to the studs only.

To provide a nailing for the soffit or planceer of a box cornice, two methods are available; (Fig. 1), 2 in. x 4 in. lookouts are nailed to each stud and rafter, thus allowing for a wide projection or overhang; and (Fig. 2) the floor beams re extended out to meet the foot of the rafters. The latter is a much more substantial construction, though not always available.

In open or bungalow cornices, the rafters themselves project beyond the wall to form the eaves, see Fig. 3, or else false or show rafters, plain or ornamented, are nailed to the base of the main rafters. The latter are cut off flush with the outside face of the wall plate and the show rafters spiked to



them and to the plate, as shown in Fig. 4. These false rafter ends are usually of better quality than the common rafters and are often sawed to pattern. Not infrequently they continue in the same line with the common rafter, but more often they are set at an angle to it, thus giving a graceful sweep to the roof line, as illustrated.

The angle of inclination that the rafter makes with the plate, is known as "pitch." It is sometimes expressed in degrees, but more often as a fraction the numerator of which is the rise of the rafter, i. e., the perpendicular distance from the top of the plate to the top of the rafter, and the denominator of which is the span of the roof, i. e., the horizontal distance from outside to outside of plate. Thus if the span is 24 ft. and the rise 6 ft., the pitch would be ¼.

The pitch of a roof or of the rafters composing it, depends primarily upon climatic conditions. In warm, tropical countries, where there is plenty of rain fall, the slope would be less steep than that required for roofs of houses in countries having heavy snow storms. The material used as a roof covering also affects the degree of inclination of the rafters. Thus a roof covered with shingles needs less of a pitch than one covered with slate; while one covered with tile needs less of a pitch than a slate roof. In general, however, a half-pitch makes the best roof, both from the standpoint of appearance and strength.

Fig. 3a is a working drawing giving the common sizes of the various parts of the cornice shown, in isometric, in Fig. 3. The builder or contractor who is desirous of learning architectural drawing will find the illustrations, in this and other plates of the series, of inestimable value.

Referring again to Fig. 4, the reader will see that but little change is required to adapt the wooden cornices for frame buildings, shown herewith, to brick buildings. In fact the only structural modification is the increase in the size of the plate from 2 x 4 to 2 x 6 or 2 x 8 timbers and bolting them to the brick or stone wall, instead of nailing them to the studding.

# Early Stages of Readjustment Finds Lumber Market Promising

## Advanced Price Lists Expected in Some Items—Demand to Increase

The new year at least offers lumber and construction interests a clear field ahead. Restrictions on capital issues, priorities on materials, price-fixing, curtailment of construction by Government order have all passed away with the old year.

The outlook for construction is not unclouded. There are problems of finance and prices, and labor adjustments to be met and carefully guided in the right channels before even a start can be made toward re-building the worndown places. But the most significant indications of an early return of normal conditions that the new year offers is the fact that construction interests are doing something positive to bring about the readjustment. The more actively every force in the industry gets under way behind these endeavors the more effective will be the result and the sooner will the readjustment be accomplished.

### The Crux of the Financial Situation

Bankers at present are generally disinclined to loan money to workers who wish to build homes for themselves, on the claim that lowering cost of construction would endanger their mortgages. The refutation of such claims is founded on the statement that the price paid by a wage earner for his house is relatively unimportant, since 95 per cent of this cost eventually returns to him. It is for the banks to choose between high costs and high wages on the one hand, or low prices, accompanied by unemployment. Prosperity goes hand in hand with high prices, while depression brings its own risk of failures. The financial encouragement of banks, sustained by intelligent public opinion, and by the sincere co-operation of the building trades, may have a valuable influence on the present aspect of the ever-present and vital labor problem.

The whole situation is encouraging. Even at the present moment, little more than two months since the cessation of actual hostilities, reports from various lumber and building authorities in the Metropolitan district show a gradual upward trend. The Government is conducting an organized campaign to encourage new building in order to keep labor employed and to avoid business depression. Before long, these efforts will bear fruit. It is true that prices are high, but the bulk of all building has been done during lumber dealers' periods when prices were high, rather than in depression periods when prices were low.

The dominating factor in the lumber market to-day is the question of price, or, rather, the uncertainty as to the increase or decrease in values. Popular opinion seems to prevail, particularly on the part of manufacturers, that prices will jump in the very near future on the assumption that present levels do not take care of the cost of production and labor. The recent price increases of Southern Yellow Pine seems to emphasize the truth of this opinion. At any rate, lumber dealers who, at the time of the signing of the armistice, were dubious if prices would "drop through the bottom" or not, are now of the firm conviction that prices, generally have held and will in all probability continue to hold.

The lumber market is substantially unchanged in general aspect. Business is not what one would call active, but is "promising."

### Advanced Prices Expected

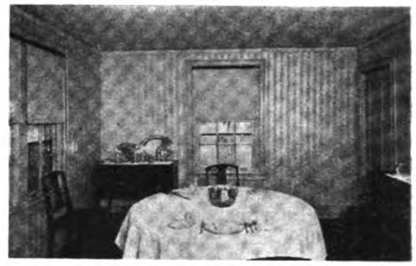
An advanced price list is looked for in Canadian Spruce. This, however, does not mean that dealers in this item are being flooded with "biz." However, with England making huge demands on the Canadian forests and with the expected building boom, a shortage is looked for with consequent higher prices.

Demand for lumber, especially hardwood, promises an increase almost immediately in the furniture line, a peace essential, but in the war largely a non-essential. Furniture manufacturers in the country are preparing for an unprecedented era of prosperity. It is said here that many plants, long since used for production of other lines of goods, will soon be making furniture.

Conditions are quite the same in the Southern pine market, with dealers in this item taking advantage of the export department which is gradually assuming shape. This demand is materializing faster than the expected lumber demand in building.

Another month or so and all items in the lumber market will begin to look up. With weather conditions favoring, building will start and the Peace Conference allowing, exporting will boom. Optimism is the spirit of the hour. A. C. S.

# Effective Handling of Modern Materials in a Moderate Cost House

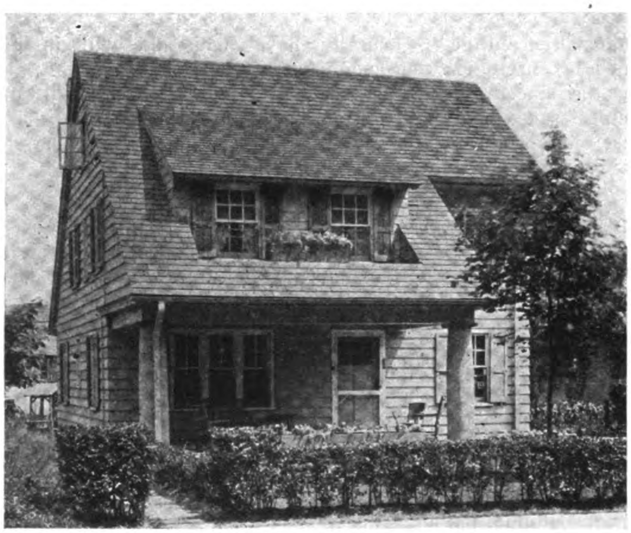


The dining room. Note how the striped paper gives apparent added height and spaciousness to this small room.

## Materials Carefully Selected and Scaled to Harmonize Vertical and Horizontal Lines

The planting around a small house has much to do with the attractiveness of the finished structure. A few evergreens well placed, a hedge serving a definite function, flower boxes on the house itself, all serve to beautify the house and aid it to catch the eye.

The suburbs of Philadelphia have developed a number of worth-while ideas in planting which aid to secure both privacy and attractiveness. Hedge planting especially can do much to secure privacy. In the house illustrated, a popular idea in its locality is carried out. The hedge is carried across the front of the house next to the walk, then down toward the side of the porch. A hedge is also carried down the other side of the walk. The advantage of this arrangement is that as soon as the hedge grows high enough, a well screened porch and front yard will be secured, free from the gaze of passers-by. The flower boxes on the front of the porch will do much to serve the same purpose.



Note the gradually increased weathering surface of shingles from ridge to eave, which harmonize with the vertical lines of the well-proportioned siding.

The lines of the house itself are of the long, sweeping type so deservedly popular. A front dormer is carried out to a flat deck on which rests a flower box. Such a flat deck is very attractive but the objection is frequently raised that if it is not properly drained, snow may collect in winter and water be forced into the house. This danger is, of course, not present in proper construction.

The wide siding has the effect of lowering the apparent height of the house, and secures a much better effect than it would be possible to gain through the use of narrower siding. The manner in which the exposure of the shingles is graduated so as to side in with the wide siding is decidedly interesting. Notice how over the porch the wide exposure of the shingles sides in excellently with the siding.

The first story carries solid shutters, while the second story carries blinds.

The fenestration has been unusually carefully studied for a house of this inexpensive type. The window and door openings are particularly well proportioned, and placed so as to effect a well lighted interior. Windows throughout are of the double hung type, with casements on the third story where limited window height renders them advisable as they render available the full height of the window, which double hung windows do not do. A curious feature in that the front and rear of the house are practically alike in the main features.

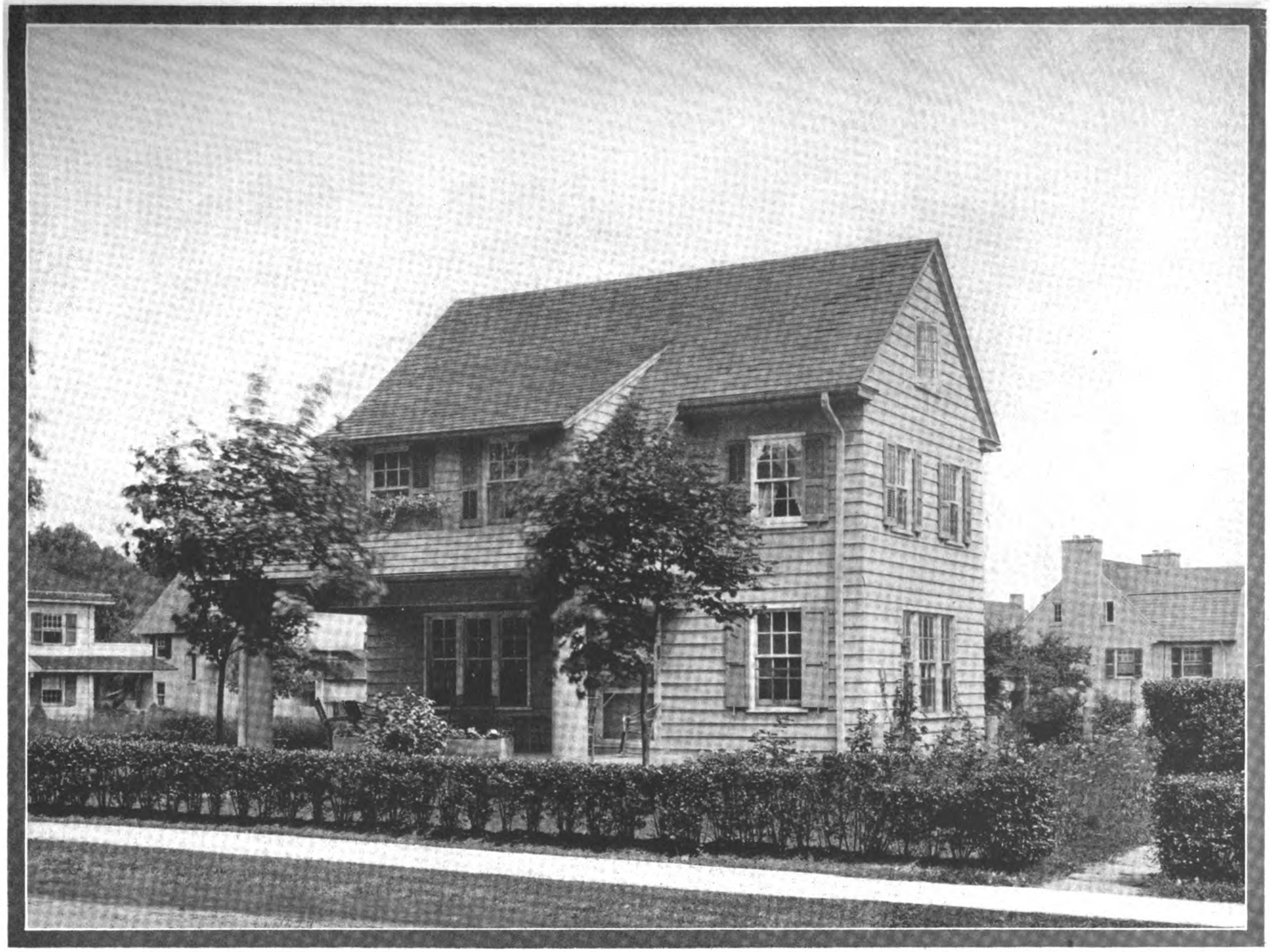
Entrance is had from the front porch directly into the living room. This is a large, well lighted room, the main feature of which is a brick fireplace. At the right of the fireplace is a book closet; at the left, the staircase.

The arrangement of the stairs is decidedly interesting. They are so placed as to enable one to go from the kitchen directly upstairs without the possibility of being seen from the living room. The particular manner in which this is managed is worthy of careful notice.

The dining room is semi-separated from the living room by a colonnade, which forms an attractive division. The dining room communicates with the kitchen through a pantry, the doors of which are so placed that one cannot look through from dining room to kitchen. The pantry contains the stairs leading to the cellar.

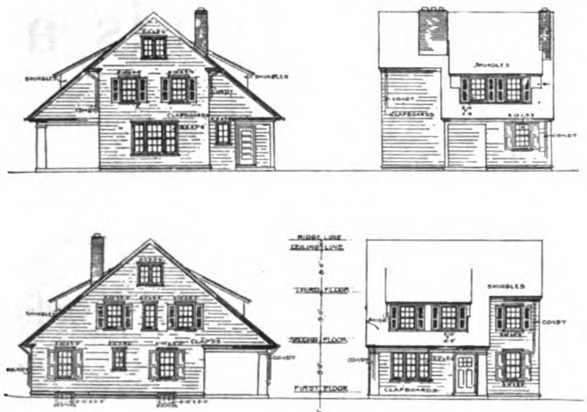
The second floor contains three bedrooms and bath. One of the bedrooms contains a brick fireplace, to the right of

The rear of the house is designed upon the same idea as the front.

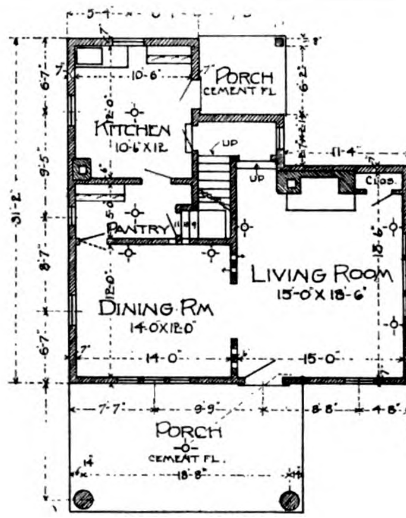


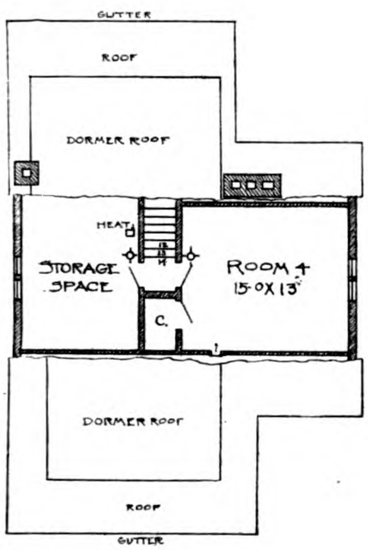
Supplement to Building Age, February, 1919

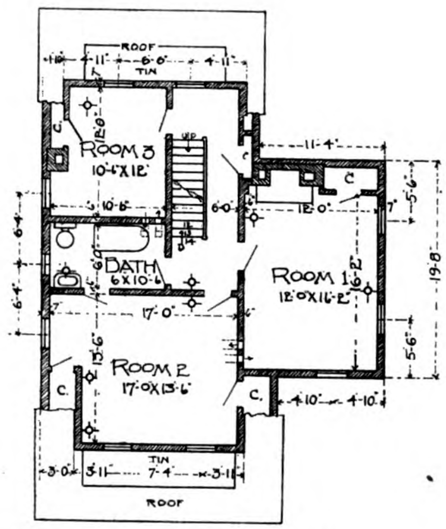
House at Haverford, Pa. McIlvain & Roberts, Architects

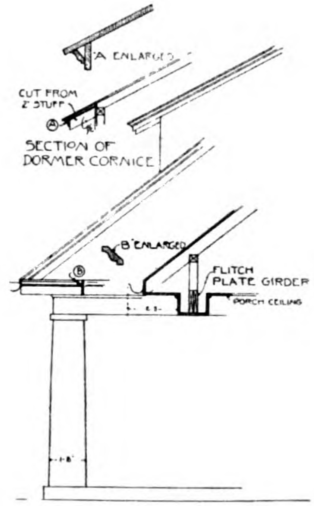


Elevations, scale, 1/32 in. = 1 ft.



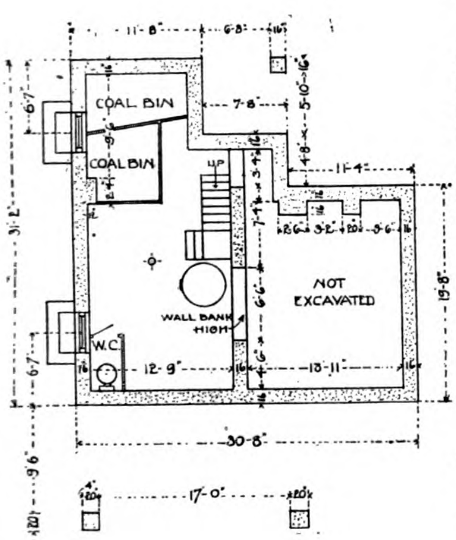




Plans, scale, 1/16," = 1 ft.

Details of porch cornice, scale, 1/8 in. = 1 ft.




which is a closet. All of these second story rooms are well provided with closet space.

The lavish use of electric wall fixtures throughout the house is worthy of notice. In the dining room, for instance, one is placed on each side of the sideboard, thus giving plenty of light there. The fixtures in the living room are placed one on each side of the side windows. Thus furniture placed to receive natural light has also the benefit of artificial light coming from exactly the same direction. For a room much used, especially for working, this is an important feature.

This house is located at Wynnewood, Pa., and was built in accordance with plans and specifications prepared by McIlvain & Roberts, architects, Land Title Bldg., Philadelphia, Pa.

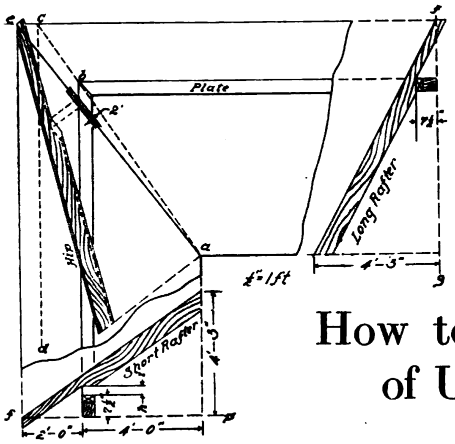
## Lock Joint for Flooring

*By E. S. Jessup*

This is my own invention, but is not patented; any one is welcome to use it. Fig. 1 is used for hardwood flooring and Fig. 2 for ceiling, softwood, etc.—*Wood-Worker.*


Fig. 1—For hardwood floors.


Fig. 2—For soft woods, ceilings, etc.




# Practical Methods and Details of Roof Framing--V

## How to Find Lengths and Cuts When Roofs of Unequal Pitch Adjoin.

*By Lawrence S. Keir*

**Fig. 30—Part plan of roof where veranda is carried part way around house, with different pitch on each side. This installment shows how to accurately figure the cuts.**

Sometimes where a veranda or other roof is carried around a corner the roof on one side is a different pitch than on the other, and yet it is desired to have each side show the same amount of projection beyond the plate and at the same time have the cornice come even all the way round at the outer edge. Fig. 30 represents a part plan of such a roof. The run of rafters on the short side is 4 ft. and on the long side 8 ft. The rafter tails are to project 2 ft. beyond the outer edge of the plate. Rise of roof from outer end of rafter tails to top of rafters where they connect with the building is 4 ft. 3 in.

The dotted line drawn from across the corner of the plate at *b* will strike the line representing the outer edge of the projection or cornice at *c*, and if the hip rafter were to follow this line, the projection on the narrow side of the roof would be narrowed to the *c* to *d*. For this reason the run of the hip rafter is on the line *a* to *e* and, as shown, crosses the plate a little way short of the corner.

On the wide side of the roof a common rafter is drawn to scale and the plate where the foot of the rafter sets as it is shown to be 7½ in. above the line *f*, *g*.

On the narrow side a rafter is drawn with the same rise above the line *f*, *g*, as was done on the wide side. The plate on the narrow side is also 7½ in. above the base line *f*, *g*, but as the run is shorter on the narrow side the roof is steeper and the foot cut of the rafter does not touch the plate by the distance *h*, *i*. The hip rafter will also come short the same amount, coming, as it does, on the narrow side. Therefore, the plate on the narrow side of the roof will require to be raised higher than the plate on the wide side by the distance *h*, *i*.

Because of the number of fractional parts of an inch involved, a problem of this sort is troublesome to handle by use of the steel square, as the numbers are apt to be confusing. To do away with the necessity of remembering so many fractions many carpenters get at the lengths and cuts of the rafters by means of a scale drawing in which each foot of the actual drawing is represented by 1 in. on the plan. This sort of drawing is generally known as a draft and different carpenters have their own favorite methods of working them out, and each carpenter is sure that the method he uses is the best.

Such a draft is shown at Fig. 31. The problem is nearly the same as at Fig. 30.

The heavy lines represent the width of the roof on the two sides together with the runs of the rafters. The light outside line shows the amount of projection or overhang of the rafters beyond the plate. Rafters are spaced 2 ft. on centers.

Having drawn the draft to the point at a scale of 1 in. to the foot, next draw on each end of the plan, at any convenient point, the two base lines *a*-*b*. Measure from *b* to *c* the total rise of rafters from outer end of tails to upper edge of the rafters where they hit against the building. In this case it is 4 ft. 3 in. A line from *c* to *a* gives the total length of rafter and from *c* to *d* gives the length of rafter from the building or ridge, as the case might be, to the outer edge of the plate.

Parallel to (*a*) (*b*) and 2½ in. away from *d* draw (*e*) (*f*), which gives the rafter tail, its line drawn square back from the plate, from (*f*) toward (*g*) gives the seat or foot cut.

Having developed the two end rafters measure up from the base line to the foot cut, and it will be found that we

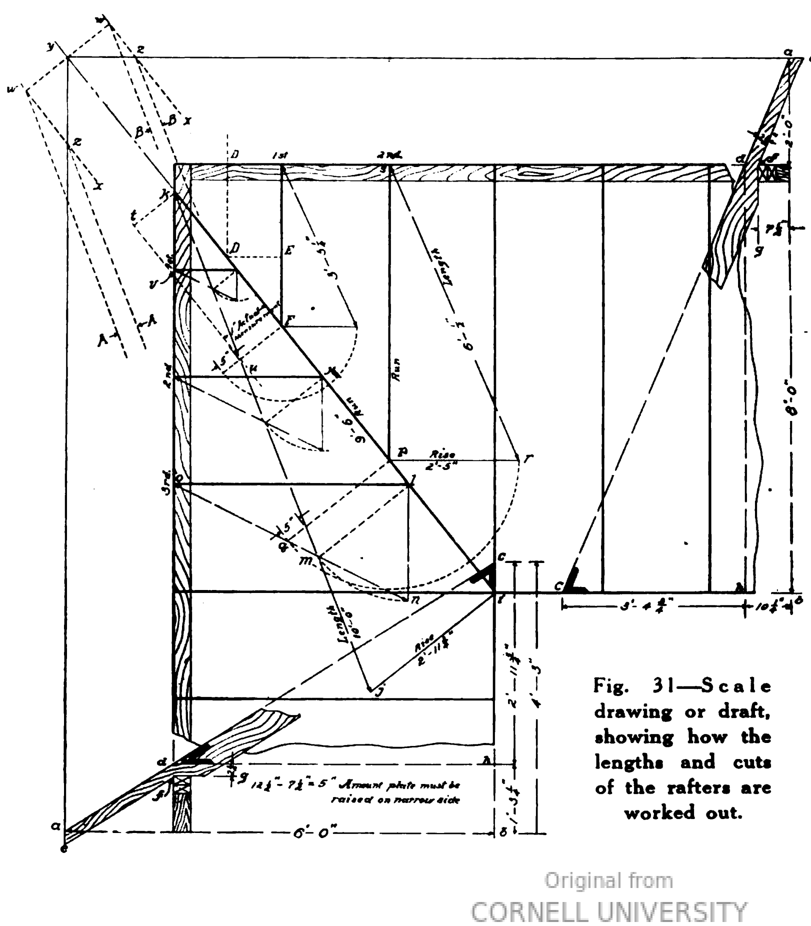



**Fig. 31—Scale drawing or draft, showing how the lengths and cuts of the rafters are worked out.**

have 7½ in. on the wide side and 12½ in. on the narrow side. The difference between 12½ in. and 7½ in. is 5 in., so the plate along the narrow side as far as the corner will be raised 5 in. higher than the plate on the wide side.

Draw the construction lines (*d*) (*H*), measure from (*h*) to (*c*), and it gives 3 ft. 4¾ in. as the rise of rafter on the wide side and 2 ft. 11¾ in. as the rise of rafter on the narrow side. If the hip crosses the plate on the narrow side the rise of hip will be 2 ft. 11¾ in. Also square out from the line (*i*) (*k*), which is the rim of hip rafter, and draw from (*i*) to (*j*) the rise of hip 2 ft. 11¾ in., connect (*j*) and (*k*), and we have the length of the hip which, by measuring with the scale, will be found to be 10 ft. and the rim of hip to be 9 ft. 6½ in.

With 9 and 6½ twelfths on the blade of the square and with 2 and 11¾ twelfths on the tongue, the tongue gives the plumb cut and the blade gives the foot cut of the hip rafter. The length of the hip can be laid off with a tape, pole or any other convenient way.

Taking 3 and 4½ twelfths on the tongue and 8 on the blade tongue will give plumb cut and blade will give foot cut of common rafter on wide side, and measuring from (*c*) to (*d*) will give 8 ft. 4½ in. as the length.

The common rafter on narrow side is found in the same way 2 and 11¾ twelfths on tongue and 6 on blade, giving the cuts and the distance from (*c*)

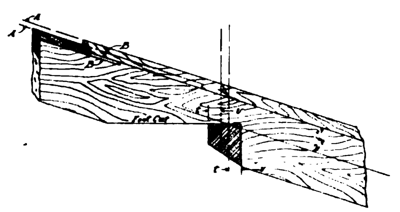


Fig. 32—Practical application of the method illustrated in Fig. 31

to (*d*) giving the length. Notice that the rise of rafter on the narrow side is 5 in. less than on the wide side, as it was necessary to have the plate raised 5 in. on the narrow side to bring the outer ends of the rafter tails even.

For convenience the numbers taken on the square to obtain the cuts can be doubled or, if preferred, the angles of the plumb and foot cuts can be taken from the draft as indicated by the miniature bench at (*c*) and (*d*).

Square out from the base line (*i*) (*K*) of the hip and draw the line (*i*) (*j*) equal in length to the rise of rafters on narrow side of the roof, or 2 ft. 11¾ in. Measuring from (*j*) to (*k*) gives 10 ft. as length of hip rafter, not counting the overhang, of course, as the rafter tails are extra and are usually cut off after the rafters are in place. The main thing is to be sure they are long enough to reach out to the cornice line. Foot and plumb cuts for the hip can be gotten by taking 9 and 6½ twelfths on blade and 2 and 11¾ twelfths on tongue of square or a bevel can be used.

Lengths of jack rafters are found as follows, first the third, or longer jack, on the narrow side. Where the line representing the rim of the jack strikes the rim of the hip rafter at (*l*) draw the line (*l*) (*m*) square out from the valley, and connecting the line representing the length or slope of the hip rafter at (*m*). With (*l*) as center and (*l*) (*m*) as radius draw the arc from (*m*) to (*n*). Now square out from the base line of the jack rafter, draw the line (*l*) (*m*), cutting the arc at (*n*), and we have the rise of the jack, and measuring across from (*n*) to (*o*) will give the length of the jack. Plumb and foot cuts will be the same as for a common rafter on the same roof that the jack rafter is on. The other jacks on this side will be found in the same way.

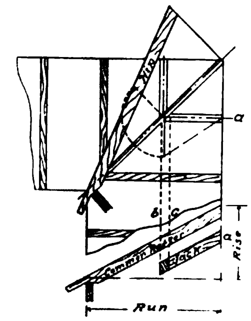
On the wide side of the roof, the plate being 5 in. lower, the rafters will have 5 in. more rise than on the narrow side, so that the line (*p*) (*q*) on the second rafter on the wide side will need to be extended 5 in. beyond the point where it crosses the line representing the length of the hip rafter, as shown. The length (*p*) (*q*) is then swung around to (*p*) (*r*) and square with the rim of the jack. Then measuring from (*r*) to (*s*) gives 6 ft. ½ in. as the length of the jack. The other jack on this side will be worked out in the same way.

Where the hip rafter crosses the plate at (*K*) there will be a side bevel to the foot cut. Parallel to the rim of the hip and a distance away from it equal to half the actual thickness of the hip rafter draw (*t*) (*u*). Supposing the rafters to be 2 x 6 material. Then the line (*t*) (*u*) will be 1 in. away from the base line of the hip. Draw from (*k*) to (*t*) square out from the base line and the distance (*t*) (*v*) will be the actual amount on the real rafter that should be measured square back from the plumb of the foot of the rafter on one side and square forward on the other side. This is shown at Fig. 32, where the distance (*t*) (*u*) have been transferred from Fig. 31 but are only one-quarter the size.

Backing for the hip can be found by drawing the lines (*w*) (*x*) and (*w*) (*x*) 1 in. on either side of the base line (*i*) (*k*) (*y*). Draw (*w*) (*w*) square with the base line and cutting the corner of the cornice line as shown. At the same pitch as the hip rafter, which will, of course, be parallel with the length line of the hip, draw the lines (*w*) (*A*), (*z*) (*A*) and (*w*) (*B*), (*z*) (*B*), the distances (*A*) (*A*) and (*B*) (*B*) when scribed along the top edge of the hip rafter on their respective sides will be the actual line to which the wood will be removed when chamfering the edges of the rafter to form the backing. These measurements are shown transferred at a reduced scale in Fig. 32, where a short section of the rafter is shown backed.

To find the cheek cut of jacks on the wide side. One inch from the rim of the first jack draw the line (*D*) (*D*) and square across from (*D*) to (*E*). The distance from (*E*) to (*F*) is the amount to be measured ahead of the plumb line on one side and back of the plumb line on the other to give the marks on which to cut for the cheek cut or side bevel. The same method will find the cheek cut on the narrow side and is the same as was used in Fig. 27. Remember to deduct half the diagonal thickness of the hip rafter measured square back from the plumb cut of the jacks. When the hip does not pass over the corner of the plate at a true angle of 45 deg. then half the diagonal thickness of the hip is not just the exact amount to deduct, but it is near enough for most purposes. The exact amount can be found by measuring from the

Fig. 33—Application of the method where the two sides of the roof form a valley.



point (*u*) where the line (*t*) (*u*) crosses the rum of the second jack on the narrow side over to (*H*), where the rim of jack strikes the rim of hip (*u*)-(*H*), is the exact measurement for jacks on the short side of the roof. The measurement for the jacks on the other side can be found in the same way.

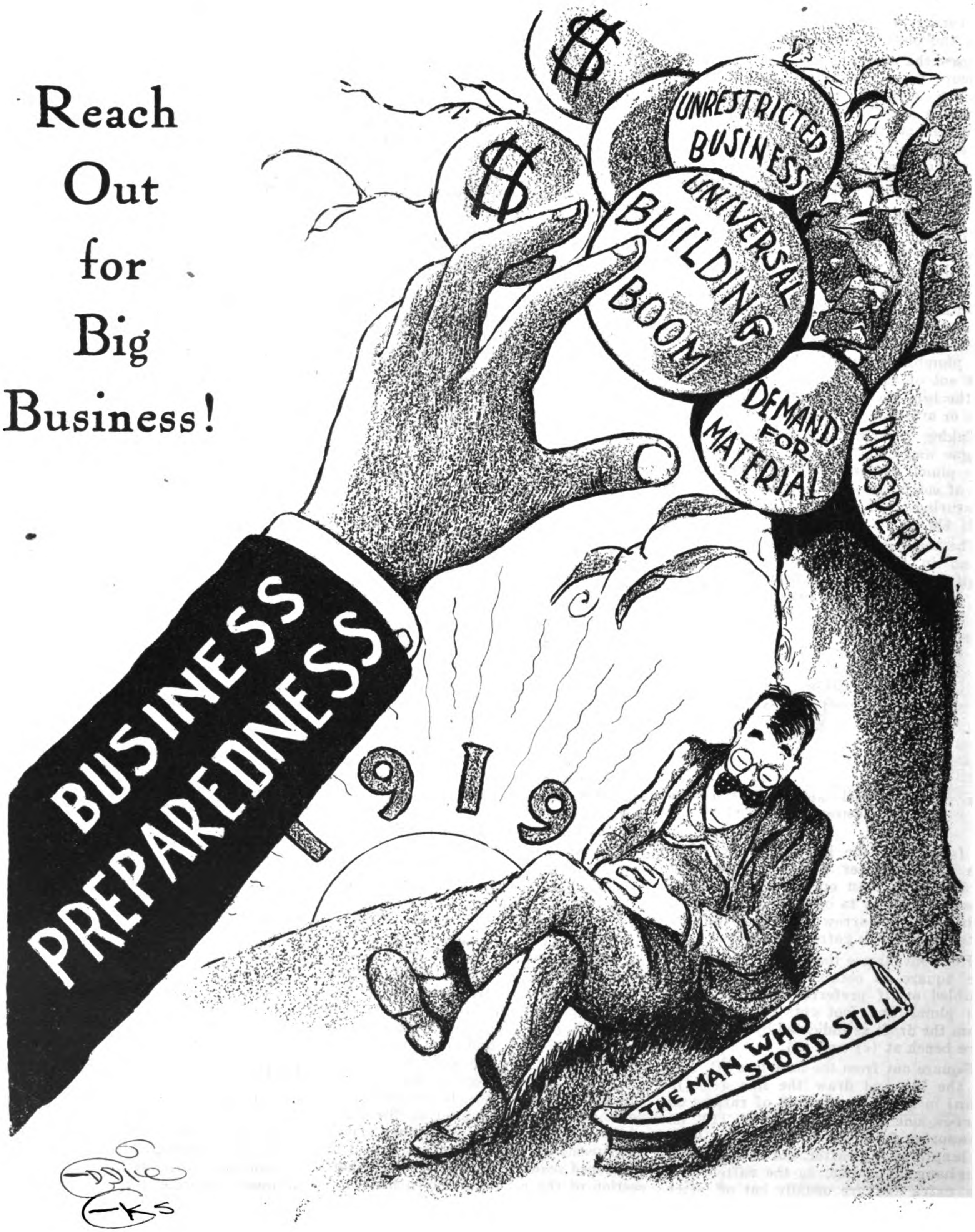
If the intersection of the two sides of the roof just mentioned had formed a valley instead of a hip the lengths and cuts of the rafters would have been worked out in the same way. The only differences would have been that there would be no backing to the valley and instead of jack rafters we would have cripples which, instead of having a foot cut and rafter tank, would have a cheek cut at their lower ends. This is shown at Fig. 33. The lines (*b*) and (*c*) are dropped down from the points where the rim of the cripple rafter intersects with the rim of the hip in the plan. From the plumb cut at top of common rafter, as shown below the plan, to the line (*b*) gives the length of the long side of cripple and the line (*c*) gives the length of short side.

(*To be concluded*)

## Builder of First Round Reinforced Concrete Barn

We are in receipt of a letter from E. McNamee, contractor, Great Falls, Mont., in reference to the article "A Round Reinforced Concrete Barn" appearing on page 61 of the November, 1916, issue. This barn was stated to be the first of its kind ever built. Mr. McNamee states that he put up several barns of this type for the one illustrated, including those of the Agricultural Experiment Station of the University of Illinois.

# Reach Out for Big Business!




### Is Landlord or Contractor Liable if Tenant Is Injured During Repairing?

In a recent interesting case where suit was started for negligence caused by a landlord to a tenant, it was desided that the landlord was not responsible for the injuries sustained, but that suit should have been brought against the contractor who was repairing the building owned by the landlord.

The defendant was the landlord of a tenement house in the City of New York. The plaintiff was a tenant, occupying rooms on the second floor. The building was a rear one, and a courtyard and alleys gave access to the street. In this courtyard the plaintiff was injured when about to enter her home. Repairs were in progress. Workmen were standing on a scaffold at the third floor and were setting pipe in place to carry water to the ground. One of the men dislodged a board or shelf which had been laid across the windowsill. It fell from his hands and struck the plaintiff. The trial judge charged that the defendant was liable, though the workmen were in the service of an independent contractor. The Appellate Division affirmed the decision, but the Court of Appeals decided that only the contractor was liable.

### When Union Circulates False Reports Can It Be Sued?

An interesting action by a firm of building contractors was recently instituted and pushed to a successful conclusion against the members of a labor union in the Massachusetts courts.

A firm of building contractors who were engaged in business at Turner's Falls, Mass., asked a mason contractor to do certain work for them. He refused to do so and showed the following notice as his reason for refusing to work for them.

> Bricklayers and Plasterers Union, No. 36 of Massachusetts, Headquarters, 304 Main St. Meetings 1st and 3d Wednesday evenings, Greenfield, Mass. July 11, 1915. A. O. Merriam, Phillips St., Greenfield, Mass. Dear Sir: A notice is hereby given to all union contractors that it was voted that all union masons will not work for Martineau & Son, Contractors of Turner's Falls until further notice as said firm has been working non-union masons.—Bricklayers and Plasterers Int. Union, No. 36.

It appeared that for the purpose of injury to contractor's business as builders, the member of the union had circulated the above report falsely, stating that the contractors had employed non-union masons.

The members of the union also refused to work for the contractor. As the result the contractor's business was destroyed and the members of the firm were compelled to seek positions.

It was decided that the contractors were entitled to recover damages against the members of the union on the ground that there had been an unlawful conspiracy, and a verdict of $4,000 was accordingly allowed to stand against them. The court said in its opinion that in a case of this kind the contractor could have procured an injunction against the members of the union prohibiting them from circulating false reports.

**Put your legal problems up to our legal advisor, George F. Kaiser, LL.B. He will answer direct by mail, the service being free to subscribers. Such of the questions and answers as are of general interest to the trade will be published in this department. No names will be published, only initials or a chosen nom de plume.**

**Inquiries must be accompanied by the name and address of the correspondent. Questions must be pertinent to some branch of the building trades.**

**Address Legal Department, Building Age, 243 West Thirty-ninth Street, New York City.**

### Principles of Construction Law Recently Decided

In a recent interesting case, several principles of construction law were clearly stated by the court. Action was instituted to foreclose a lien for labor and services rendered, and materials furnished in the construction, alteration and repair of a dam.

The court said that a promise by a contractor who had threatened to abandon his contract to continue with the contract was not consideration for a promise to pay additional compensation.

The court further said that a contractor cannot recover for extra work done under a contract, providing that no extra work should be done, except upon written directions given by some certain person, unless such written directions are given or it is shown that such condition of the contract was waived.

Lastly, the court held that when a party agrees to perform an undertaking he must carry it through, even though it may mean a loss to him instead of a profit.—Hoskins vs. Powder, Land of Irrigation Co., 176 Pac. (Oregon) 124.

### When Can Contractor Recover Damages?

A contractor was denied the right to recover damages for breach of a building contract by the owner in a recent case.

The claim was made under a contract to rebuild a building which had been destroyed by fire for an amount not to exceed $15,700. The contract provided that 80 per cent was to be paid to the contractor during the course of construction, and 20 per cent of the cost was to be paid on the completion of the building. It was further provided that the building was to be completed in 100 working days.

Paragraph 11 of the contract read: "Should the contractor become bankrupt, or refuse or neglect to furnish a sufficiency of properly skilled workmen, or of materials of proper quality, and these facts being certified by the architect in writing, the owner shall be at liberty after five days' written notice to provide any such labor or material, and charge the same to the contractor, or to employ some other contractor to furnish the necessary material, and finish such work at the most reasonable price obtainable for such work, and deduct the cost of same from any payment then due or thereafter to become due to the contractor under this contract, and the amount remaining if such there be after the completion of the said work shall be paid to the contractors or their authorized agents."

It appeared that the owner claiming to act under the above paragraph, and on notice to the contractor, terminated the contract and had it completed at an increased cost of $8,000.

The contractor sued for breach of contract, and the owner counter claimed for the increased amount he had had to pay the other contractors.

The jury held that the contractor was not wrongfully prevented from completing the contract, and awarded $8,000 damages to the owner.

The court held that evidence as to a note which the contractor had given to a third party, and on which judgment had been entered, was proper evidence to show that the contractor was not financially able to provide proper materials or workmen, and that the contract was terminated for that reason.—Wilkerson vs. Lang, 97 S. E. 466.

## In Case of Accident to Workmen, Is Contractor or Sub-Contractor Responsible?

The question of whether a contractor or sub-contractor is responsible where an accident occurs on a construction job is always an interesting one.

In a recent New York case it was decided that where an employee of a subcontractor on a building is injured by the breaking of a ladder belonging to the general contractor, which the sub-contractor is using, the injured employee cannot maintain an action for damages based upon the unsafety of the ladder, unless the general contractor is obligated to furnish the ladder by the provisions of the contract between him and the subcontractor, or where a contract is silent, by a custom so general and uniform as to impose the obligation by enlarging the terms of the contract.

The court further said that such a custom is not established by proof showing that the sub-contractor's employees are in the habit of using without objection from the general contractor ladders brought to the premises by the general contractor for his own use, as a trade custom will not be considered where the parties have seen fit to exclude it, and it may be shown by verbal testimony that it was understood at the time the contract was made that the general contractor was not under any obligation to furnish ladders.

## Who Is Responsible for Injury to Unauthorized Person on Premises?

It is now a well settled rule in the courts of the various states that an owner of premises or the person in control of them owes to a person who has "no business" on the premises only the duty of not knowingly letting him run upon a hidden peril or refraining from wantonly or willfully causing him harm.

In one recent case the court said:

"Under the undisputed facts of this case we think that the plaintiff when she entered this building was a licensee only, and the defendant owed her no duty, except not to injure her wantonly and willfully after her presence became known. Possibly the owner must also protect a licensee from such hidden perils as pitfalls, man-traps and the like, negligence in this respect being considered as equivalent to wantonness and willfulness. That, however, does not enter into the present case, as it is not predicated upon wantonness and willfulness. The plaintiff clearly therefore, was not entitled to recover, and the court did not err in granting a non-suit.

## Building Terms as Defined by the Courts

In the building contract every word is important. Oftentimes the rights and liabilities of the architect, builder, owner or contractor may depend on the meaning of a single word. In cases where this happens—and there have been many—the meaning of the word must be defined by a court of competent jurisdiction.

It is well, then, to be familiar with the meaning of words which appear in building contracts, as judicially defined.

The word "architect" has been defined to mean "a person skilled in the art of building; one who understands architecture or makes it his business to make plans and designs of buildings, and to superintend the artificers employed." Wilson vs. City of Greenville, 43 S. E. 967.

A "builder," according to the courts, "is one who builds; one whose occupation it is to build." Savannah & C. R. Co. vs. Callahan, 49 Ga. 506.

The legal definition for the word "contractor" is "one who contracts or covenants with a public body or private parties to construct works or erect buildings at a certain price or rate." Brown vs. Title & Trust Co., 34 Atl. 335.

"Extra work" and "additional work," as used in a contract, have different meanings according to the courts, "extra work" being work arising out of and entirely independent of the contract and not required in its performance, while "additional work" is something necessarily required in the performance of the contract and without which it could not be carried out. Shields vs. City of New York, 82 N. Y. S. 1020.

Even a "general strike" has been passed upon, and where a construction contract provided for the extension of time for the completion of a building, if the contractor was unavoidably delayed by a "general strike" it was decided that where only three out of twenty-eight planing mills continued in operation in a city, and those three mills were unable to get skilled labor, the closing down constituted a "general strike." Weber vs. Collins, 41 S. W. 249.

"Material men" are, according to the courts, "gentlemen in trade who do not follow the business of building or contracting to build homes for others, but who keep for sale the various materials and commodities which enter largely into buildings and the completion of them." Hallett vs. Aron, 6 Houst. 477.

A "lien" has been judicially defined to be "a claim which one person has upon the property of another as a security for some debt or charge; a tie that binds property to a debt or claim for its satisfaction." Mendelhall vs. Burnett, 49 Pac. 93.

The word "owner," as used in a construction contract, is a correlative of "contractor," and means the person who employs a contractor and for whom the work is done under the contract. McDermott vs. Palmer, 11 Barb. 9.

A "plan," when applied to a building, is an architectural drawing representing the horizontal section of the various floors or stories of the building, the disposition of apartments and walls, with the situation of the doors and windows. In fact, it represents the different stories as they are to be built, and the whole as it will appear when completed. State vs. Kendall, 18 M. W. 85.

"Specifications" in architecture embrace, as understood by the profession, not only the dimensions and mode of construction, but a description of every piece of material of its kind, length, breadth, and thickness, and the manner of joining the separate parts together. Gilbert vs. U. S. Ct. Cl. 28.

A "strike" is a cessation of work by employees in an effort to obtain more desirable terms. Iron Moulders Union vs. Allis-Chalmers Co., 166 Fed. 45.

A "sub-contractor" is one who has entered into a contract, expressed or implied, for the performance of an act with a person who has already contracted for its performance. Lester vs. Houston, 8 S. E. 366.

The term "working contract" is something used to designate what is properly known as a "building contract," that is, a contract for furnishing work or materials in erecting buildings, etc. Cary Lonbard Lumber Co. vs. Jones, 58 W. E. 347.

The expression "working days" has in commerce and jurisdiction a settled and definite meaning. It means days as they succeed each other, exclusive of Sundays and holidays. Pedersen vs. Engster, 14 Fed. 422.

The words "workmanlike manner," as used in a building contract reading that the work shall be done in "a plain, substantial and workmanlike manner," mean that the work shall be done perfectly for the character of the job contemplated. Smith vs. Clark, 58 W. 145.

# How to Construct Casement Windows

## Approved Methods of Making Sash Weathertight—Construction in Frame and Brick Walls

*By Ernest Irving Freese*

**Do you know the best way to make in-swinging casement windows weather tight?**

**Do you know where to put drainage channels in the mullions?**

**Do you know every place where the sash should be beveled?**

**Do you know how to give clearance for shades on in-swinging casements?**

**Do you know how to cut meeting stiles so as to prevent passage of moisture?**

**Do you know how to best frame jambs for casements in brick walls?**

**These questions and many others are answered in the article. Read it carefully.**

A three-fold problem immediately presents itself when considering the subject of casement windows:

First—Why use them?

Second—Which way shall they swing?

Third—How shall they be constructed?

The first part of the above "problem" is largely the concern of the architect; the second part, the housewife; and the third part, the builder.

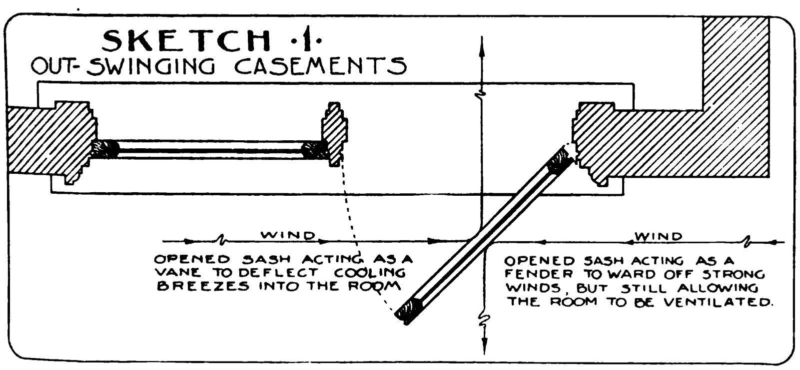
While this article is chiefly devoted to the "How," or construction, of casement windows, yet it will not be irrelevant to herein present and briefly discuss this type of window from the standpoints of the architect and the housewife.

In the first place, it must be admitted that there is a distinct charm and personality about the "wide-flung" casement that is entirely lacking in the more practical double-hung window. Also, there is no gainsaying the fact that a double-hung window becomes only "half a window" when compared to a full-opening casement. Moreover, there are certain styles of domestic architecture that demand the swinging window as an element in design. No one with an inherent or acquired sense of the fitness of things could tolerate the double-hung window in an Italian villa, a Spanish hacienda or an English cottage. Hence, since American architecture is mostly American-*ized* architecture, it follows that the casement window must first be reckoned with from the viewpoint of architectural fitness. Apparently, then, the first part of the problem—the "Why" of the casement—is largely the concern of the architect or designer. However, in the final analysis it becomes evident that the casement window, unlike the double-hung, "goes well" with any of the architectural styles. It has even gone so far as to inveigle itself into the good graces of our own Colonial architecture—in spite of time-honored tradition.

In any case, whatever be the reason for the choosing of casement windows, it immediately becomes necessary to decide upon which way they shall swing—whether inward or outward. This is the *real* problem of the casement. Here the housewife has much to say, although the difficulties of rendering an *in-swinging* casement weathertight should also give the builder an opportunity to exercise his judgment in the matter. But, alas! when housewives and builders disagree—the housewife wins! Hence, both *in-swinging* and *out-swinging* casements must here be dealt with. A few words will suffice to state this part of the problem which the housewife herself must solve.

Screens, curtains and shades! These things are enough to drive anyone to drink—even a housewife—when it comes to applying them to casement windows.

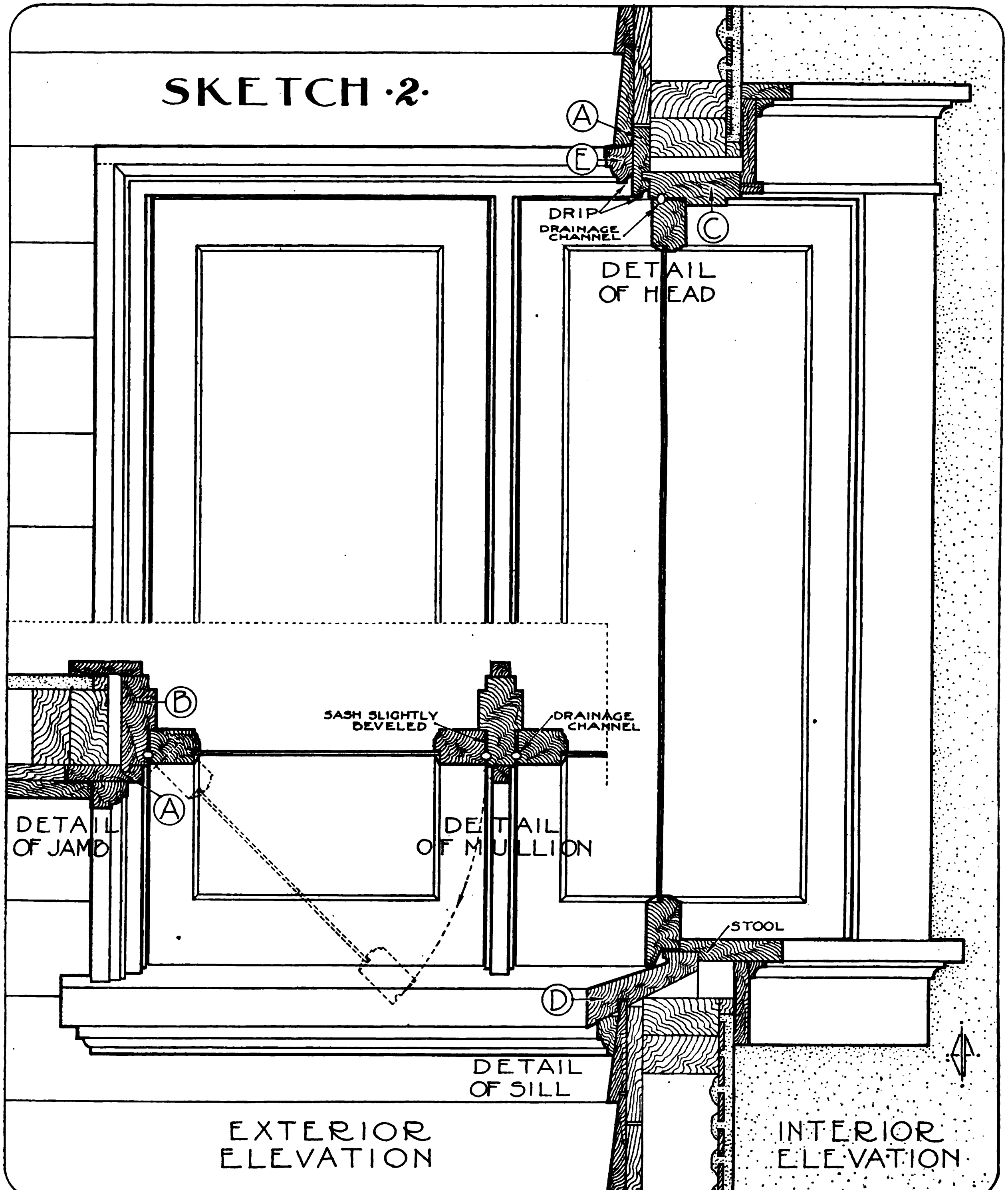
If the window swings inward, the curtains and shades must be hung on the sash itself and swing inward with them. Otherwise the window cannot be operated without rolling up the shade and disarranging or wrecking the draperies. Moreover, in-swinging casements must either be high enough off the floor to swing clear of furniture or there must be no furniture in the path of their inward circular sweep. In the first case they are extravagant of wall-space. In the second case they are extravagant of both wall-space and floor-space. In both cases they are a nuisance. Their one redeeming feature is that the screens can be hung on the outside without "interfering with anything." It would seem, then, that here the "wide-flung" casement is not all that it should be. It may be charming. It may be good to look upon. But it's not altogether practical.




On the other hand, if the window swings outward, the difficulties of draping and shading vanish with the difficulty of rendering the window weathertight. However, the screening of the window now develops into an awkward problem. The screens must, in this case, he placed on the inside, yet the operation of the window must be accomplished without the screen being disturbed. Otherwise the screen fails of its purpose and becomes of no avail. But this screening difficulty has been solved by the production of various paterted "sash adjusters" that serve to operate the sash independent of the operation of the screen. These adjusters also serve to hold the outswung sash at any desired angle and thus allow the sash to do duty either as vanes to deflect cooling breezes into the room or as fenders to ward off strong winds while yet the window remains open for ventilation. (See sketch No. 1.) There now remains only one other difficulty connected with the out-swinging casements, and that is the washing of them from the inside of the room. A single-leaf casement cannot be washed unless the sash is very narrow and the washer acrobatic. The same thing applies to one leaf of a triple casement. But this difficulty is easily banished by hanging the sash in pairs so that one can be opened to allow of the washing of the other. It is thus evident that the use of efficient sash adjusters, together with the placing of the sash in pairs, renders the "wide-flung" out-swinging casement as practical in operation as it charming in appearance.

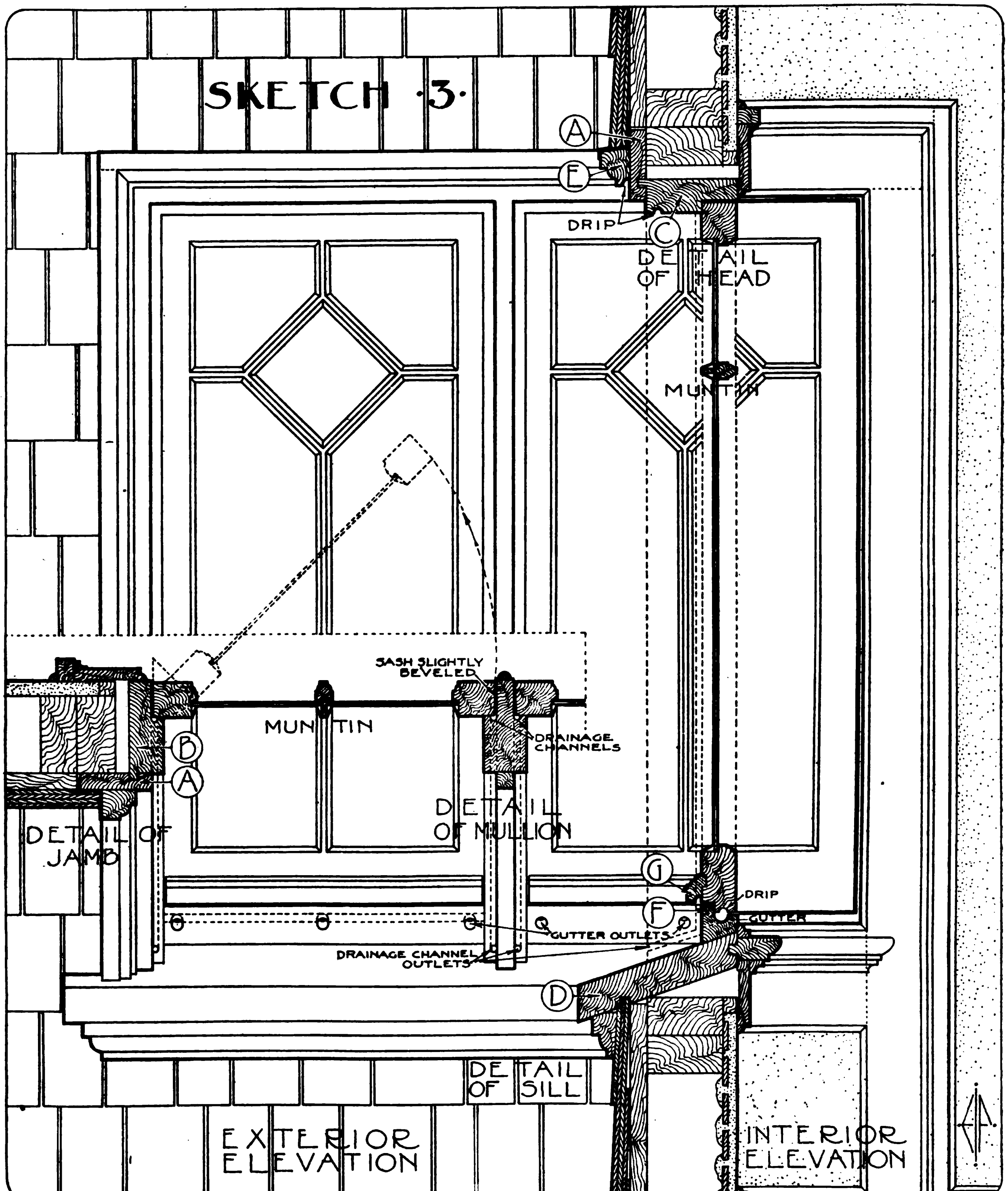
The problem presented in the construction of casement windows is the same problem that is met with in the construction of all types of windows and doors; namely, draught and capillary attraction must be stopped. When this is done, the window becomes watertight.

In sketches numbered 2 and 3 respectively are shown typical and approved details for out-swinging and in-swinging casements. The essential parts of the frame are the exterior casings *A*, the side jambs B, the head jamb *C* and the sill *D*. The exterior casings *A* perform the highly important duties of giving stiffness to the entire window frame and rendering the same absolutely weather-tight. For these reasons, the casings should never be less than 3¾ in. wide so as to lap well over onto the studding as shown. The jambs *B* and *C* should



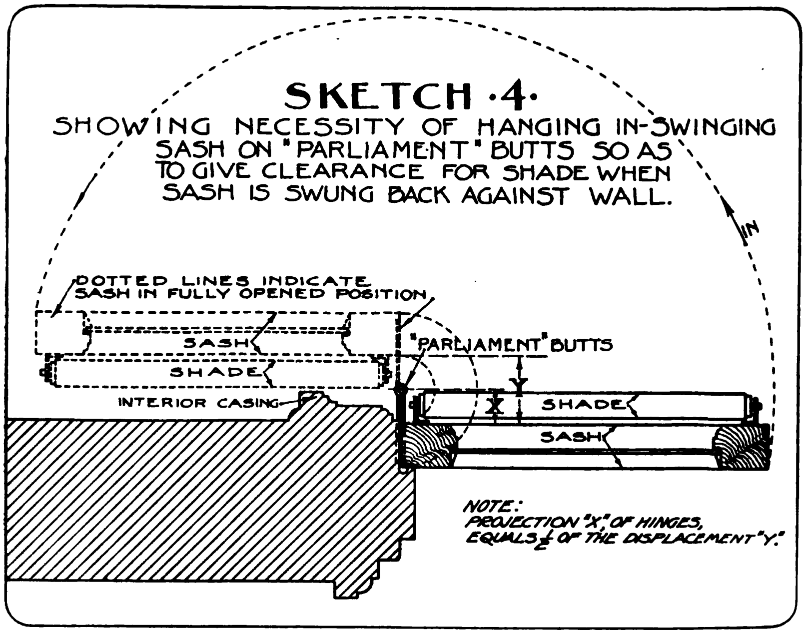

TYPICAL OUT-SWINGING CASEMENT WINDOW
FOR A 2" x 4" FRAME WALL
SCALE 12 INCHES

never be less than 1¾ in. in thickness and they should invariably be tongued into the exterior casings. The sill *D* should also be made from 2-in. stock, preferably redwood, and given a much greater pitch than is usually done; a slope of 1 in. in 8 in. is none too much, and it adds greatly to the architectural beauty of the window. Also, a groove should be left in the underside of the sill so as to allow of the joint between sill and sheathing being covered by the finish siding. If the above points are rigidly adhered to, an absolutely weather-tight window frame will be the sure result, for this construction effectually bars the entrance of wind, water and sifting dust.

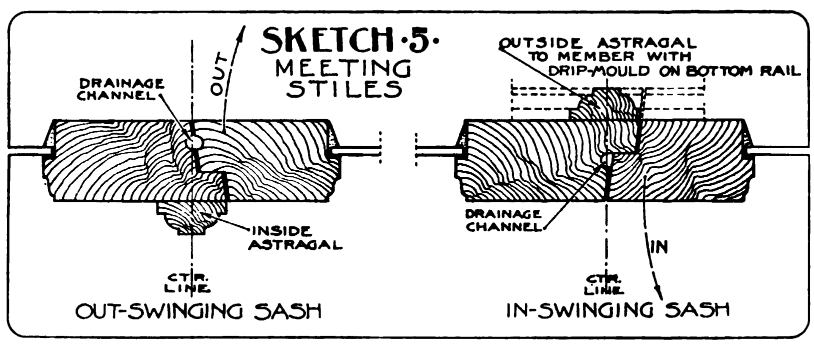



TYPICAL IN-SWINGING CASEMENT WINDOW
FOR A 2" x 4" FRAME WALL
SCALE — 12 INCHES

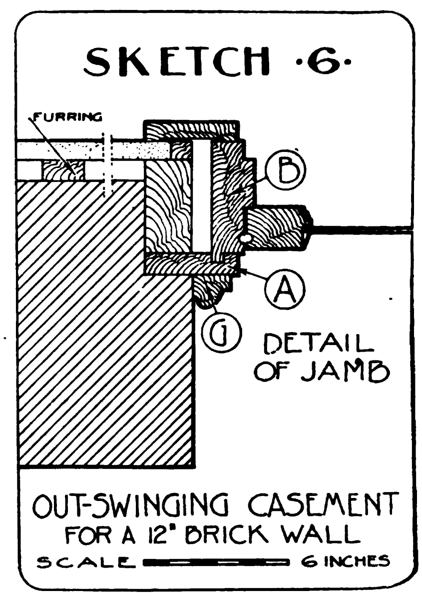
The next consideration, as regards weather-tightness, is the method of making the joint between sash and frame at the head, jambs and sill. In the first place it is highly essential that the sash have a draught-tight shoulder to shut against. In other words, the horizontal joint between sash and frame should not extend straight through from the outside, or weather face, to the inside of the building. This first requirement at once banishes the "nailed on" stop, for no matter how tightly these be nailed, they will eventually open up from alternate shrinkage and swelling and so allow the wind-blown water working its way in behind them. Hence, if the best results are desired, the frames must be "rabbeted" to receive the sash, as indicated in the accompanying sketches. However, the elimination of "nailed on" stops will not, in itself, render the joint between sash and frame watertight, for even though draught be thereby stopped, yet moisture will still work its way into the joint by the force of capillary attraction. Therefore, in order to break up capillary attraction and, at the same time, to provide a means of carrying off the water thus freed from its influence, it is necessary that drainage channels be formed in the joint between sash and frame. These channels are clearly indicated in sketches No. 2 and No. 3.




The most difficult point to render watertight, in an *out-swinging* casement, is the joint between the top rail of the sash and the head of the frame. A horizontal drainage channel should here be formed in the top rail and frame so as to intercept and carry off the moisture that is almost sure to "creep" into this necessarily open joint. Another wise precaution is to lower the exterior head casing so as to come flush with the sash rebate and work the lowered edge of the casing into a drip mold. It would be a further protection for this joint if a drip were also formed on the lower edge of the head architrave *E*. All of these vital points are clearly illustrated in Sketch No. 2 herewith. In this case, the drainage channels should be continuous up the side stiles of the sash and across the top rail, and they must be so located as not to be in line with the screws that fasten the hinges in place. By plowing the channels close to the exterior face of the sash and then hanging the sash on "parliament" butts, the channels will be left unobstructed. In any case, the lip on the bottom rail of the out-swinging sash should be far enough back to allow of the side channels draining directly onto the sill, as indicated in the sketch.




In *in-swinging* casements it is exceedingly difficult to procure a watertight joint at the junction of sash and sill. In Sketch No. 3 is detailed a method of forming this joint that, if followed, will render the resulting construction watertight even in a driving rain. I realize that this is a broad assertion, for it has become almost proverbial that in-swinging casements can not be made watertight. The facts of the case are that it is difficult and somewhat expensive to make them watertight. But it is not impossible. The construction detailed in Sketch No. 3 has been given careful study, and long experience has demonstrated the fact that in-swinging casements constructed in faithful accord with this detail will be as weathertight as any other well-constructed window. The sill detail is especially worthy of note. The hardwood stop *F* provides a draught-tight shoulder for the sash to shut against and is so shaped that it also forms a gutter under the sash to intercept and drain off any water that may work its way into the joint by capillary attraction. The gutter should have outlets bored through the outer shoulder of the stop at intervals of 18 in. or less, so as to allow the moisture collected therein to drain off onto the main sill *D* as shown by the dotted lines in the sketch. Moreover, the bottom edge of the sash immediately over the gutter should be plowed to form a drip, thus frustrating any tendency of moisture bridging the gutter by working its way along the lower edge of the sash to the inside stool. Finally, the drip mold *G* should never, under any conditions, be omitted, for it is this piece that protects the joint from wind-driven rain as well as from water that runs down the face of the window pane. Both the drip mold *G* and the hardwood stop *F* should be set in pure white lead. And the gutter outlets should be reamed out smooth and also be coated with white lead. This last also applies to the vertical water channels in the side jambs



which, in this case, are formed in the shoulder of the jamb against which the sash shuts. Outlets for these channels are to be bored in the side jambs at a point just above the sill and following the pitch of same, as shown in dotted lines on the sill detail of Sketch No. 3. These outlets, like the gutter oulets, must be reamed out smooth and coated with white lead.

Sketch No. 4 shows clearly that in-swinging casements must be hung on "parliament butts" so as to give clearance for the shade-roller when the sash is swung back against the wall. Otherwise the edge of the roller, or the bracket holding it in place, will strike against the face of the inside casing unless the sash be fitted with some checking device that prevents it from being fully opened. But a half-opened in-swinging casement is an abomination. Hence, unless abominations are particularly desirable, in-swinging casements should be hung on parliament butts as indicated in the sketch. Care must be taken to ascertain that the distance *X*, or the projection of the hinge from face of sash to center of pin, is not less than one-half of the distance *Y*, which latter is the projection of the rolled-up shade beyond the face of sash (about 1½ in. usually), plus the projection of the inside casing beyond the face of the sash in the closed position. Ordinarily the projection *X* of the hinges need not be over 1⅜ in., even where back-band casings are used. But the proper procedure is to ascertain this projection for each individual case so as to have it neither more nor less than it should be.

In both Sketch No. 2 and Sketch No. 3, narrow mullions are shown between the pairs of sash. This is not only much better construction, but is better as regards weather-tightness than to have the sash come together in meeting stiles, as is commonly done. However, if center mullions are objectionable, the meeting stiles should be made as detailed in Sketch No. 5.

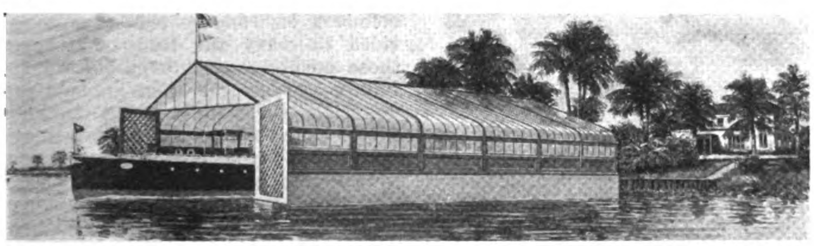
Sketch No. 6 indicates the method of setting a casement frame in brick construction. Note that the details of frame and sash are identical with those in wooden construction. In a masonry wall the exterior casing *B* is simply set back against a shoulder in the brick jamb, while the exterior architrave becomes the brick-mold *G*.

Casement sash, being hung at the side, are subjected to considerable strain in operation. For this reason they ought never be less than 1¾ in. in thickness, the side stiles 2¾ in. in width, and the bottom rail a full inch more. Moreover, they should be solidly mortised and tenoned together. Possibly, where the sash are stiffened with muntins, the above dimensions might be decreased. But this should not be done unless the most rigid economy demands it.

Finally, casement sash require ample fastenings to hold them tightly in place when closed. They should be provided with bolts at both top and bottom, as well as with a latch that will "draw" the sash firmly against the frame and thus contribute toward *weather-tightness* which, in the end, is the one qualification that will proclaim the much-mooted casement a practical success.

# A Boat House Built of Glass

## Glazed Glass Was Used as It Softens Direct Rays of the Sun. Construction Gives Maximum Amount of Light



What is said to be the world's first glass boat house is being built at Alton Beach, Miami, Florida, adding another item of interest to the many yachting novelties of this sub-tropical region.

Glass has been widely used in the construction of conservatories and swimming pools; however, its application to boat houses comes as a distinct novelty, though, when its advantages for this purpose are considered, it is a wonder no one thought of it before.

The structure is of pleasing lines, with curved eaves, and with the roof and sides constructed of glass there is little chance of mildew. It can be washed down with a hose from top to bottom. There is not a dark spot in the whole structure.

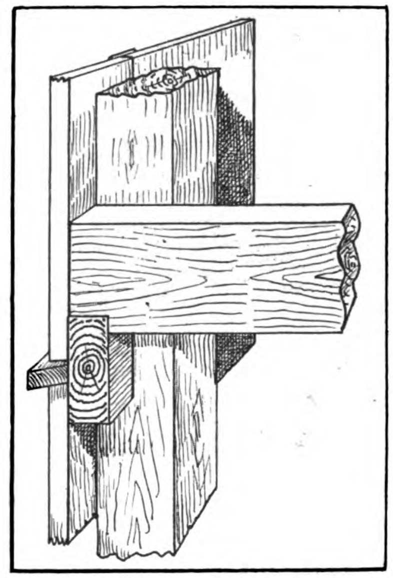
The supporting framework is of cast iron and steel, heavily galvanized. The glass used in glazing is ground, which softens the direct rays of the sun, while yet giving the maximum amount of light. The double doors are of wood, with an open lattice pattern that insures good air circulation.

In designing the structure, the architects, Lord & Burnham, of New York City, aimed to secure conditions approaching a boat at anchor, with a suitable covering to shield it from the weather. The foundation is of concrete. A toilet and storage closet are provided at one end. The boat house is being constructed for Lee M. Rumsey.

## Money Saving Hint in Double Tier Siding

*By W. B. Gray*

The chance to economize may take precedence over mere appearance or established custom on common out-buildings



Detail of kink which permits short lengths to be used.

at any time, and since the price of lumber has gone up, a cheapening feature is welcomed as never before. A plan that can sometimes be resorted to is shown in the sketch herewith. Desiring to build a coal house and kindling room with a storage loft above, the writer was jiggering with the lumber man as to what his finances would permit. "There is a lot of short stuff I will sell you for a song," said the dealer. "Can you use it? My usual trade calls for nothing less than 10 feet." Finding it would square up 7 ft. long, I bought it and used one tier over another with a water-table between, as shown.

The nail tie at the water-table is, in this case, 2 x 6 in., notched into the 4 x 4 framing post. Whether the tie is 2 x 6 or 2 x 8 in., or the posts 4 x 4 or 2 x 4 or some other size may depend on circumstances. The siding which the water-table rests on should be cut slanting on the end, as shown, if a plain beveled strip is used for the table. The ends of the siding standing on the table are best cut square so air can get back to dry the ends.

A job of this kind looks well, and in after years it has an advantage in that, if a board becomes defective, it is a short piece only that has to be removed.

If the season of the year at which the work is done permits, do not put battens on for some months after the siding is put up. This lets shrinkage of the boards take place and the battens do not split by being strained by shrinking siding.


# How to Build and Fireproof with Hollow Tile—X

## Fireproofing, Special Tile—Flat Arches and How to Build Them

*By J. J. Cosgrove*

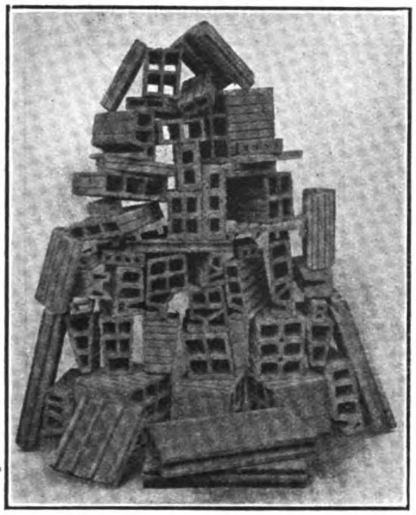


Fig. 71—Types of hollow-tile blocks made specially for fireproofing.

Up to the present installment we have been considering hollow tile primarily from the standpoint of a building material. It has another and if possible still greater value, however, and that is as a fireproofing material.

It is a fact which will bear repeating many times that there is a great difference between the properties or qualities of being non-combustible and being fireproof. Many substances which will not burn nevertheless are not fireproof, due to some other quality which they lack. Then thus there is a difference known in building practice between being fireproof and semi-fireproof or slow-burning in construction.

A building can be of frame construction but so protected with fireproof materials that should it catch fire it would bury very slowly. Using plasterboard for the walls and partitions of buildings, or covering the walls and partitions with wire lath and plaster, are examples in point.

Again, iron will not burn, but under a temperature comparatively low iron will soften, bend and otherwise fail, so that while non-combustible it is not fireproof, or proof against heat, which amounts to the same thing. Take for comparison the behavior of masonry piers and steel columns. Under a temperature which would destroy steel columns, the tile, brick or concrete piers would remain practically undamaged, or at all events sufficiently strong not to fail.

A few figures will show this in its right light. Cast-iron melts at a temperature of from 1960 to 2500 deg. Fahr., depending upon the purity of the metal. Steel, which is a more uniform mixture, melts at a temperature of 2520 deg. Fahr., while wrought-iron melts at the higher temperature of 2912 deg. Fahr. But the great danger is not of the metal columns or beams melting. At a temperature of approximately 1000 deg. Fahr. steel beams will fail under the loads they carry.

Now the significance of this lies in the fact that the temperature within a burning building ranges from normal, when the fire is started, to a temperature in excess of 1700 deg. Fahr. when the fire is well under way, and in many cases in excess of 2000 deg. Fahr., or just double the temperature at which steel fails from softening and bending.

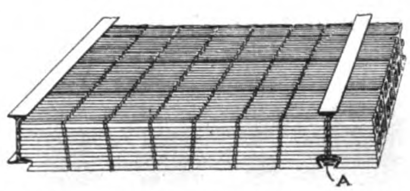



Fig. 73—Flat arch, end construction. Tile laid this way develop about 50 per cent greater strength than when laid as shown in Fig. 72.

Because iron and steel will fail under high temperatures is no reason why they should not be used in building construction. On the contrary, they are absolutely necessary for the construction of tall buildings, as every one knows. It is necessary, however, when iron or steel are used, to so encase it in some non-heat conducting material that the temperature of the metal will never reach as high as 1000 deg.

Special designs of hollow-tile blocks are made for this purpose, as shown in Fig. 71. Some of the blocks are so made that they possess in themselves great strength and are used for building purposes as well as for fireproofing. Other blocks are made simply to enclose metal members and protect them from fire.

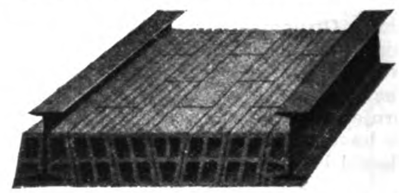


Fig. 72—Hollow-tile flat arch, with tile laid side to side.

This latter kind when laid up possess only ordinary strength.

From what has already been said it will be understood there are two steps to fireproofing buildings. First, tension members of iron or steel must be provided to carry the load; and, second, those members must be protected from failure by encasing them in heat-proof materials, such, for instance, as hollow tile or concrete; and this heat insulating material must be of sufficient thickness to prevent the transmission of heat in any great quantity, as will be explained later.

The protection afforded by a good heat insulating material can be judged from the fact that exposed to a temperature which would destroy an unprotected column or beam no great rise in temperature takes place. For instance, when exposed for two hours to a temperature

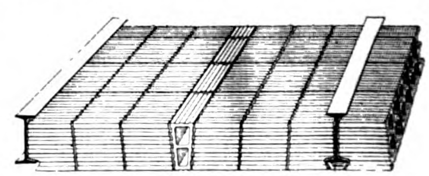


Fig. 74—End construction, with side construction for the key tile.

of 1700 deg. in experimental tests columns and beams protected by only 2 in. of fireproofing material increased in temperature only 160 deg. Fahr.

The three grades of tile, "dense," "porous" and "semi-porous," have each their own particular field of usefulness, and one and all are used in the practice of fireproofing. Porous hollow tile is the very best from a strictly fireproof standpoint, but as it does not possess as great strength as semi-porous or dense tile it is not so suitable for arches or like construction where the blocks must be used for structural as well as for fireproofing purposes. Owing to this fact porous blocks or semi-porous blocks are generally used for the protection of columns, as covering for girders, for roofing blocks or any other place where the maximum protection is desired.

One of the earliest uses to which hollow-tile was put was in the construction of arches. Originally bricks were used for this purpose, but with the development and growth of tall buildings weight became a factor in design, and every-

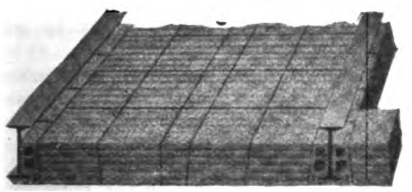


Fig. 80—The skew shown in Fig. 79 used in end construction.

thing which could be eliminated to decrease weight without sacrificing strength was adopted. Hollow-tile lent itself to this new type construction. Sprung between two I-beams of a building they were light, easy to lay, economical, fireproof and, when desired, presented a flat surface for the under side or ceiling.

Hollow-tile arches vary in design, covering a wide range, blocks having been made to suit any condition or requirement. There are, therefore, short-span arches and long-span arches, side-construction arches and end-construction arches, flat arches and segmental arches.

A perspective view of a flat arch, side construction, is shown in Fig. 72. In this type of construction the cells in the hollow-tile blocks run longitudinally with the beams. It will be noticed that the tile are so laid that they break joints, a condition which obtains in no other type of flat arch. This is an advantage inasmuch as should one of the blocks fail it will not impair seriously the stability of the arch, or even of one row of tile. Notwithstanding that advantage, however, this type of construction is not so generally used as other forms which will be illustrated and described later.

In Fig. 73 is shown a flat arch of end construction. In this type of arch block the air cells, likewise the shell and webs, run crosswise from beam to beam. This forms without exception the strongest arch of the kind made of hollow-tile. It is about 50 per cent stronger than an arch of similar depth and span laid up with side construction blocks.

There is no type of construction which is perfect, so it may be inferred that there are objections to end construction arches as well as advantages. The advantages so outweigh the disadvantages, however, that end-construction tile are far more extensively used than side-construction tile, and may be considered the strongest type of arch made. In present-day practice, however, it is modified somewhat to obtain some of the advantages of side construction while retaining the greater part of the strength and most of the other advantages of end construction. This brings about a combination arch which will be described later.

It will be noticed that in the end construction the blocks are laid end-to-end and the rows stretch from beam to beam without breaking joints. It follows as a consequence that should one of the tile be removed or become broken by a weight falling upon it, there is nothing to hold the other blocks in place but the side adhesion to the two adjoining courses. There is no danger of the arch failing on that account, it might be well to add, so that it is of little moment in practice.

In Fig. 74 an advance is made a step toward modern construction. In this arch we have the end construction for all blocks except the key tile, which are side-construction.

It might be well here to point out a few features of arch construction com-

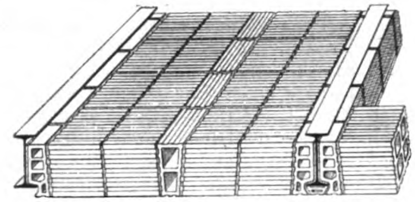


Fig. 81—Combination of end and side construction, the type of flat hollow tile arch most used to-day.

mon to all types, and at the same time explain the different kinds of blocks employed in building arches and give their names.

In Fig. 75 is shown a "skew," or "skewback." This is the tile block which fits against the steel I-beams and against which the arch is sprung from beam to beam. Next comes the lengthener, Fig. 76. These are used to fill out the spaces between skews and arch keys, and the number employed in any one course will depend on the length of the span. Four lengtheners are all that are generally required for short-span arches, although many more are required for the long-span arches later to be described.

The key block, Fig. 77, is common to all kinds of arch construction, so that its shape and function are known. It might with good reason be called a wedge block, because it is by wedging the other blocks in place that it keys them, or secures them where they belong. The key shown in the illustration is a side-arch block but is now used with combination arches.

A "soffit" is shown in Fig. 78, and its place in arch construction, or its application in fireproof construction, may be seen by referring back to A in Figs. 3 and 4. It is not in any sense structural in its function, nor is it a part of the arch proper. Its entire use is in protecting the under side of the I-beam from the heat of a fire. By studying carefully the illustrations Figs. 3 and 4, it will be seen that in spite of the trouble and expense gone to in putting in hollow tile arches, from a fireproofing standpoint it might all come to nothing if the soffits were omitted. The under rail of the I-beam is the tension member. It is here the weight superimposed on the floor tends to tear the rail or beam apart. Less heat applied here would be dangerous than if applied to the upper rail of the beam. Once the rail reached the temperature of 1000 deg. Fahr. it would begin to stretch, bend or sag, and the arch would go with it. It will be readily seen, therefore, that it is necessary from a strictly fireproofing standpoint to protect the under rail of the beam, and that is just what the soffit is designed for. It will be noticed that the soffit is made with an air space. In fact, with two air spaces, for the shells extending above the upper surface, form a second air space when the soffits are in place. Some soffits are made solid, but as will be demonstrated later, fireproofing with air cells offer greater protection against the transmission of heat than do solid blocks, besides being lighter to handle and easier to hold in place.

The skew shown in Fig. 75 is objec-

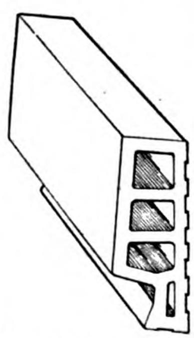


Fig. 79—A skew which is better than that shown in Fig. 75, considered from the point of fireproofing.

Fig. 75—A skew back, or tile made to fit against the I-beams.

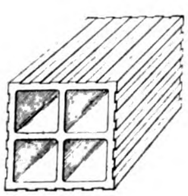


Fig. 76—A "lengthener," used to fill out spaces between skew backs and arch-keys.

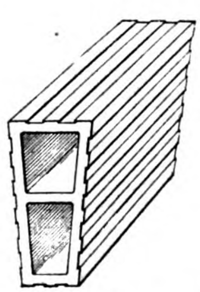


Fig. 77—A key block.

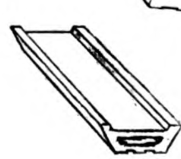


Fig. 78—A soffit block, used as shown in Figs. 73 and 74, at A.

tionable for the reason that if the soffit be omitted, or if it becomes broken or removed, the entire side of the I-beam as well as its under rail becomes exposed to the flames. Structurally it is a good strong block, but it lacks something from the fireproofing standpoint, so the weakness has been strengthened by designing the skew shown in Fig. 79. This is a side skew strong, safe and satisfactory. It is used not only with arches of side construction, but with end construction as well, as may be seen in Fig. 80.

All of the arches shown in preceding illustrations have been more or less evolutionary in their course. As improvements either from a structural or from a fireproofing standpoint have been worked out they have been adopted, until at the present time the arch most used, and which combines the greatest number of good points, is a combination of end and side construction flat arch, similar to that shown in Fig. 81. In this combination the skews and key blocks are all side construction, while the lengtheners are of end construction. This arch represents the maximum of strength, lightness and safety all combined in one.

(*To be continued*)

# Designing and Building a Brick Fireplace

## How to Make the Proportions Harmonize With the Room—Proper Size of Opening and Flues

*By J. E. Ray**

The cheerfulness of the fireside is universal, for its comfort, warmth and coziness create an atmosphere of hospitality and sociability. To meet these requirements a fireplace must be constructed properly. Care should be taken in the choice of colors. Design plays an important part in fireplace construction.

Brick is the aristocrat of all building materials. It has three artistic elements, color, texture and design. It has warmth, is absolutely fireproof, which is an essential feature in fireplace work.

A working drawing should always be made to a convenient scale. Working from a sketch is inaccurate and unreliable. There are some bricklayers who through continual experience in building fireplaces might safely construct them without the aid of either.

### Size Fireplace According to Room

The fireplace should be in proportion to the room, both in regard to the height and length. The projection into the room must be taken into consideration also.

A large room will take a much larger projection into the room, ranging from 17 in. to 21 in. A small room will take from 4 in. to 9 in. Building the face of the fireplace flush with the wall on the inside has a pleasing effect in some instances.

The average length of a modern fireplace ranges from 5 ft. to 8 ft., according to the size of the room and the cost. A very large room will take a much larger fireplace, in length and height, and still not be in discord with the surroundings. A fireplace continued to the ceiling looks good in a large room, but should not be used in a small room. The distance from the floor line to the mantel shelf varies from 4 ft. 6 in. to 5 ft. 6 in. A thick heavy looking mantel shelf supported by brackets will harmonize with a fireplace of large proportions. A small fireplace, with a massive mantel shelf, is a common sight and should be avoided.

The opening should be in proportion to the breadth of the fireplace. The brick jambs or piers should be heavy enough to balance the span of the brick work from the top of the opening to the mantel shelf.

Arches come into consideration when spanning an opening, and the proper style of arch to use has caused considerable comment. An elliptical or semicircular arch should never be used in a fireplace work because a curved line does not harmonize with the straight line of the mantel piece.

A good arch which harmonizes perfectly with a fireplace is the flat arch, known to the trade as the "jack arch." Although being one of the weakest arches in masonry, it is self-supporting, and with the support of an angle iron it is strong and practical. A 13-in. bonded "jack arch" will fit almost any ordinary fireplace. Larger fireplaces require an arch of greater depth. A full sized detail of a flat arch is always required to facilitate the grinding of the brick, which are generally too hard to cut by hand.

A soldier course (brick standing on edge) looks well over an opening and takes away the plainness of the horizontal course over the opening. They are never out of place in spanning an opening. Ornamental work, sometimes called "ginger bread" work, should be used very little if at all. Inserting tiles here and there is a bad practice and should be discouraged. Simplicity should be the keynote of every fireplace. A plaster cast sometimes looks well in a large fireplace which continues to the ceiling.

The color scheme is an important feature and fireplaces may or may not blend well with the surroundings if this is overlooked. There are a great variety of colors available in brick. The coloring of mortar adds to the color scheme either for harmony or contrast.

The variety of joints in brickwork gives effects and will harmonize with the texture of the brick. For example, a rough texture brick requires a wide, rough joint, which may be flush or raked, while a smooth brick will take either a fine or a large joint.

### Hints on Foundations

The footings may be of brick, stone or concrete. They should have a projection of 6 in. at least, and a depth of 8 in. or 10 in., according to materials used. If, to begin with, there is a masonry wall it may be economically utilized as one wall of the ash pit. However, this is poor practice, since the greater weight of the fireplace and chimney invariably results in settling and cracking of both wall and footing. A footing should be used in constructing the other wall of the ash pit. These walls should never be less than 9 in.

The size of the ash pit is determined by the depth and length of the proposed fireplace. The clean-out door is located in the center of the ash pit, the bottom of the door level with the bottom of the ash pit. A large door is the most convenient in removing ashes. The furnace flue is located at either end of the ash pit, separated by a 4 in. wall. An 8 in. x 12 in. furnace flue is most desirable, with walls plastered or lined with flue lining. (Flue section equals one-tenth area of fireplace grate.)

The ash pit should be closed over 6 in. from the finished floor line. This is done by corbeling several courses on the walls of the ash pit. It may be done by the use of iron bars to support the brick work. An allowance should be made for the ash trap opening, which is placed in the center of the firebox near the back. Two or three courses of the inside ash pit wall should be corbeled out to support the centering for the trimmer arch.

### Roughing in Fireplace

The chimney breast is that part of the fireplace which projects into the room. The rough work is constructed first, and the veneering, of face brick, is generally done when the plastering is finished. When brickwork is about 6 in. below the floor line lay out the piers or jambs and the firebox according to the plan, allowing 4½ in. for face and fire brickwork. Check dimensions over carefully and start rough work. Build piers level to height of damper. Insert metal ties frequently to tie in the face work. The exterior work should be carried up with the interior rough work. The furnace flue is located in one pier and a hollow core in the other. Four inches of brickwork around a flue lined with flue lining is sufficient.

The firebox should be lined with fire brick laid flat. The common practice of laying them on edge should be discour-

*Prepared to accompany the course in brickwork at Stout Institute, Wis.

aged because they burn out much quicker and require repairing more often. Fire brick should be laid in thin fire clay by dipping or buttering them and settling them in place with a hammer.

The fire brick flooring may be laid first, either rowlock or flat. The ash trap is set in the center of the firebox, 2 in. from the back fire brick wall. The bond should be laid out for the walls to eliminate small pieces, which burn out quickly and are unsightly. The width of fireboxes ranges from 2 ft. 6 in. to 4 ft.; depth, 20 in. to 25 in.; height, 2 ft. to 2 ft. 6 in., according to the size of the fireplace. The inside walls should flare from 3 in. to 5 in. The back wall should be run up plumb four or five courses and then brought forward 4 in. to 6 in. to form the throw of the firebox. This is done gradually by tilting each course a trifle, keeping the surface smooth. It should never be done by corbeling. The damper is placed in position having a bearing on the back and side walls. A 2-in. air space is sometimes used between fire work and rough work.

The throat is the most vital part of the fireplace, but with the many dampers on the market it is almost impossible to construct one incorrectly.

The throat should be from 4 in. to 6 in. wide, and extend the full length of the opening. It should be about 6 in. or two no chuck and the smoke would be blown back into the room.

The function of the smoke shelf is to reverse down drafts and thereby prevent any interference of these with the upward drafts, a necessity to properly convey the smoke through the flue.

The expansion chamber just above the smoke shelf serves to facilitate the checking of down drafts by providing sufficient room for air currents to be reversed. A fireplace may be constructed successfully without the aid of a damper, providing this method of construction is carried out.

### Construction of Flues

All flues should be lined with flue lining. No flues should be built less than 8 in. x 8 in. inside measurements. There are two kinds of flue lining, fire clay and terra cotta. The fire clay flue lining is used where there is intense heat. For ordinary purposes terra cotta is suitable.

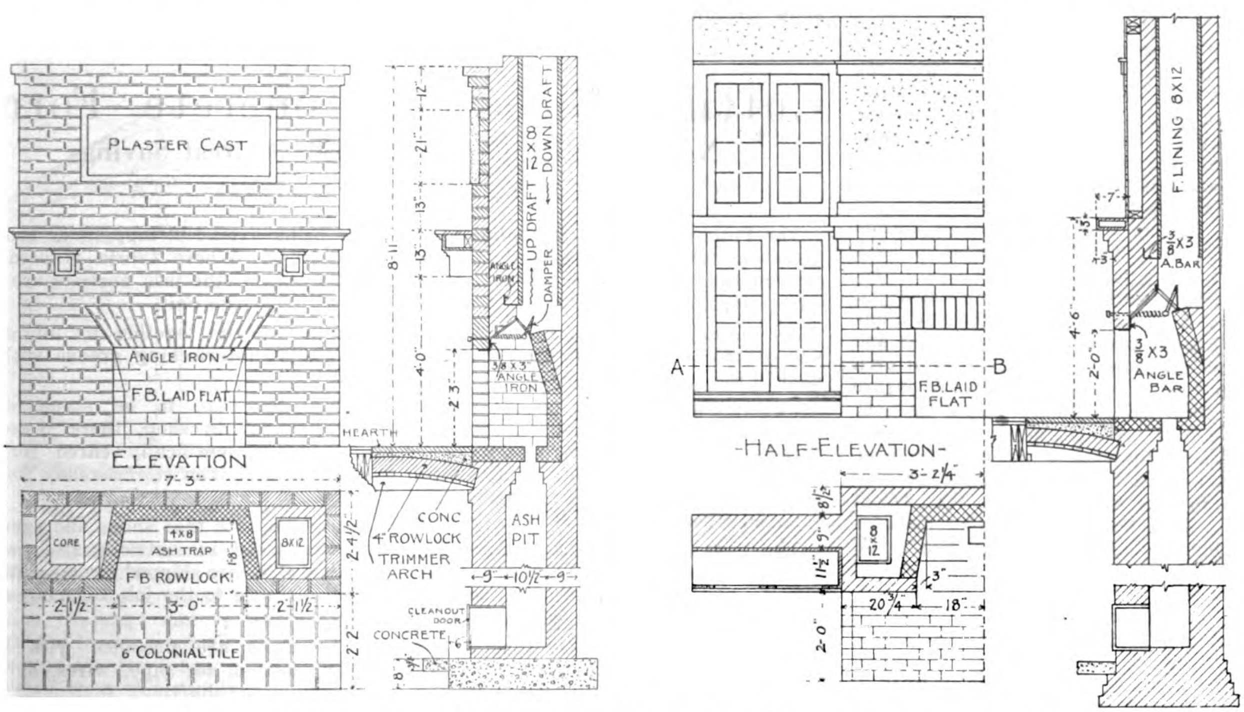
The damper being in position a flue has to be developed above the opening. This is done by a process of corbeling until the proper size of the flue is reached. All corbeling should be gradually done to eliminate any abrupt angles in the flue which would be detrimental to the flue's draft.

In all combustion chambers a certain size of flue is required to carry off the by 10 = 98 sq. in.; 8 in. x 12 in. = 96 sq. in., which is sufficient. Another rule is to allow 13 sq. in. in the flue for every square foot of opening. For example, 2 ft. 6 in. x 3 ft. = 7½ sq. ft.; 13 x 7½ sq. ft. = 97½ sq. in. in the flue.; 8 in. x 12 in. = 96 sq. in. An 8-in. x 12-in. flue is sufficient for most any fireplace. An 8-in. x 8-in. flue should never be used. A separate flue must be used for each fireplace. A furnace flue should not be connected with the fireplace flue.

The exterior work above the grade line is generally the same width as the chimney breast inside the room. Racking to the chimney line is established at different heights according to the type of fireplace.

Where a fireplace is 4 ft. 6 in. high inside the racking may be started a foot or two higher on the outside. The higher the racking is done the more pleasing the exterior appearance. Large fireplaces which run to the ceiling start racking at the second floor line.

The racking to the chimney line should always be done gradually, and preferably at an angle of 60 deg. It may be done by a series of 1 in. to 2 in. setbacks or racks in each course of brick work. Care should be taken to have both sides uniform when racking to the chimney line. Stone and tile are often used in racking to the chimney line. The racking may




**Elevations and sections, scale 1/16 in. = 1 ft., showing how to construct a fireplace.**

courses above the opening. The narrow throat prevents all the heat from going up the flue, and is sufficient to carry off all of the smoke. The damper controls the draft and the amount of heat to be given off into the room.

There is an "up" draft and a "down" draft in a flue. If it were not for the narrow throat the down draft would have smoke, and a fireplace is no exception to the rule. A flue that is too small will cause the fireplace to smoke even with the proper throat construction. A good rule to follow is: The cross section area of the flue should equal one-tenth or one-twelfth of the area of the fireplace opening. Example, opening 3 ft. wide, 2 ft. 6 in. high, 30 in. x 36 in. = 980 divided be done all on one side to avoid a window. A battering chimney looks well in large fireplace work.

In frame and stucco houses a cheaper brick may be used for the exterior of the chimney than used for the interior. The plainness of the exterior of the chimney may be relieved by ornamenting with a panel. The size of the chimney depends on the number, size of the flues and the thickness of the walls surrounding them.

In a small fireplace chimney a 4-in. wall is sufficient providing the flue is lined with flue lining and the chimney is not very high. In large fireplaces a 9-in. wall is much better, and will give the shaft of the chminey a better proportion to the width of the fireplace above the grade line.

The last 4 ft. of the chimney should be laid in cement mortar, as this part of the chimney starts to crumble and disintegrate first. A good hard vitrified brick should be used if possible.

Fancy and ornamental tops or crowns should be eliminated as much as possible, as they are quickly attacked by the weather and need much repairing. A stone or concrete cap is much more substantial and practical. Extending the flue lining 6 in. or 8 in. above the cap adds to the appearance. The capping of a chimney should be in harmony with the other chimneys of the same structure. All chimneys should extend 2 to 3 ft. above the highest point of the roof.

### Veneering Face Work

Lay out the bond from corner to corner to eliminate cuts, small pieces, and to insure the right bond over the opening. Make a gauge strip having each course marked upon it. This will insure uniformity of all horizontal joints (bed joints). Line up the first course, square the returns and lay it level. Run up both piers level to the height of the opening. Tie in the face work with the metal ties inserted in the rough work. Set an angle iron about 1 in. from the face to eliminate cutting of brick resting on the angle iron. Raise the corners and cut the skewback for the arch. Lay out the flat arch just as it is to be laid. Put up lines for top and bottom and lay up four or five courses on each side, keeping joints the same as the rest of the brickwork. Keep courses straight, true and flush. Make damper key come in a joint if possible. Key out arch and be sure all courses line up on top of arch to the line. This is imperative to insure a uniform joint when first course over the arch is laid. Keep all courses perfectly level by leveling corners from time to time. All face brick should be uniform in size and laid with the utmost care. Keep courses as nearly flush as possible, giving them a very slight roll or hack. Spoiled, chipped brick should not be used, but considerable care must be used in striking the joints. Level all corbeling on the underside and straightedge them. Ornamental work should be executed with great care. Brick work in a fireplace should always be the very best.

The support of the hearth is called the trimmer arch. This is constructed by the framing of joists about 2 ft. 6 in. from the fireplace. The framing should be stiff and rigid. The trimmer joists should be doubled and kept 2 in. from all brick work. The header should also be doubled. A wooden center supports a 4-in. rowlock arch. The sub-base for the tile is made of concrete-mixture, 1 cement, ... and ... regate. This should come within 1½ in. or 2 in. of the finished floor line. A brick hearth will require more depth and an allowance should be made accordingly. A raised hearth is sometimes used, but it is a frequent stumbling block for everyone. A glazed tile hearth is entirely out of the question. Six-inch square Colonial tile, sometimes called Promenade tile, laid with a wide joint, is a good combination and will harmonize with almost any kind of brickwork. This can be obtained in any color or mixed colors. The price of tile ranges from 35 cents to 80 cents per square foot. Small tile, such as 2 in. x 6 in. or 3 in. x 6 in., are used, and some pretty patterns can be laid out with them. Brick makes a very neat hearth and its flexibility to various bonds and patterns make it oftentimes desirable. The square and oblique herring bones are used mostly in hearth work. A concrete hearth is the cheapest and is suitable where economy is a factor to consider. It can be laid on a sub-floor 5 in. or 6 in. below floor level. Use two-course work. Base, 1 cement, 2 sand, 4 aggregates. Top, 1 cement, 2 sand.

The laying of a tile hearth can be done by almost any one without previous experience. A 1-cement — 2-sand mixture is used on top of the sub-base of concrete. This is leveled off by a skreed board which is a foot longer than the hearth, and notched out at both ends to allow straight-edging the mixture. This is gauged by the thickness of the tile. Over this spread a thin coat of neat dry cement. Soak tile in water for 10 or 15 minutes and set them in place according to the pattern desired. Allow them to set for a while, and when fairly solid readjust those that need it, leveling them with a straight-edge and settling them with a block of 3 in. x 4 in. and a hammer. Joints may be filled by pointing or grouting. Allow them to set an hour or so and wipe off carefully with sawdust, finishing finally with a damp cloth. Do this thoroughly or tile will look smeary when dry.

### Cleaning Brickwork

Cleaning down brickwork gives it a fresh appearance, and all fireplace work should be cleaned after being laid up. A mixture of four parts of water and one part of commercial muriatic acid (HCl) will remove all spots and daubs of mortar. The mixture is best applied with a brush. Care should be taken not to let any of the acid touch the mortar joints, as it will discolor them. Rinse with water if possible and repoint any joints that need it.

The cost of a fireplace runs from $75 up, according to the size, material, grade of work and cost of labor. A large fireplace will require more time and money. A fireplace will cost much more to build in an old house than in a new one, because the cutting out and rebuilding runs up the cost.

# Cutting Costs in Concrete Forms

## New Invention Expected to Effect Great Savings

*By C. F. Cramer, Architect*

The Patent Office has just allowed an invention which may revolutionize the construction of reinforced concrete floors, roofs, steps, etc.

All the expensive preparations, delays and obstructions in such work are obviated in the following manner:

The bearing supports as the permanent walls, partitions, columns and girders being in place, floor, roofs, steps are laid in small interlocking units, which are parallelopiped in form and in full span lengths.

The units are of light weight concrete in sheet metal sheaths, reinforced with rods or fabrics of strength desired.

The units may be placed by unskilled labor, each piece being laid before the layer much as logs are laid in a corduroy road; when so laid the units are immediately ready for use, to walk over and work upon.

Floors, steps, roofs, etc., may be laid in any kind of weather or temperature without detriment to the work and without the usual waiting for wet concrete to harden and season. The costs of protecting such concrete work under the old methods are entirely eliminated.

The logs are secured in place by iron anchors at both ends, the reinforcing rods being extended, lapping or hooking as desired. Where fabric is used for reinforcement, the iron anchors are cast into the concrete unit.

Steps are run together by filling the trough-like interlocking groove with cement.

The units are to be standardized, "ready-made" in shop, there tested to guarantee, scientifically cared for till seasoned, and then stored ready for delivery.

It is proposed that shops and agencies be established in districts, from which finished slabs are shipped a comparatively small distance to the job, insuring small freight costs.

The units are provided with holes where desired, for pipe, wires, lighting fixtures, line shafting, fasteners, etc., etc. Wood nailing strips are inlaid in the slab if desired. Pipe space in floors is afforded by cross furring. The work is designed so that it cannot be laid wrong. It is therefore "foolproof."

There is no tamping, no testing, no riveting, bolting, nailing or screwing. No delays or obstructions to other branches or tradesmen, thus saving all costs of labor, material and time the foregoing eliminations would entail.

# Building a Thirty-Ton Ice House for the Farm

## Valuable Data on Ice—Construction That Best Prevents Melting

Where one has access to a small stream or pond and at the same time wishes ice through the warm months for cooling milk and preserving food, an ice house that can be built for a nominal sum is the connecting link.

The items to be borne in mind in designing a house for ice are: quantity of ice required, losses from shrinkage, insulation, drainage and ventilation. The quantity of ice required will depend somewhat upon its use during the season. A couple of tons will supply ordinary domestic uses for about six months, that is, for the ice box and for occasional ice-cream manufacture and cooling of drinks. Aside from household use, ice is used most largely on the dairy farm. Under average conditions allow about 1000 lb. of ice a cow where the cream only is cooled, and about 2000 to 3000 lb. where the whole milk is cooled.

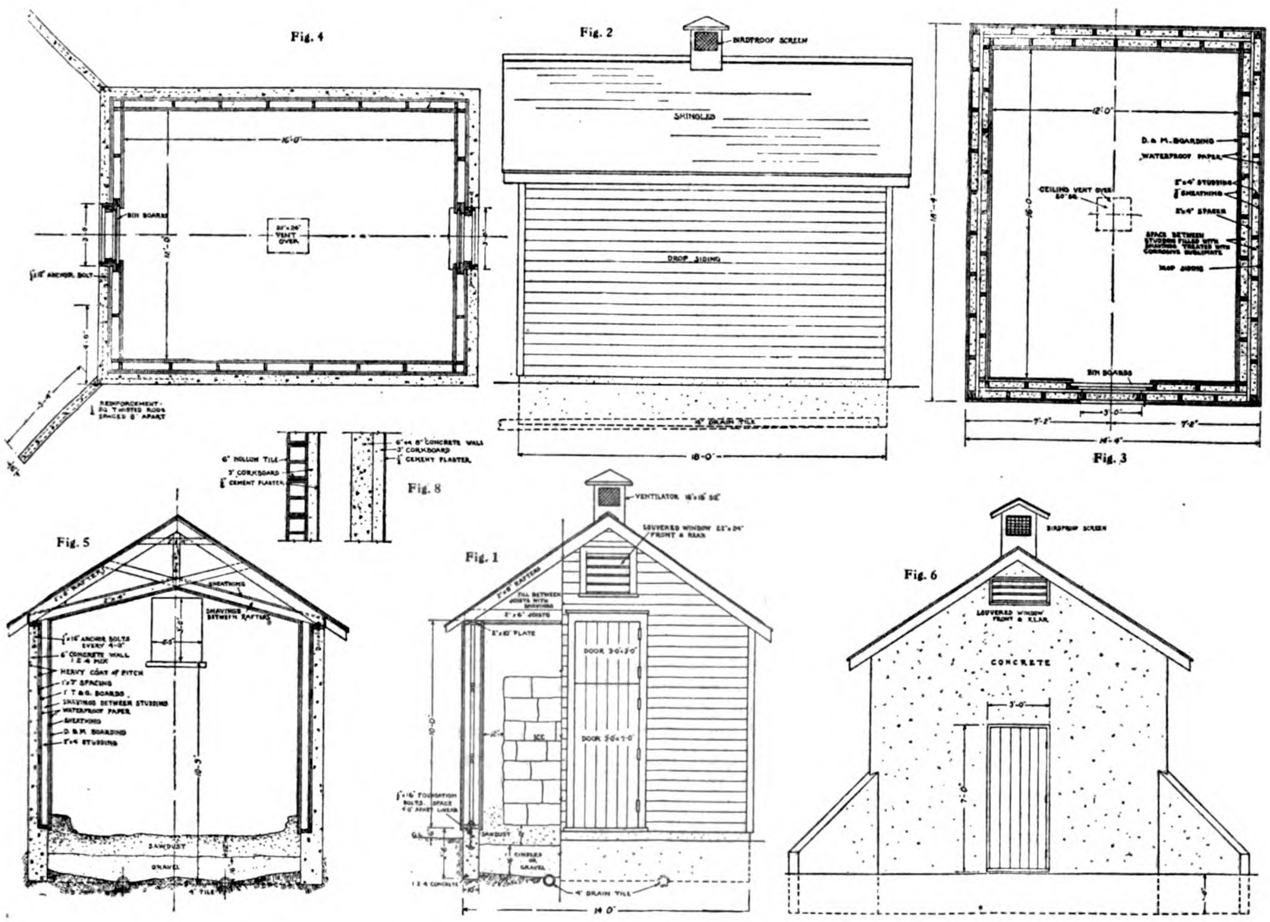
Ice occupies about fifty cubic feet a ton, allowing for irregularities and packing. The nearer the shape of the mass approaches the cube, theoretically at least, the better it will keep. Allowing twelve inches all round for sawdust and three feet of head room for packing, the size of house may be determined, for the quantity and space required may be easily computed from the above data. Some al lowance must be made for shrinkage, for no ice house will preserve all the ice put into it. This shrinkage may vary from fifteen to fifty per cent.

Two kinds of construction are now being favored. One has a loose construction allowing the wind and sun free play on the porous sawdust, insulating material, depending upon the iceless-refrigerator principle to keep the inner layer o. sawdust next to the ice cool and moist. This is said to give very good results.

The other method, and the one which will be considered here, consists in building the house in a sheltered place, with strongly insulated walls, well-ventilated roof space and good underdrainage.

The site should be excavated to a depth of about eighteen inches, or as low as is possible to secure good drainage. Drain tile should be laid slightly below the floor level and then covered to a depth of twelve to eighteen inches with cinders, gravel or other porous material. This will allow thorough drainage without admitting air.

The foundation may be made of concrete, brick or tile. Foundation bolts should be provided, for while not essential they increase the stability of the structure and allow of smaller sill timbers. Fig. 1 illustrates the cross section of the frame house and shows the drains,



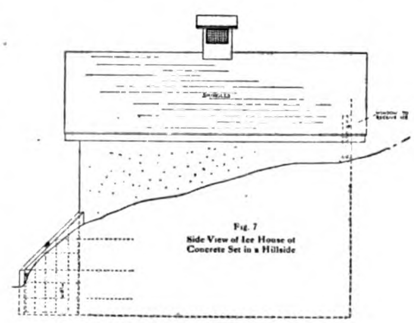



Fig. 7
Side View of Ice House of Concrete Set in a Hillside

foundation, method of packing the ice and other features.

The plan view, Fig. 3, shows the method

of setting the studs so that a continuous dead-air space is formed. Specifications as to the sheathing are also given. It will be noted that the dead-air space is filled with shavings or sawdust. Shavings are to be preferred in this case, as decay is not so likely to occur. The shavings should be treated with corrosive sublimate to prevent burrowing by rats and mice. The ceiling should be treated in a similar manner.

An ice house to be built into a bank is shown in Figs. 4 to 7 inclusive. The outer walls are constructed of a combination of concrete and frame. This construction may be altered as shown in Fig. 8. The scissors roof truss used as shown in Fig. 5 allows more head room than would be possible in the other house shown.

These houses are of equal size and have a capacity of four tons for each foot in depth of the ice, if packed as shown. Thirty tons would be about normal capacity at convenient filling height and should furnish ice for a twenty-cow dairy farm with ice for all purposes. These houses may be built for about $500 to $600 at present prices.

Fig. 8 shows a possible variation of wall construction that may be applied to either house without materially affecting the cost.—*Country Gentleman.*

# THE EDITOR'S PAGE

## Why Build Now Is Essential

The Government realizes that building must be resumed on a large scale as soon as possible. It realizes that the trade is a big important factor directly affecting the welfare of this country. And it realizes that the building industry can and will provide an efficient basis for bridging the gap between the false prosperity of war and the sound prosperity of peace.

In the words of F. T. Miller, director, Division of Public Works and Construction Development, "The pivotal nature of the building industry and the fact that building materials have shared less in the general inflation of commodity prices than almost anything else, make stimulation of building the most feasible means of aiding industry."

Cities and towns which have in many cases started municipal improvements have either stopped progress or have held the project in abeyance. Such work can and should go forward immediately. Given the example of governmental construction, private work would soon follow—and one contract for a building means many sub-contracts that grow out of that one.

Many real estate interests are, of course, advising delay on the chance that prices will soon be lower. This is only natural, for such firms have much to gain by the present shortage, with its consequent high rents and therefore increased value of the holdings. When the shortage is met, it will be difficult to raise rents, and there is even a chance that rents will fall.

It is not exactly clear on just what grounds real estate interests base their belief that lower prices will soon come.

Wages are high, and can only drop following the decreased cost of living. The Quartermaster's Department is estimating on a basis of 10 per cent increase in the cost per day of feeding a soldier, expecting this rise in foodstuffs.

Some branches of the building trades in certain localities are demanding and receiving increased wages. High transportation costs are likely to remain with us, and these are a very real factor in the cost of materials which must add the cost of freight to the charge for their goods.

Reports from the offices of architects reveal the fact that some are enjoying a rush of business, especially in the field covered by BUILDING AGE. This is encouraging. It shows that a certain class of wide awake investor is going to reap its profits now. It is a wise man who follows their example.

## Help Clean Up the Slums

Lloyd George said of English housing conditions, "Those who were in charge of recruiting came to the conclusion that if the people of this country had lived under proper conditions, were properly fed and *housed*, you could have had a million more men available and fit to put into the army. You cannot keep even animals in their full vigor unless you give them good conditions. There are millions of men's lives which have been lost as a result of the war, but there are millions more of maimed lives in the sense of undermined constitutions through atrocious social conditions that you have got in consequence of the whole of the terrors of this great war.

"It is good business to see that the men, the women and the children are brought up and sustained under conditions that will give strength and vigor to their frames, more penetration and endurance to their intelligence, and more spirit and heart than ever to face the problems of life, which will always be problems that will require fighting right from the cradle to the tomb. That is the first problem. One of the ways of dealing with that is, of course, to deal with the housing conditions. Slums are not fit homes for the men who have won this war, nor for their children. They are not fit nurseries for the children who are to make an Imperial race, and there must be no patching up. This problem has got to be undertaken in a way never undertaken before, as a great national charge and duty."

These words of Lloyd George are applicable not alone to England, but to every country in the world, for unfortunately bad social conditions and unsanitary housing are responsible for most of the diseased minds and bodies in this world.

One needs only to stroll through certain sections of a great city to see disease and immorality stalking, rampant and unashamed. And the dreary, forbidding houses look out upon dirty, ill kept streets that suck pride and self respect down into the morgue of degradation.

A man, a woman, cannot live in such localities without becoming at least tolerant of those conditions, for familiarity with disgusting things takes the edge off loathing. Gradually a decent person living in such a locality will show the influence of the careless streets in his dress, in the order of his room—and then in his mind and body. Few indeed can live in a degrading locality without having brought forth all the worst that is in them.

Education; education of body and mind and soul are needed in order to correct the conditions revealed by the war, conditions which have caused an astonishing amount of veneral disease in this country.

But education, even when of the best, will prove unavailing if the right housing is not provided.

Decent looking homes, with clean, well kept streets, will do much to create a feeling of self respect in the people who live there. And these people will go to their work healthier and happier, and labor better because of the influence of their home surroundings.

It is good business, both social and economic, to provide the right kind of living conditions. Better homes mean better men and better women. Let us all use our influence to help clean up the slums.

## Help Service Men to a Chance for a Job

Demobilization is proceeding rapidly. Soldiers and sailors are being returned in a steady stream to civilian life.

The big problem of to-day is the absorption of this labor.

Many of the men are going back to their old jobs. Others are finding their jobs filled, sometimes by women who are working for a smaller salary, and sometimes by men whom it would be an injustice to turn out. Some employers who promised to hold the jobs open have either deliberately gone back on their word or else the condition of their business renders the keeping of the promise inadvisable.

Now that the war is over, many employers who made glorious promises to prove to their trade their patriotism have conveniently forgotten that there ever was a war.

Those of us who are sincerely patriotic, who did not indulge in idle vaporings merely to court popularity, can do much to ease the situation.

The solution is, of course, to give preference to men who have been in the service. And this is really a very practical and appreciative way of showing our gratitude both to those who have returned safely and to those who have made the Supreme Sacrifice.

A clearing house for labor has been established by the United States Employment Service, which is the official governmental organization in charge of finding positions for returning soldiers and sailors, as well as for war workers and others. Over 1580 community labor boards, 850 offices and volunteer agents are scattered through the country. In every town it is intended to organize a Bureau for Returning Soldiers and Sailors.

Various local organizations such as churches, lodges, Red Cross, Y. M. C. A., draft boards, American Federation of Labor, etc., are aiding to solve the problem.

All the efforts put forth to prove this country's very real and practical appreciation of the service men will come to nought if it does not receive the hearty co-operation of employers.

Each and every employer should notify the proper authority in his district just what jobs are open in his business, and also give prompt notification when that job is filled.

With this job data centrally filed, the Employment Service can work efficiently and be of real service.

No one, least of all the discharged soldiers and sailors, desires that a service man shall be given a job merely because he is a service man.

But every soldier and sailor has a right to expect that he will be given a chance to step back into the business world. He has a right to expect that an employer will make a reasonable effort to give service men a chance to know of the jobs in his office. And he has a right to expect preference when his merits are equal to those of a man who has been fortunate enough to be left on the home front.

Returned soldiers and sailors have had a hard, often unpleasant, experience. Their folks at home have had a trying, anxious time of it, too.

Let us help to wipe out some of the sacrifice that these service men have made. Let us give them the real practical thanks afforded by at least a *chance* for a good job.

## Architects Should Show Consideration for Builders in Preparing Drawings

There is an increasing tendency especially among architects doing country house work, to make in pencil what serve as the finished sketches. Blueprints made from these hastily drawn pencil sketches are handed to builders, who are then expected to work from blueprints whose lines are indistinct and often even illegible. This latter is especially true in cases where the architect does his own blueprinting.

It is an injustice to ask and expect a builder to work from faint blueprints of unverified pencil sketches. BUILDING AGE receives many designs from architects, and this office is frequently compelled to relayout plans and elevations which are not only inaccurately scaled but are also contradictory in dimensions and layout.

This is not right. An architect is paid to prepare drawings and specifications which the builder can confidently follow. Not only does an architect often state that the contractor shall check up all figures and be responsible for inaccuracies, but the specifications also often include a clause stating that if anything is omitted, the contractor shall go ahead just as if that omission had been specified.

Architects doing the smaller sort of work are not alone in the lack of consideration shown the contractor. On even the biggest work, it is not an uncommon sight to see the superintendent and his foreman poring over a set of well-drawn blueprints in an endeavor to decipher letters and figures drawn so small that they are practically illegible on the blueprints handed to the contractor.

Figures and letters should always be made large enough so that they can be easily read. No contractor should be expected to be responsible for an architect's or an engineer's illegibility.

In simple justice to the contractor, every architect should be considerate enough to see that his blueprints are legible, correct and worthy of having his signature attached. If the carelessness of some architects were known among their clients, they would never get another job.

Be fair to the builder. Remember that his work is not easy, and that he is deserving of every consideration in the matter of legible and correct drawings.

# Building Activity Throughout the United States for December and for 1918

Several of the building commissioners reporting activity in their cities for December feel that building is going to pick up slowly. Others, and they are in the majority, already are feeling the stimulus that the shortage of buildings is bound to provide. In the words of Inspector Healy of Washington, D. C. "The effect of the war is still appreciably felt, of course. Indications are, however, for decidedly increased activity in the spring." Permit Clerk Galven of Detroit, states that "Outlook is favorable for a good increase in building activities, principally schools, dwellings, and apartments." Chief Inspector Greig of Berkeley, Cal., states "The month of January is starting out very favorably with a better feeling all around for the building business." Building Inspector Bellows of Shreveport, La., states "Building operations picking up at a rapid rate since Jan. 1."

These opinions are typical. Yet, as stated by Building Commissioner Graham of Davenport, Iowa, the "Building ban was raised too late in the fall to stimulate building." Consequently, it is only natural that many communities have not as yet felt the surge of increased activity. In spite of that, combined with the fact that December is a slower month than November, December this year shows an increase over November of this year. This is merely an indication, but it shows that the work was only waiting a chance to go ahead, and we can, therefore, look for a gradually increasing activity.

Conditions from now on should show improvement, unless weather conditions prove discouraging. Many builders would undoubtedly have gone ahead during December had they known that the winter was to be an open one.

In December, 1918, compared with December, 1917, the country shows a loss of 34 per cent, 164 cities reporting; sixty-one show a gain. Eastern cities report a loss of 49 per cent, middle cities, 32 per cent; Southern cities, 39 per cent, and Western cities, 19 per cent.

Figures for the year 1918, compared with 1917, show a loss of 45 per cent, 144 cities reporting; of these thirty-nine show a gain. Eastern cities for the year report a loss of 42 per cent, middle cities, 59 per cent; Southern cities, 30 per cent, and Western cities, 40 per cent.

Comparative figures in detail for December and for the year follow:

### CITIES IN EASTERN STATES

| | December, 1918 New Work Permits | December, 1918 New Work Value | December, 1918 Repairs Value | December, 1917 New Work Permits | December, 1917 New Work Value | December, 1917 Repairs Value | 1918 Total Estimated Construction | 1917 Total Estimated Construction |
|---|---|---|---|---|---|---|---|---|
| *Albany, N. Y. | 56 | $108,675 | ........ | 60 | $49,799 | ........ | $1,336,102 | $2,446,212 |
| Allentown, Pa. | 2 | 1,225 | ........ | 8 | 27,200 | ........ | 731,715 | 1,367,907 |
| Altoona, Pa. | 5 | 1,480 | 8,530 | 5 | 3,713 | $6,460 | 205,853 | 320,464 |
| Atlantic City, N. J. | .. | ........ | 98,621 | 3 | 18,050 | 42,925 | *603,780 | 2,604,817 |
| Auburn, N. Y. | 2 | 3,025 | ........ | 3 | 5,000 | ........ | 233,249 | 234,115 |
| *Bayonne, N. J. | 7 | 22,300 | ........ | 5 | 7,000 | ........ | 588,573 | 864,589 |
| Binghamton, N. Y. | 24 | 16,693 | 9,502 | 24 | 16,327 | 22,579 | 607,293 | 1,657,742 |
| *Boston, Mass. | 22 | 201,685 | 283,630 | 39 | 381,875 | 119,440 | 7,346,537 | 23,294,161 |
| *Bridgeport, Conn. | 55 | 134,385 | ........ | 30 | 105,430 | ........ | 3,202,829 | 4,562,723 |
| *Brockton, Mass. | 6 | 2,870 | 13,500 | 7 | 7,825 | 2,218 | 280,130 | 757,832 |
| *Buffalo, N. Y. | 68 | 123,300 | 19,700 | ... | ........ | ........ | 7,014,000 | 10,501,000 |
| *Easton, Pa. | 4 | 6,195 | 3,300 | 3 | 5,050 | 4,375 | 207,398 | 492,586 |
| East Orange, N. J. | 24 | 50,100 | ........ | 21 | 194,275 | ........ | 947,987 | 1,555,115 |
| Elizabeth, N. J. | 14 | 25,789 | ........ | 13 | 152,800 | ........ | *1,497,627 | 1,453,641 |
| Erie, Pa. | 38 | 63,395 | 8,928 | 49 | 152,750 | 27,343 | 2,138,080 | 3,924,240 |
| Harrisburg, Pa. | 131 | 791,125 | 119,740 | 325 | 1,811,815 | 194,800 | *2,006,515 | 912,815 |
| Hartford, Conn. | 403 | 1,957,477 | 615,785 | 685 | 6,708,241 | 383,649 | .......... | .......... |
| *Camden, N. J. | 38 | 410,844 | ........ | 27 | 202,417 | ........ | *7,727,187 | 2,308,477 |
| *Hoboken, N. J. | 1 | 2,500 | 13,695 | 2 | 1,750 | 3,000 | *662,635 | 337,219 |
| *Holyoke, Mass. | 8 | 19,575 | 2,750 | 1 | 1,500 | 3,500 | 230,595 | 752,410 |
| Irvington, N. Y. | .. | ........ | ........ | ... | ........ | ........ | .......... | .......... |
| Jersey City, N. J. | 12 | 19,153 | 17,430 | 23 | 122,601 | 52,335 | .......... | .......... |
| *Lawrence, Mass. | 2 | 10,500 | 23,650 | ... | ........ | 35,100 | *1,852,398 | 592,405 |
| Manchester, N. H. | 5 | 7,735 | 6,659 | 7 | 7,832 | 13,815 | 320,862 | 1,263,945 |
| Mt. Vernon, N. Y. | .. | ........ | ........ | 13 | 76,750 | 10,690 | .......... | .......... |
| Newark, N. J. | 106 | 215,100 | ........ | 121 | 701,860 | ........ | 5,320,833 | 9,395,920 |
| New Bedford, Mass. | 30 | 108,277 | ........ | 19 | 281,149 | ........ | 976,714 | 3,054,211 |
| New Britain, Conn. | 8 | 3,550 | 2,100 | 12 | 69,200 | 1,600 | 971,250 | 1,080,280 |
| *New Haven, Conn. | 43 | 103,700 | ........ | 41 | 42,320 | ........ | 3,227,058 | 5,642,869 |
| New York: | | | | | | | | |
| Manhattan | 14 | 434,300 | 285,245 | 13 | 549,000 | 1,241,655 | 17,697,650 | 42,738,169 |
| Bronx | 125 | 164,008 | ........ | 132 | 452,073 | ........ | 5,207,320 | 10,126,360 |
| Brooklyn | 85 | 468,195 | 257,966 | 112 | 1,486,600 | 429,275 | 23,234,539 | 33,590,071 |
| *Queens | 324 | 327,185 | ........ | ... | ........ | ........ | *6,728,030 | .......... |
| *Richmond | 36 | 87,632 | 21,610 | 22 | 77,910 | 4,960 | 2,083,654 | 3,717,270 |
| *Niagara Falls, N. Y. | 68 | 592,847 | ........ | 20 | 88,780 | ........ | 2,081,126 | 1,819,054 |
| *Nutley, N. J. | 5 | 7,500 | 740 | 2 | ........ | ........ | .......... | .......... |
| Passaic, N. J. | 93 | 292,420 | 98,100 | 168 | 1,615,705 | 117,355 | 390,520 | 1,733,050 |
| Paterson, N. J. | 33 | 11,604 | ........ | 23 | 15,813 | ........ | 1,086,126 | 1,599,838 |
| *Philadelphia, Pa. | 358 | 778,080 | ........ | 270 | 740,020 | ........ | 15,452,670 | 34,016,480 |
| Pittsburgh, Pa. | 127 | 506,622 | ........ | 142 | 513,238 | ........ | 7,938,350 | 11,318,313 |
| Portland, Me. | 4 | 8,000 | 5,760 | 5 | 68,200 | 6,410 | 601,647 | 769,543 |
| Quincy, Mass. | 17 | 11,325 | ........ | 26 | 43,777 | ........ | *3,915,796 | 1,348,297 |
| *Reading, Pa. | 10 | 12,975 | 15,625 | 9 | 10,400 | 14,075 | 793,575 | 1,276,030 |
| Schenectady, N. Y. | 10 | 10,875 | 1,750 | 13 | 171,200 | 7,480 | 1,230,001 | 1,869,168 |
| Scranton, Pa. | 13 | 4,625 | ........ | 7 | 5,030 | ........ | 426,346 | 1,338,871 |
| Springfield, Mass. | 32 | 65,850 | ........ | 43 | 114,334 | ........ | 1,600,565 | 3,782,318 |
| Syracuse, N. Y. | 47 | 51,250 | ........ | 53 | 322,900 | ........ | 1,637,895 | 4,251,701 |
| Trenton, N. J. | 358 | 522,615 | ........ | 500 | 1,219,258 | ........ | 545,485 | 1,801,549 |
| *Troy, N. Y. | 8 | 4,613 | ........ | ... | ........ | ........ | 875,530 | 1,394,810 |
| *Utica, N. Y. | 17 | 50,600 | ........ | 5 | 19,100 | ........ | 876,530 | 1,413,980 |
| Wilkes-Barre, Pa. | 15 | 9,252 | ........ | 21 | 29,533 | ........ | *704,676 | 600,510 |
| *West Hoboken, N. J. | 5 | 3,350 | ........ | 3 | 900 | ........ | 120,556 | 138,860 |
| York, Pa. | 2 | 350 | 925 | 1 | 150 | 3,842 | *435,245 | 184,145 |
| *Fitchburg, Mass. | 2 | 3,200 | 2,600 | 1 | 1,500 | 1,800 | 325,291 | 440,389 |
| *Lowell, Mass. | 11 | 28,425 | 22,565 | 6 | 13,040 | 3,690 | *1,342,362 | 1,241,351 |
| *Lancaster, Pa. | 4 | 7,950 | 1,800 | 5 | 7,650 | 1,250 | 290,640 | 360,711 |
| Newport, R. I. | 2 | 5,625 | 5,473 | 9 | 18,850 | 550 | .......... | .......... |
| Providence, R. I. | 37 | 121,700 | 29,100 | 27 | 101,100 | 83,100 | .......... | .......... |
| Pittsfield, Mass. | 73 | 82,170 | 103,227 | 97 | 334,193 | 150,000 | .......... | .......... |
| Rochester, N. Y. | 40 | 61,560 | 11,474 | 35 | 380,830 | 42,815 | 1,949,551 | 6,739,620 |
| *Worcester, Mass. | 17 | 25,050 | 34,120 | 16 | 27,290 | 12,660 | 2,066,734 | 4,838,840 |
| Chelsea, Mass. | 8 | 5,325 | ........ | 7 | 6,775 | ........ | 393,485 | 582,558 |
| Salem, Mass. | 22 | 4,325 | ........ | 22 | 13,894 | ........ | 189,545 | 583,142 |
| Yonkers, N. Y. | 8 | 16,000 | ........ | 8 | 63,200 | ........ | 1,162,800 | 1,405,400 |
| | 3144 | 9,198,056 | 2,145,600 | 3369 | 19,572,082 | 3,044,746 | 149,540,314 | 258,398,093 |

### CITIES IN EXTREME WESTERN STATES

| | December, 1918 New Work Permits | December, 1918 New Work Value | December, 1918 Repairs Value | December, 1917 New Work Permits | December, 1917 New Work Value | December, 1917 Repairs Value | 1918 Total Estimated Construction | 1917 Total Estimated Construction |
|---|---|---|---|---|---|---|---|---|
| *Berkeley, Cal. | 8 | $19,150 | $12,557 | 5 | $18,000 | $12,000 | $722,290 | $123,365 |
| Denver, Col. | 28 | 20,400 | 9,800 | 69 | 162,800 | 50,950 | 2,595,890 | 4,292,000 |
| *Col. Spgs., Col. | 4 | 10,745 | 360 | 5 | 1,450 | 1,570 | 164,182 | 263,565 |
| Fresno, Cal. | 27 | 28,455 | 10,302 | 51 | 66,020 | 23,647 | .......... | .......... |
| *Long Beach, Cal. | 173 | 175,384 | ........ | 81 | 67,469 | ........ | *2,828,844 | 809,721 |
| Los Angeles, Cal. | 301 | 466,934 | 135,935 | 296 | 581,022 | 319,221 | 8,678,862 | 16,932,082 |
| *Oakland, Cal. | 200 | 281,175 | ........ | 186 | 244,045 | ........ | *5,382,159 | 4,442,520 |
| Pasadena, Cal. | 84 | 28,663 | ........ | 66 | 52,577 | ........ | 455,030 | 1,368,750 |
| *Portland, Ore. | 176 | 268,590 | 48,625 | 92 | 45,610 | 45,675 | *6,176,052 | 3,643,410 |
| Pueblo, Col. | 18 | 6,022 | ........ | 26 | 10,061 | ........ | 373,349 | 1,032,478 |
| *Salt Lake City, Utah | 36 | 531,950 | ........ | 56 | 215,800 | ........ | 2,278,585 | 2,787,925 |
| *San Diego, Cal. | 29 | 26,235 | 56,955 | 27 | 45,530 | 13,515 | *1,602,990 | 906,097 |
| San Francisco, Cal. | 47 | 381,671 | 95,331 | 63 | 391,684 | 89,954 | 7,724,319 | 15,635,319 |
| San Jose, Cal. | 13 | 12,440 | ........ | 35 | 33,075 | ........ | *524,089 | 489,577 |
| Seattle, Wash. | 529 | 286,135 | ........ | 514 | 545,055 | ........ | .......... | .......... |
| Spokane, Wash. | 19 | 9,405 | 3,675 | 27 | 259,265 | 19,500 | 423,066 | 2,140,740 |
| Stockton, Cal. | 35 | 27,376 | ........ | 38 | 38,418 | ........ | *1,409,711 | 1,355,243 |
| *Tacoma, Wash. | 116 | 97,245 | 29,624 | 55 | 46,955 | 26,780 | *2,844,490 | 1,141,628 |
| Cheyenne, Wyo. | 1 | 1,200 | ........ | 53 | 337,091 | 8,500 | .......... | .......... |
| Tucson, Ariz. | .. | ........ | ........ | 9 | 18,000 | 3,000 | .......... | .......... |
| | 1844 | 2,679,175 | 395,165 | 1754 | 3,179,927 | 608,812 | 44,183,908 | 57,464,420 |

### CITIES IN MIDDLE STATES

| | December, 1918 New Work Permits | December, 1918 New Work Value | December, 1918 Repairs Value | December, 1917 New Work Permits | December, 1917 New Work Value | December, 1917 Repairs Value | 1918 Total Estimated Construction | 1917 Total Estimated Construction |
|---|---|---|---|---|---|---|---|---|
| Akron, Ohio | 114 | $222,850 | ........ | 120 | $1,179,150 | ........ | $4,112,236 | $14,166,818 |
| *Canton, Ohio | 49 | 142,450 | ........ | 18 | 28,350 | ........ | 1,845,167 | 2,674,280 |
| Cedar Rapids, Iowa | 4 | 8,000 | $9,000 | 5 | 41,000 | $8,000 | 767,000 | 1,752,000 |
| Chicago, Ill. | 112 | 1,410,650 | ........ | 134 | 3,238,000 | ........ | 34,792,500 | 64,244,150 |
| *Cincinnati, Ohio | 614 | 362,115 | ........ | 616 | 188,835 | ........ | 4,856,593 | 10,451,315 |
| Cleveland, Ohio | 60 | 385,400 | 144,505 | 118 | 1,246,800 | 123,480 | 16,385,800 | 30,483,750 |
| *Columbus, Ohio | 39 | 214,555 | 228,130 | 28 | 119,925 | 25,855 | 3,301,220 | 3,915,030 |
| *Davenport, Iowa | 18 | 12,900 | 6,000 | 12 | 10,000 | 7,200 | *1,031,332 | 777,223 |
| *Dayton, Ohio | 41 | 152,841 | 6,725 | ... | ........ | ........ | 3,833,063 | 4,204,493 |
| Decatur, Ill. | 5 | 850 | 1,490 | 11 | 43,075 | 32,840 | 726,975 | 1,331,000 |
| *Des Moines, Iowa | 620 | 4,002,381 | 108,185 | 920 | 2,537,049 | 103,420 | *4,110,566 | 2,640,469 |
| Detroit, Mich. | 201 | 365,325 | 176,540 | 207 | 935,710 | 169,315 | 18,194,415 | 39,666,800 |
| Dubuque, Iowa | 1 | 1,500 | ........ | 2 | 4,050 | ........ | 270,119 | 603,170 |
| Duluth, Minn. | 19 | 25,910 | 5,947 | 21 | 63,170 | 49,055 | 2,590,788 | 4,536,684 |
| *East St. Louis, Ill. | 14 | 35,100 | ........ | 12 | 21,050 | ........ | 919,841 | 1,238,551 |
| Ft. Wayne, Ind. | 11 | 91,200 | 132,500 | 11 | 477,710 | 500 | .......... | .......... |
| Grand Rapids, Mich. | 18 | 27,376 | 5,155 | 23 | 26,000 | 6,987 | 1,209,011 | 1,811,165 |
| *Indianapolis, Ind. | 85 | 108,065 | 59,274 | 62 | 48,752 | 37,191 | 4,588,676 | 7,103,102 |
| Joplin, Mo. | 1 | 8,000 | 6,600 | 12 | 15,020 | 8,000 | .......... | .......... |
| Kansas City, Kan. | 4 | 15,600 | ........ | 7 | 11,900 | 23,525 | 1,058,016 | 1,656,670 |
| Kansas City, Mo. | 68 | 58,050 | ........ | 100 | 137,500 | ........ | 5,649,445 | 10,128,450 |
| Lincoln, Neb. | 10 | 3,370 | ........ | 11 | 33,750 | ........ | 759,172 | 1,386,193 |
| Milwaukee, Wis. | 93 | 499,067 | ........ | 103 | 526,767 | ........ | 6,513,096 | 11,270,292 |
| Minneapolis, Minn. | 146 | 242,070 | ........ | 134 | 595,150 | ........ | 5,395,740 | 9,258,365 |
| Omaha, Neb. | 32 | 131,365 | ........ | 49 | 578,830 | ........ | 3,709,554 | 7,737,047 |
| Peoria, Ill. | 12 | 10,800 | ........ | 17 | 72,115 | ........ | 783,885 | 2,109,070 |
| Richmond, Ind. | 9 | 7,150 | 3,823 | 3 | 33,300 | 5,200 | .......... | .......... |
| *Saginaw, Mich. | 17 | 31,888 | ........ | 14 | 13,670 | ........ | *521,947 | 428,496 |
| St. Louis, Mo. | 99 | 112,211 | 235,270 | 112 | 325,606 | 99,072 | 6,352,582 | 12,538,332 |
| St. Paul, Minn. | 69 | 92,283 | ........ | 83 | 117,109 | ........ | *10,152,709 | 7,256 706 |
| *Joliet, Ill. | 2 | 6,000 | ........ | ... | ........ | ........ | .......... | .......... |
| Sioux City, Iowa | 16 | 53,900 | 12,500 | 9 | 65,000 | 12,700 | *3,223,341 | 3,083,159 |
| South Bend, Ind. | 27 | 2,945 | ........ | 33 | 70,880 | ........ | 926,277 | 2,028,980 |
| *Springfield, Ill. | 12 | 23,520 | 9,860 | 5 | 8,150 | 11,750 | 635,315 | 942,100 |
| Superior, Wis. | 39 | 37,640 | ........ | 36 | 1,264,885 | ........ | 1,008,927 | 2,163,053 |
| Terre Haute, Ind. | 20 | 16,160 | ........ | 8 | 21,185 | ........ | 455,729 | 579,400 |
| Toledo, Ohio | 96 | 119,672 | ........ | 83 | 126,113 | ........ | 6,616,800 | 12,509,950 |
| *Topeka, Kan. | 3 | 3,700 | 1,985 | 1 | 125 | ........ | 184,290 | 603,974 |
| Wichita, Kan. | 21 | 22,175 | ........ | 54 | 172,260 | ........ | 3,065,631 | 3,771,490 |
| Youngstown, Ohio | 37 | 53,760 | 4,875 | 59 | 135,635 | 4,050 | *4,577,984 | 4,542,395 |
| Bloomington, Ill. | 14 | 33,000 | 22,000 | 46 | 125,000 | 40,000 | .......... | .......... |
| *Fargo, N. D. | 6 | 30,000 | 6,000 | 3 | 15,000 | 4,000 | *826,700 | .......... |
| *Hamilton, Ohio | 9 | 23,700 | 3,150 | 4 | 19,300 | 625 | *724,356 | 254,104 |
| Kalamazoo, Mich. | 7 | 17,000 | ........ | 4 | 48,490 | 1,300 | .......... | .......... |
| Lansing, Mich. | 8 | 9,246 | ........ | 5 | 18,350 | ........ | 341,717 | 1,307,515 |
| *Springfield, Mo. | 2 | 250 | 3,100 | ... | ........ | ........ | 106,945 | 331,988 |
| *Bay City, Mich. | 12 | 20,000 | ........ | 8 | 8,400 | 350 | 454,700 | 561,492 |
| *Jackson, Mich. | 21 | 41,830 | ........ | 10 | 5,500 | ........ | *652,467 | 593,750 |
| Springfield, Mass. | 32 | 65,850 | ........ | 43 | 114,334 | ........ | .......... | .......... |
| | 2969 | 9,332,670 | 1,192,614 | 3376 | 14,750,390 | 774,415 | 168,232,627 | 288,670,871 |

### CITIES IN SOUTHERN STATES

| | December, 1918 New Work Permits | December, 1918 New Work Value | December, 1918 Repairs Value | December, 1917 New Work Permits | December, 1917 New Work Value | December, 1917 Repairs Value | 1918 Total Estimated Construction | 1917 Total Estimated Construction |
|---|---|---|---|---|---|---|---|---|
| *Wheeling, W. Va. | 19 | $32,420 | ........ | 23 | $25,823 | ........ | $326,727 | $430,584 |
| Atlanta, Ga. | 53 | 58,430 | $32,109 | 56 | 185,548 | $31,402 | 3,572,086 | 4,967,675 |
| Baltimore, Md. | 32 | 85,200 | 130,600 | 27 | 210,305 | 80,965 | 4,674,475 | 7,289,836 |
| Birmingham, Ala. | 253 | 41,833 | ........ | 229 | 95,993 | ........ | 1,793,872 | 1,818,736 |
| *Charleston, S. C. | 234 | 492,236 | ........ | 415 | 461,061 | ........ | *491,326 | 366,948 |
| *Charlotte, N. C. | 10 | 44,750 | 1,450 | 5 | 34,000 | 950 | *876,546 | 724,413 |
| Chattanooga, Tenn. | .. | ........ | 14,571 | ... | ........ | 28,273 | 398,833 | 2,196,149 |
| *Corpus Christi, Tex. | 10 | 6,480 | ........ | 2 | 4,200 | ........ | .......... | .......... |
| Dallas, Tex. | 33 | 61,635 | ........ | 28 | 128,115 | ........ | 1,667,730 | 3,573,259 |
| El Paso, Tex. | 65 | 52,668 | ........ | 78 | 58,770 | ........ | 626,121 | 3,749,407 |
| Houston, Tex. | 61 | 128,096 | 21,689 | 37 | 698,624 | 14,060 | 2,270,649 | 3,124,327 |
| Huntington, W. Va. | 16 | 4,360 | ........ | 15 | 50,000 | ........ | 1,106,841 | 1,622,127 |
| *Louisville, Ky. | 46 | 113,305 | ........ | 28 | 42,130 | ........ | *1,991,632 | 1,806,150 |
| Memphis, Tenn. | 44 | 28,035 | ........ | 49 | 65,625 | ........ | 1,591,078 | 2,626,855 |
| Miami, Fla. | 53 | 44,200 | ........ | 66 | 65,300 | ........ | .......... | .......... |
| Macon, Ga. | .. | ........ | ........ | ... | ........ | ........ | .......... | .......... |
| *Montgomery, Ala. | 94 | 30,552 | ........ | 102 | 28,113 | ........ | 258,236 | 335,476 |
| New Orleans, La. | 3 | 11,450 | 3,080 | 29 | 78,111 | 2,885 | 1,765,571 | 2,828,878 |
| Norfolk, Va. | 15 | 27,707 | 1,300 | 15 | 26,800 | 13,700 | *2,834,107 | 1,665,180 |
| Oklahoma City, Okla. | 30 | 144,850 | 10,425 | 28 | 164,430 | 5,585 | 2,504,451 | 3,038,076 |
| *Richmond, Va. | 53 | 216,945 | ........ | 58 | 86,435 | ........ | 1,838,614 | 4,118,688 |
| San Antonio, Tex. | 118 | 82,983 | ........ | 204 | 434,945 | ........ | *3,753,974 | 2,185,813 |
| Savannah, Ga. | 5 | 625 | 3,850 | 10 | 16,000 | 4,400 | 277,275 | 918,160 |
| Shreveport, La. | 4 | 5,300 | 12,724 | 13 | 10,950 | 6,665 | .......... | .......... |
| *Tampa, Fla. | 7 | 61,220 | 5,220 | 11 | 17,335 | 22,787 | 383,397 | 800,064 |
| Washington, D. C. | 34 | 237,825 | 70,446 | 53 | 399,620 | 223,045 | 7,172,818 | 12,603,606 |
| Wilmington, Del. | 29 | 46,245 | 30,811 | 7 | 60,516 | 21,133 | *3,151,200 | 2,986,714 |
| Covington, Ky. | 2 | 400 | ........ | 4 | 6,350 | 2,300 | 141,125 | 265,820 |
| Fort Worth, Tex. | 18 | 42,627 | 10,685 | 16 | 127,820 | 8,525 | *2,267,887 | 1,789,612 |
| Pensacola, Fla. | 1 | 600 | 9,659 | 79 | 20,134 | 22,725 | .......... | .......... |
| *Galveston, Tex. | 415 | 15,062 | ........ | ... | ........ | ........ | *175,618 | 86,461 |
| Knoxville, Tenn. | 45 | 15,115 | ........ | 46 | 20,705 | ........ | 871,282 | 1,271,759 |
| *Lexington, Ky. | 28 | 33,515 | ........ | 6 | 11,000 | 350 | *407,522 | 392,910 |
| *Portsmouth, Va. | 14 | 33,453 | ........ | 13 | 23,460 | ........ | *410,742 | 185,756 |
| Roanoke, Va. | 8 | 1,715 | ........ | 7 | 4,170 | ........ | 191,029 | 615,170 |
| | 1852 | 2,201,837 | 358,619 | 1759 | 3,662,388 | 489,410 | 49,792,764 | 70,384,609 |

* Indicates a gain over last year


**Hendrick's Commercial Register of the United States for Buyers and Sellers.**—This is the twenty-seventh edition of a work that has come to be accepted as a standard list of architects, contracting builders, manufacturers of all sorts of equipment such as mixers, brick-making machinery, etc.; in fact dealers, producers, manufacturers and consumers of all sorts. Some idea of the extensive scope of the work may be gained from the fact that 17,145 classifications are contained.

The firms are listed in various convenient ways, the first of which is in an index under the material or product required. Thus all the names desired under one classication can readily be learned.

A valuable feature is the containing of 115 pages of trade names, printed on tinted paper for easy reference. Thus, if the trade name only is remembered, this section will enable one to learn the manufacturer's name and address.

Listed alphabetically on white paper at the end of the book are the names and business of all firms and individuals contained in this book. This section covers 477 pages. Thus, if a firm's name only is remembered, the address and specialty can be learned.

By dividing up the book into three sections, the first and third sections being printed on white paper and the second section on pink, reference to any section is instantaneous.

The book contains 2381 pages, is 8 x 10 in size, sells for $10, and is published by S. E. Hendrick's, Inc.

**How to Handle and Develop Your Own Business.**—The experiences of a number of unusually successful business men have been drawn upon for the purposes of this book. Practical and helpful principles have been collected from different types of business, the aim being to secure the best thought of all business rather than to limit the work to a particular branch. Such plans as are suited to the reader's business can then readily be adopted.

The work covers a number of worth-while subjects. It gives some interesting hints on simple accounts and records, telling how to keep track of jobs under way, describing an architect's method of doing this, shows how to allot the proper time to different jobs, and tells how to keep losses from bad payers at a minimum.

Especially interesting at this time, when better merchandising is essential, are three chapters devoted to the writing of letters that bring results, to making advertising "pull" better, and to methods which will result in better selling. These subjects are all of timely interest to builders and dealers, for the right kind of publicity to-day will help to divert the big business of the future your way.

Other chapters include "How to Make Your Banker See Your Way," which describes the best way to approach a bank for a loan; "Better Ways to Select and Train Your Assistants," and "Office Methods That Cut Red Tape," which describes method of filing, etc.

The book has 142 pages, size 5½ x 8¼, is illustrated by reproduction of time cards, etc., is published by the A. W. Shaw Company, and sells for $1.50.

**The Modern Motor Car. By Harold P. Manly.** In these days when the motor car and motor truck is popular in all parts of the country among those who have to travel much from one place to another, any information which will lead to a better understanding of the repairing of ordinary road troubles is valuable.

This book is intended to afford owners, drivers, etc., in an every-day reference book just the kind of shop and roadside methods of repair and adjustment that will prove of every-day value. The material is all simply and clearly written, nothing being taken for granted. This latter feature is one that makes the book of special interest to the man who has had little or no previous knowledge of the subject.

The book is divided up into five sections, treating severally of motor car parts, their construction, use, care and repair; how to use, buy or make materials and supplies used in running a car; electric lighting and starting, which is explained in such a way that the average man without electrical experience may be able to handle and care for and repair every electrical unit; electric ignition, treating of the design, construction, use, care and repair of various units, etc.

The book is conveniently arranged so that material can readily be found, and is fully indexed and cross-indexed.

The book contains 536 pages, size 5 x 7¼ in., 225 illustrations, is bound in flexible leather, sells for $2, and is published by Laird & Lee, Inc.

**Making the Office Pay.—Edited by W. H. Leffingwell.** Any contractor or architect whose business is such that it cannot be "carried under his hat" will find worth while suggestions in this book. It is built up around the idea of searching for the best office systems in the country and then compiling them in book form. As a result, short cuts and tested new efficiency methods are contained in profusion.

The book is built up around office detail of all kinds, and is very complete. Some idea of the extent of its scope may be gained from a brief review of the subjects treated, as follows:

Records for the one-man business, increasing efficiency by different office arrangement, selecting the right kind of workers, sending out the kind of letters that are sure to build business, saving money in letter writing, increasing stenographic output, keeping track of work, selecting the kind of office equipment which will best meet requirements, how to file letters, selecting the right kind of office forms so as to keep costs low, short cuts in accounting, the kind of records that aid purchasing, bringing money in on time, how to visualize the trend of your business by graphs, etc.

Naturally but few of these valuable ideas are directly applicable to the building business. But they are ideas which, with a little study, can be turned into real helps.

The book is intended, to a certain extent, to be used as a reference work when any office conditions are being investigated. For instance, if there is trouble in finding blue-prints which have been filed, one can refer to a section of the book in which this very problem has been adequately solved. Or if collections are slow, methods successfully used can be studied up as an aid to solving the problem before you.

The book contains 389 pages, size 6½ x 10 in., is illustrated by reproductions of photographs and office forms, is published by the A. W. Shaw Co., and sells for $4.

**Gasoline and Kerosene Carburetors.—By Victor W. Page, M.S.A.E.** The increasing price of gasoline makes economy more paying to owners of commercial and pleasure car than ever before. This brings the matter of carburetors and their adjustment into even more important consideration from the man who wants his car or truck to run at its best.

The book under review explains the construction and operation of carburetors for all types of internal combustion engines intended to operate on liquid fuels such as gasoline, kerosene, benzine and alcohol. Valuable indeed are the pages devoted to adjusting carburetors of leading makes, such as the Ford, Packard, etc.

The book contains practical data on carburetor action and construction, modern gasoline carburetors, liquid fuel supply methods, kerosene carburetors, carburetor faults, locations and remedies, manifold and carburetor installation and other information that is of value.

The subject matter is presented in a non-technical manner so that it would be readily understood by the average motorist.

The book contains 206 pages, size 5 x 7½, is profusely illustrated, bound in cloth, published by Norman W. Henley Publishing Co., and sells for $1.50.

# New Catalogs of Interest to the Trade

**Soil Pipes and Fitting.** The Central Foundry Co., New York, N. Y.—Booklet describes the F. & W. system of special fittings, which produces a finished job at a lesser cost. It is also marked from a sanitary point of view, because of the use of much less space. Prices and illustrations of fittings are included.

**Fighting the Flameless Fire.** Harrison Works of the du Pont Co., Wilmington, Del.—Describes a rough, inhibitive paint, its application and its fire preventing property.

**Clay Products for Building Construction.** The Sewer Pipe Mfrs. Ass'n, Akron, Ohio.—Describes and illustrates flue lining. Testimonials by its many users are also included.

**Porcelo.** Harrison Works of the du Pont Co., Wilmington, Del.—Leaflet describes a product called porcelo which is intended for walls of bath rooms, and for the bath tubs.

**Harrison Concrete Floor Coating.** Harrison Works of the du Pont Co., Wilmington, Del.—Describes and illustrates in color four paint products intended for use on concrete floors. This coating is durable and elastic with a hard glossy surface so that it may be kept perfectly clean and sanitary.

**Hints to Decorators.** The Standard Oilcloth Co., Inc., 320 Broadway, New York City.—Hints to decorators on stenciling on Sanitas, which is a modern wall covering put out by this company, and the possibilities of this stenciling is contained in this booklet. This issue also contains a review of some of the good qualities of Sanitas, including its economy, etc.

**S.O.S. Fire Retardant Shingle Paints.** Bridgeport Works of the du Pont Co., Wilmington, Del.—Folder describes and illustrates in four colors the Bridgeport Standard S.O.S. Fire Retardant Shingle Paints. This product is described as making shingles not only fire retardant but weather resistant.

**Woodworking and Metal Cutting Saws.** The Wardwell Mfg. Co., Cleveland, Ohio. —Catalog illustrates and describes a line of saw and knife sharpening machinery and tools for the care of all wood working saws, finer and jointer knives, metal cutting band saws, circular saws, hack saws, etc. The many features of the products of this company are illustrated and described in this interesting catalog.

**Air Dry—A "Hundred Per Cent Sanitary" Substitute for Towels.** Groton Electric Devices, Inc., Groton, N. Y.—Air dry is an electric appliance designed to eliminate towels in hospitals, factories, public wash rooms of hotels, apartment stores, office buildings. etc. It consists of a white enameled iron stand, containing a motor, a stand, heating element and an adjustable metal for directing the flow of air. It is operated by a pressure on a foot petal. The warm air discharged from the nozzle causes the evaporation and dries the skin thoroughly. It is described as 100 per cent sanitary.

**Sanitas Modern Wall Covering and Its Uses.** The Standard Oilcloth Co., Inc., 320 Broadway, New York.—Catalog describes and illustrates this wall covering as hygienic, expresses individuality, different styles for every room are possible. It is described as economical and many testimonials are published showing the popularity of this item.

**The Facts About Elastica Stucco.** American Material Co., Inc., 101 Park Avenue, New York.—Describes the many good qualities of this brand of stucco including its durability, elasticity, perfect adhesion and its freedom from cuts or breaks.

**Any of these catalogs will be furnished by the manufacturers. Or, if you prefer, we will see that you receive any that you desire. Just check the catalogs you want, tear out the page, and mail it to Building Age, 243 West 39th Street, New York.**

**"Classic" Steel Ceilings.** The Berger Mfg. Co., Canton, Ohio.—Catalog embracing a careful selection from the many possible combination designs obtainable from standard patterns; also a few modern installations; instructions for taking measurements and erecting. By its many illustrations, it brings out forcibly the possibilities for art in steel ceilings.

**Panoramic Friezes, and Wall Decorations.** The Schmitz-Horning Co., Cleveland, Ohio.—Describes and illustrates friezes and decorations which afford the decorator a material complete as to design and retaining all the qualities of hand work or mural paintings. All the productions are sanitary and may be cleaned with a damp cloth or sponge. The colors will not stain or fade, it is said.

**Paints and Varnishes.** Wadsworth Howland Co., Inc., Boston, Mass.—Describes and illustrates a variety of liquid paints of the highest grade.

**Diamond Fibre Products.** Diamond State Fibre Co., Bridgeport, Pa.—Describes and illustrates automobile specialties consisting of specialties for motor car, motor truck, and tractor manufacturers. It also describes its vulcanized fibre receptacle and its fibre gears. These gears are described as noiseless, practical, economical and durable. Fibre track insulation for railways is also given considerable prominence in the catalog.

**Garage Hardware.** The Stanley Works, New Britain, Conn.—Describes and illustrates the many good qualities of Stanley garage hinges including the utility, strength, appearance, durability, efficiency, and economy. By illustrations and plans, the catalog brings forth the many advantages of its product.

**The Sprangling Crack.** Milwaukee Corrugating Co., Milwaukee, Wis.—Describes plaster cracks, their causes and cure.

**Better Joints for Vitrified Clay Pipe.** The Sewer Pipe Manufacturers' Association, Akron, Ohio.—Better joints for vitrified clay pipe are now being made by pouring the joint material than is possible by the old hand troweling method. Booklet touches on the importance of tight joints and the advisability of the methods described.

**The Henry Airtight Weatherstrip.** The Henry Airtight Weatherstrip Co., Crawfordsville, Ind.—Booklet describes weatherstrips which are made for both right and left hand doors and casements of swinging windows.

**Modern Building Drainage.** The Sewer Pipe Manufacturing Association, Akron, Ohio.—Describes in detail the advantages of vitrified clay pipes for the building drain and the building sewer. Economy is one of the features of vitrified clay pipes and cleanliness and durability are others.

**Elastica Stucco.** The American Material Co., Inc., 101 Park Avenue, New York City.—The testimonials of tests made of elastica stucco when applied on wood laths, extended metal laths, Clinton wire cloths are included in this pamphlet.

**Flue Lining Prevents Fires.** Sewer Pipe Manufacturing Association, Akron, Ohio.—Advocates use of flue lining as a fire preventative. Describes fire clay as the best fire resistant known to structural art.

**Van Guilder Double Wall Machines.** Van Guilder Double Wall Co., 20 Wagner Building, Rochester, N. Y. Booklet describing machines or forms for building hollow concrete walls, economizing by eliminating the usual forms.

**Alpina Gives Perfect Ventilation.** Milwaukee Corrugating Co., Milwaukee, Wis. Illustrated Booklet describing ventilation by means of this device. Contains pictures of theaters, factories, etc., in which these ventilators have been used, together with testimonials from contractors. Also gives price list and dimension of the ventilators.

**Masterpieces of Doorcraft.** Morgan Sash and Door Company, Chicago, Ill. Illustrated booklet describing Morgan doors, and showing pictures of them in colors, together with photographs of the houses in which these doors have been used. Also contains testimonials and some correspondence showing how the Morgan Company back their guarantee.

**The "Concrete Builder" January number.** Portland Cement Association, 111 West Washington Street, Chicago, Ill. Contains pictures of concrete garages, milk-houses, silos, etc. Also contains valuable illustrated article on concrete walks, and an article on a concrete block hog house, accompanied by dimensioned drawings.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### Sterling, Illinois

# BUILDING AGE

NEW YORK, MARCH, 1919


# A Shingled Bungalow Built on a Steep Hillside

## *Well Adapted to Site—Full Two Stories, Although House Is Typical Bungalow Style*

This little house is an excellent example of adaptability to site. Built on a steep hillside, it takes every advantage afforded by the opportunity to make the house look like a small bungalow, yet still preserves the spaciousness of two full stories.

The exterior of the house is a pleasing combination of local field stone for the basement and shingles for the first story. Just below the windows a belt course is carried around, meeting a similar strip at the corners. Below the belt course the shingles are laid with an attractive combination of spacing, every third course being laid with a narrow exposure that contrasts well with the wider surface of the other two courses.

A pleasing variety of fenestration is shown in the use of a triple window on the right of the house balanced against the one window on the left and the doorway.

The doorway is placed off center, being balanced by a small window with a flower box underneath.

One of the striking features of the roof treatment is the projection of rafters, which are pointed instead of being cut off in the usual manner.

Entrance to the house is had through a vestibule, containing a coat closet.

The living room is comparatively large, being 19 ft. 6 in. x 14 ft. in dimensions. Its main feature is a brick fireplace.

In the back of the house is a porch or sun room and a bedroom.

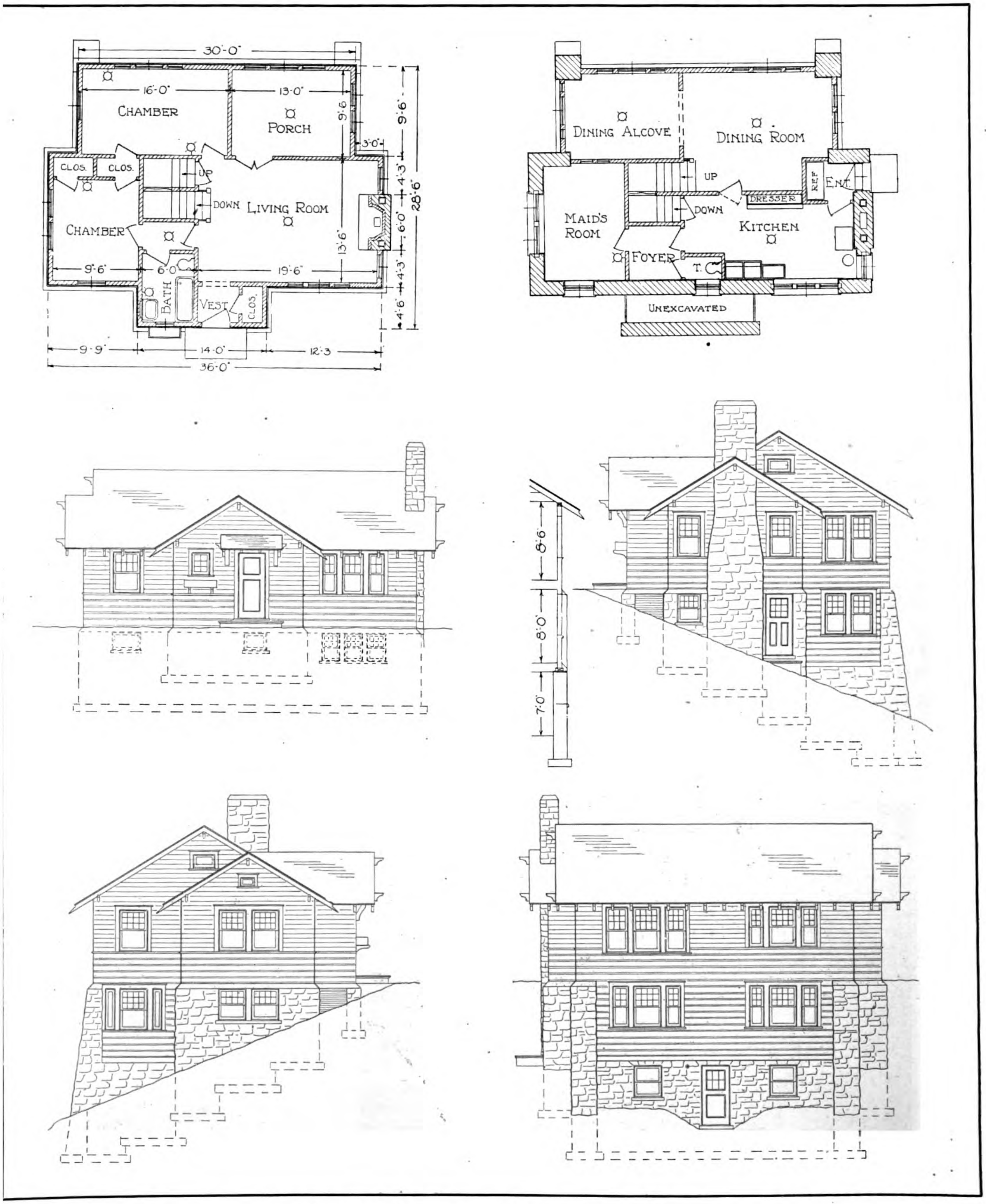
Another bedroom and the bathroom are placed to the left of the living room. The bathroom, being placed directly over the kitchen, economizes plumbing.

At the left of the living room is a staircase leading to an unfinished attic, and the stairway communicating with the basement, which contains the service quarters.

The stairs lead into the dining room. The main part of the dining room is used as a living room, with the alcove doing duty at meal time. As these rooms open to a view of the distant hills they are very pleasant and comfortable.

The front of the basement contains a large kitchen, long and narrow. Outside

Cozy and inviting is this little bungalow, which fits in well with its surroundings




Plans and Elevations, Scale 1/16" = 1 ft.

entrance is through an entry containing the refrigerator.

At the left of the kitchen is the maid's room and a toilet.

The cellar is excavated only at the rear, thus saving additional excavation cost.

This house was built at Nepperhan Heights for the Robert E. Farley Organization, 12 East Forty-fourth Street, New York City, in accordance with plans and specifications prepared by Philip Resnyk, architect, 40 West Thirty-second Street, New York City. The contracting builders were Watson & Bremmer, 58 Douglas Avenue, Yonkers, N. Y.

# Increasing Home Comfort by Built-In Conveniences

*Room Corners Can Be Utilized to Good Advantage*

By PAUL D. OTTER

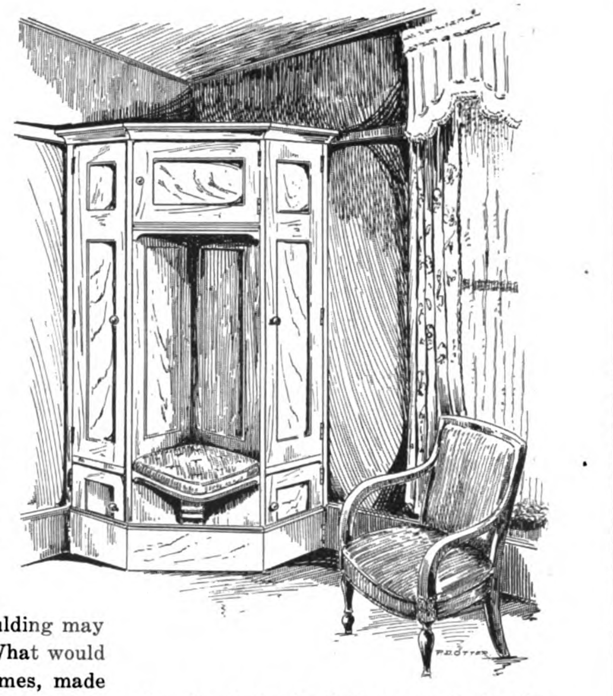


Fig. 1—A handy built-in wardrobe that adds convenience to the bedroom

Rooms may be varied from the four square wall impression they immediately convey when entering by breaking a corner with a built-in convenience. In the dining room, the corner china closet suggests itself, also a similar cabinet in the kitchen. The living room may afford a particularly good corner to build in a writing desk where a favorable window on each side would give good light through the day.

Some bed rooms which are often small and too frequently of a box-like character could be modified and provided with conveniences which are lacking by building into a corner a wardrobe and slipper seat which would in many instances trespass very little into the room.

Fig. 1 shows the idea which may be worked out in various ways to conform to particular needs. Measurements in the plan are merely given for a provisional laying out when it may be thought best to enlarge, say, by two, four, or six inches according to size of room; height of seat remaining the same, 14 inches from the floor, when if a cushion is added later it would not be over 16 inches, which is a comfortable height when putting on shoes or slippers which may be stored in space under seat and wardrobe.

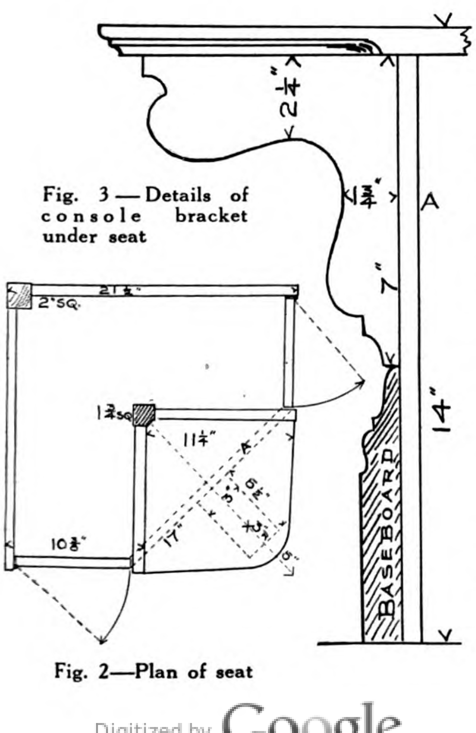



Fig. 3 — Details of console bracket under seat

Fig. 2—Plan of seat

A small door may be made for lower part or one large narrow door may serve to cover from floor to top of wardrobe space. You will notice from the plan, Fig. 2, that the two wardrobes are open to the back corner, and while narrow, give ample diagonal space for many garments hung on hangers properly located.

Solid boards joined together and relieved by suitable moulding may be used in the construction. What would be called the construction frames, made up of stiles, and rails with panel filling, produce a more satisfactory and better designed carcase, as it admits of trimming with attractive moulding easily set in.

The carcase may be built to fasten permanently against the wall, or be provided with back paneling. Should back frames be used, the better grade of "Compo" or "Wall board" may be used to fill the frames. "Compo" board will be found most excellent. As a quick, smooth filler of space in hidden places, set in a firm rabbet and supported over wide spaces by an under cleat, it is much more to be desired than veneer or thin tongue and grooved filling, and is cheaper.

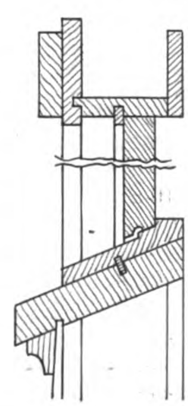
Many modifications may be worked out in producing a corner structure which provides storing space for more than shoes and clothes. The height may be roofed off at 7 ft. 6 in. with a properly projected moulding, or it could be continued to ceiling and partake of the ceiling mould.

Six inches above the height of garment hooks, which should be 5 ft. 6 in. from floor, a roofing or division is set in forming the bottom to the upper compartment, which is roofed off as suggested at a height of 7 ft. 6 in., or continued to ceiling which would save roofing and give very much more space. This upper compartment may be spaced into convenient divisions, or remain full size for purpose of storing extra blankets, or things infrequently required.

Naturally a sense of fitness should enter into our consideration of built-in furniture. It is quite possible to overdo the idea and carry it too far to the exclusion of movables. We would have then a sense of being nailed up and battened down "for keeps"; rather should it convey the thought of not supplanting, but of supplementing, or for the purpose of economizing space.

We should also consider, is it for the daughter or a "mere man"? If for the daughter, provide her in this corner space saver with all the little shelves, drawers, and "cubby holes" which will house her many possessions in an orderly manner.

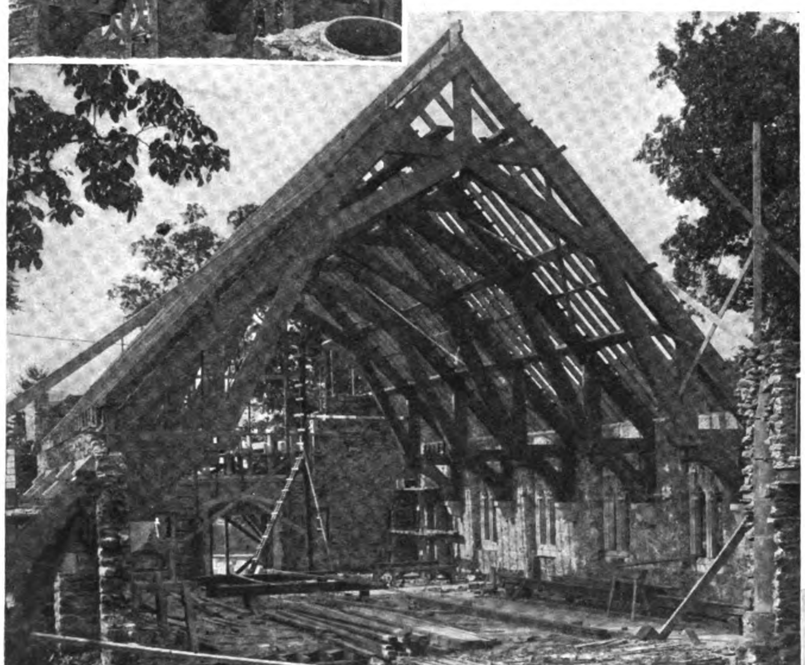
## Detail of Weathertight Window



An architect practising in Long Island found that the severe storms in that locality caused the windows in his houses to leak. After trying several methods of construction he evolved the one illustrated. This has proved to be tight against heavy rains accompanied by high winds. The construction as shown in the illustration needs no explanation nor comment other than to state that it has proved satisfactory under very severe conditions.

# Roof Trusses for a Suburban Church

*Progress Pictures and Dimensioned Drawings Afford Valuable Data on Construction of Trusses for 32 ft. and 41 ft. Span*



Truss of 41 ft. span for main part of church

In designing a church one of the most important construction and architectural details is the type of roof truss to use. It not only must be sound structurally, but must also present an attractive appearance, since the trusses are usually left exposed to view.

Two exceptionally fine types of trusses are illustrated in this article. The chaurch is "L" shape in plan, the long arm being intended for the main part of the church, and the short arm for the Sunday School. The truss for the larger span is 41 ft., for the smaller span 32 ft.

The trusses were constructed on the ground and raised in position after being framed.

The roof has a pitch of 13 in. in 12 in. This pitch, slightly steeper than the usual half pitch roof, was chosen because of the variety offered by getting away from ordinary half pitch roof so popular because of the relative ease with which it can usually be built. The main numbers of the truss are of 18 x 14 in. long leaf yellow pine. All members were framed together in the manner best calculated to cause the joints to withstand the stresses to which they would be subjected, and to be self-supporting as far as possible. All joints were made firm by bolts, sized according to the stress they were calculated to withstand.

Where the foot of the truss was enclosed in mortar, the parts were painted with white lead so as to prevent rot.

The trusses carry three purlins of 8 x 10 long leaf yellow pine, let 1½ in. into the outer member of the truss. The purlins carry 3 in. x 6 in. rafters, let over the purlins 1½ in.

The foot of the 3 x 6 rafters are carried upon a 3 in. x 8 in. plate, well bolted to the wall by a 1-in. anchor bolt placed at the side of the foot of each truss. The foot of the truss itself rests upon a ¾ in. x 12 in. x 12 in. steel plate carried on a wooden plate. That part of the truss carried down the wall is bolted into it in two places.

The placing of the bolts and shaping of joints is interesting and worthy of careful study.

The trusses described were erected in the Huguenot Memorial Church at Pelham Manor, New York, the architect being Francis A. Nelson, 15 West Thirty-eighth Street, New York City.

Truss of 32 ft. span for the Sunday School

# Plan Features That Make Homes Sell Quicker

By ALBERT MARPLE

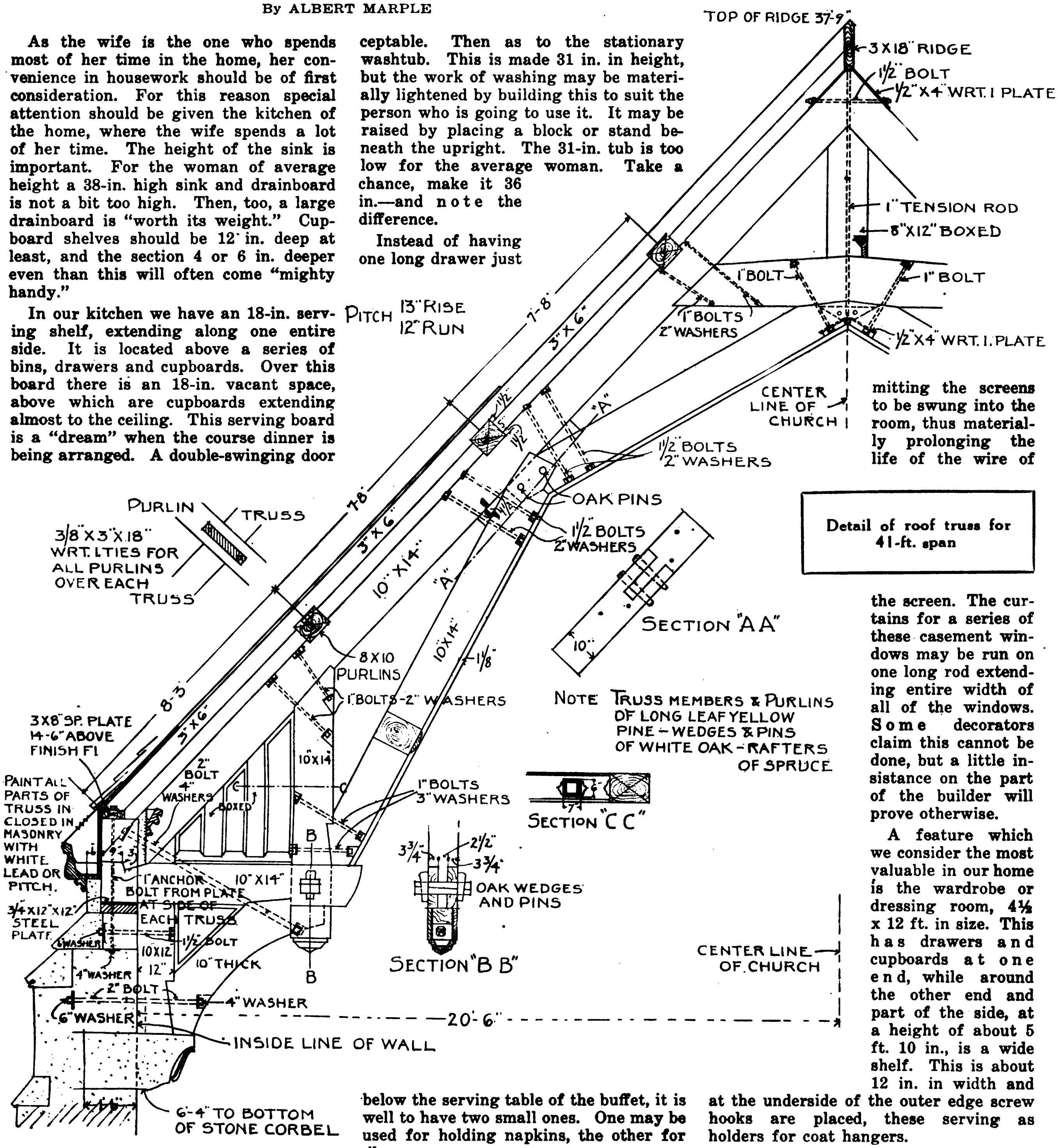
As the wife is the one who spends most of her time in the home, her convenience in housework should be of first consideration. For this reason special attention should be given the kitchen of the home, where the wife spends a lot of her time. The height of the sink is important. For the woman of average height a 38-in. high sink and drainboard is not a bit too high. Then, too, a large drainboard is "worth its weight." Cupboard shelves should be 12 in. deep at least, and the section 4 or 6 in. deeper even than this will often come "mighty handy."

In our kitchen we have an 18-in. serving shelf, extending along one entire side. It is located above a series of bins, drawers and cupboards. Over this board there is an 18-in. vacant space, above which are cupboards extending almost to the ceiling. This serving board is a "dream" when the course dinner is being arranged. A double-swinging door between the kitchen and dining room will prove very desirable. Of course, the hood will be built above the range to carry off undesirable cooking odors, etc.

The value and convenience of the rear porch will be greatly enhanced if a storing closet is built within it. If the porch, also, is equipped with a two-way swinging screen door it will prove more acceptable. Then as to the stationary washtub. This is made 31 in. in height, but the work of washing may be materially lightened by building this to suit the person who is going to use it. It may be raised by placing a block or stand beneath the upright. The 31-in. tub is too low for the average woman. Take a chance, make it 36 in.—and note the difference.

Instead of having one long drawer just below the serving table of the buffet, it is well to have two small ones. One may be used for holding napkins, the other for silver.

In the home of a contractor who is possessed of considerable originality we noted recently that he has done away with individual blinds to casement windows, where these windows occur two or more in a row. He found that it is quite difficult to raise the narrow blinds so that they will always roll straight. Almost always the edges of the blinds become frayed and rough. To eliminate this trouble he has made his blinds the width of the entire series of windows. The windows are swung outward, this permitting the screens to be swung into the room, thus materially prolonging the life of the wire of the screen. The curtains for a series of these casement windows may be run on one long rod extending entire width of all of the windows. Some decorators claim this cannot be done, but a little insistance on the part of the builder will prove otherwise.



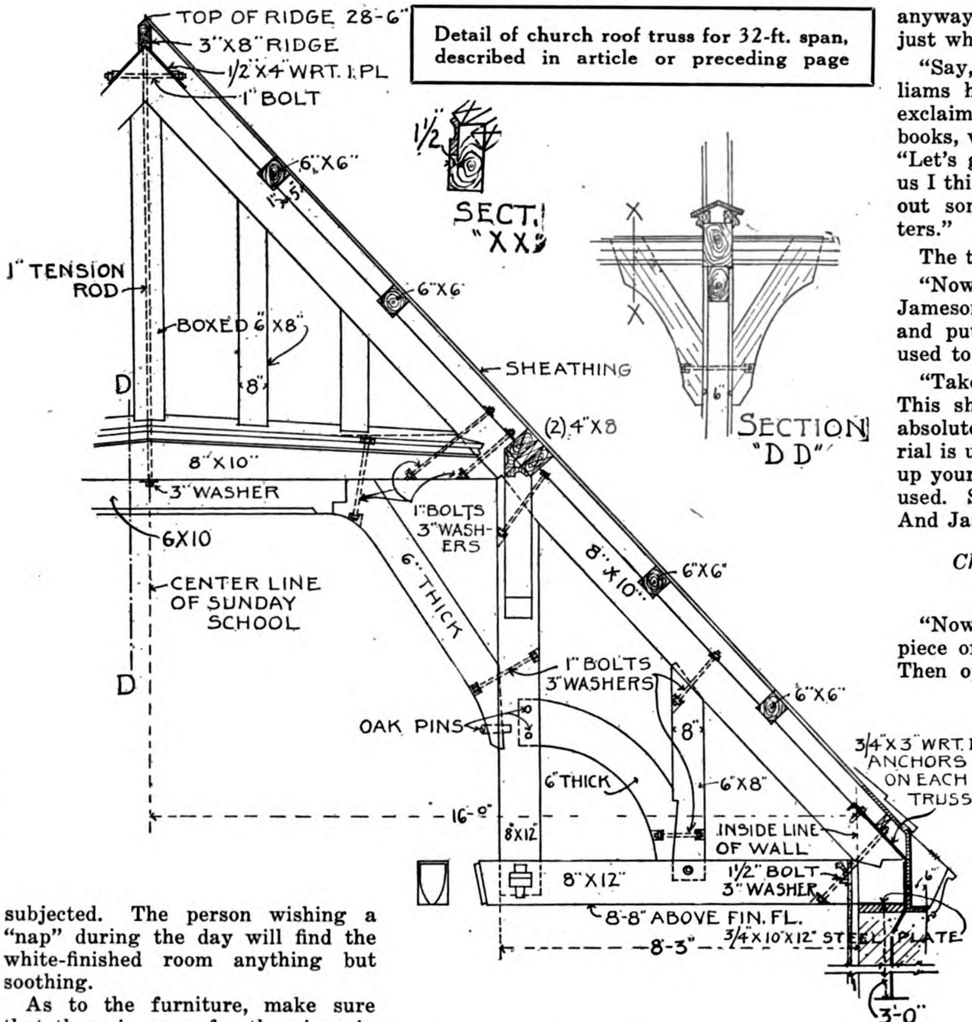

Detail of roof truss for 41-ft. span

A feature which we consider the most valuable in our home is the wardrobe or dressing room, 4½ x 12 ft. in size. This has drawers and cupboards at one end, while around the other end and part of the side, at a height of about 5 ft. 10 in., is a wide shelf. This is about 12 in. in width and at the underside of the outer edge screw hooks are placed, these serving as holders for coat hangers.

A good depth for the window seat is 20 in. This permits the person who is occupying the seat to have a cushion behind him as well as under him.

Some home decorators claim that the sleeping porch should be finished in white, but think twice before accepting this advice. Dark woodwork and walls materially soften the glare of light to which a room of this kind is generally

**Detail of church roof truss for 32-ft. span, described in article or preceding page**




subjected. The person wishing a "nap" during the day will find the white-finished room anything but soothing.

As to the furniture, make sure that there is room for the piano in the living or music room, for the bed and the dresser in the bedroom, etc. This may seem an unnecessary suggestion, but how many times have we all seen the larger pieces of furniture extending before windows, when the windows should have been placed to accommodate these various pieces.

# How to Make Sure of Your Profits

## *Careful Cost Keeping Will Prevent You from Losing Money—Checking Up an Estimate So as to Be Sure No Mistakes Have Been Made*

By BRICKSAND MOTTOR

"Do you know anything about cost keeping?" Jones, the builder, asked Jameson as the latter wearily put down his valise. Jameson was traveling salesman for a big material concern and had frequently given Jones worthwhile pointers.

"Something. Naturally I've picked up a lot of good ideas traveling around, but cost keeping is something most builders only play at. If they get a contract they have to wait till the job is finished before having any idea as to whether it has made a profit—and some of them don't know even then."

"I reckon that there is something to what you say, Jameson. Here I've been doing plenty of business lately, yet I've not got nearly as much money in the bank as I feel I ought to have."

"What books do you keep?" inquired Jameson. "Tell me just how you run your business, and I'll see if I can make any suggestions."

Jones called over his typist, one of the results of his activity in getting new work. The girl was kept busy writing letters, handling callers, and lending an air of importance to the office.

"I have tried to work out some system for keeping track of the estimates and work," the girl said, "but I am afraid that my system does not tell much. And Mr. Jones has never before thought it worth while to bother. He says that the money comes in and has to be paid out anyway, so why bother to keep track of just where it goes?"

"Say, Jones, I think that Miss Williams has more sense than you have," exclaimed Jameson. He glanced over the books, with a smile at their lack of data. "Let's get together on this, and between us I think that we should be able to work out something that will improve matters."

The three drew chairs up to the table.

"Now the first thing to do," said Jameson, "is to start with your estimate and put it in shape so that it can be used to check your costs against.

"Take your bill of material first. This should, of course, be figured with absolute accuracy. Then as the material is used in the building you can check up your estimate with what was actually used. Something like this, for instance." And Jameson figured out a few items.

### *Checking Up Materials Will Reduce Waste*

"Now you can, for instance, list every piece of timber in your frame like this. Then opposite each item leave a space where you can check what was actually used. Of course, your large timbers will be figured accurately enough, but there is plenty of opportunity to go astray on the small items. Checking up like this also helps to eliminate waste. It is surprising how much more careful a workman will be when he knows that he is being checked. And it will also keep you from paying for things which were accidentally not delivered and ordered over again without your remembering. It is best to confirm all verbal orders in writing. And check up every order when it is received.

### *Classifying Labor Estimates Will Bring Maximum Accuracy*

"Handle your labor estimates the same way. Estimate your time as accurately as possible, and then check the actual time against your estimate. Classify and file this data so that you can refer to it when estimating on future jobs.

"If you work on that basis, your estimates ought to become much more accurate.

"And another thing, if you check up the way I have suggested, you'll know just what your investment is at every stage and whether you are running ahead or behind. Then if you see that costs are running too high, you can get busy and eliminate the waste that is probably present. That means surer profits."

"Say, Jameson, that must be where I've dropped some of the profits I was sure I had," exclaimed Jones.

"I *know* it is," seconded Miss Williams.

"Well, if it is as bad as all that, you

had best keep a check board with all your jobs on. You can use pegs with the job name written above, and stick a different colored tag on at different stages of the work. Thus when the job is started you can put on a white tag, when the excavation is completed and the cellar wall started, a yellow tag; when the frame is started, a green tag, etc. When you change tags check up your cost so far against your estimate. That will help keep you from going in the hole. Or you can work out some similar scheme; there are lots of them.

"Another important thing is, don't forget to figure in your overhead. All your carfare, postage, cost of estimating, office charges, advertising, etc., should be calculated, and a percentage charged against each job. Of course, the more jobs you have, the less the overhead on each one will be.

### *Don't Overlook Overhead Leaks*

"Lost tools, replacement, cost and depreciation of equipment, etc., should all be charged for. Big city contractors often charge equipment only against jobs on which it is used. In your case, however, I think it would be better to lump all equipment charges under a fixed overhead, charged indiscriminately against all jobs. And keep checking your overhead so that you will know that your percentage is right.

"Even when you estimate costs with great accuracy, unexpected emergencies are apt to crop up and wipe out your overhead. A small percentage should be added to take care of these emergencies, say 4 to 6 per cent. Then add your profit to this. Some jobs you will probably only be able to charge 5 per cent profit, while on others when you are selling an idea as well as your structural services, you can make 10 per cent or even more."

"Does all this afford you any ideas that you think you can use?"

"Yes," replied Jones. "I think that from the skeleton you have shown me I can learn to keep more accurate track of my costs."

### *How to Make Sure That You Haven't Omitted Important Items*

"But," he added, "I'd like to know if after I've completed an estimate, there is any way to check it. Lots of times I've forgotten things, or made some mistake in adding, that has caused me a loss."

"There are two good ways in which you can make sure that you haven't forgotten anything," explained Jameson.

"One way is to always prepare your estimate in the same order. A good order to follow is to estimate just as the material would be used in the house. Then you won't leave anything out.

"Another way is to prepare a list of all items covered by an estimate. Then use this list to check your estimate against."

"That's a help," said Jones. "But how about finding out whether my bid is too high or too low?"

"After your estimate is completed, check it by the cubic foot method of roughly estimating the cost of a building. This method, of course, is based on your record of past jobs like the one under consideration. Or you can use the square foot method of estimating as a rough check.

### *How to Find Out if Your Estimate Is Too High or Too Low*

"You can check up costs in detail by a rather useful method, based on percentage of estimated cost. That is, the hardware in a frame building may usually be about 3.5 per cent, plaster 8.3 per cent, carpenter labor 18 per cent, etc. Now you can take your total estimated cost, take 18 per cent of this to find the carpenter cost, for example, and compare the result with your estimate. If there is a big variation, you probably have made a mistake. Do you get the idea?"

"Yes; I like that," exclaimed Jones. "It's an easy way of making sure that I haven't estimated too low or too high on any item entering into the building. But how am I to know what percentage to take?"

"Various estimating books have printed tables showing what you want. Or, better than that, calculate the percentage from work you yourself have already done. Your figures will probably differ from those of a man living in Chicago or Omaha, for instance, because your local costs are different.

"What I've told you are really fundamentals, rather than exact methods. You've got to work out your own problems from them as a basis."

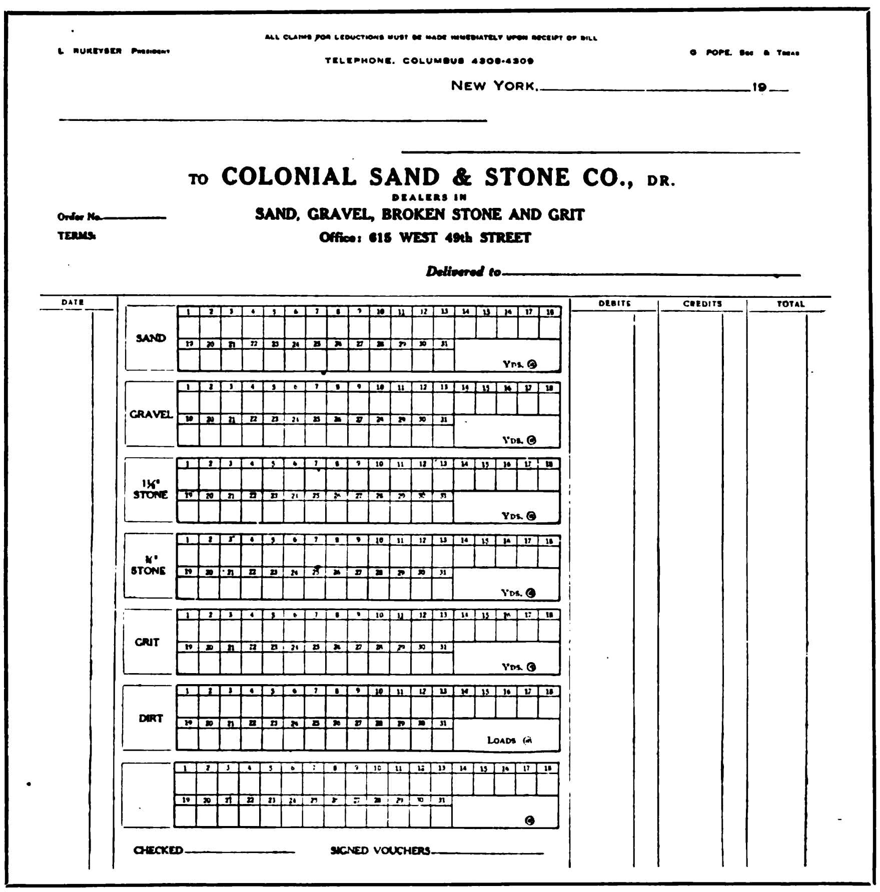
"I reckon I can," slowly replied Jones. "It's worth my spending time and money on to get it right, because it means that I always get a real profit instead of sometimes losing money."

"That's the idea," exclaimed Jameson. "Sometime when I drop in again let me know how you make out. Perhaps I'll be able to make some suggestions on how to improve the way you've worked things out."

# Time Saving Billhead Used by Material Man

An idea that can be applied to any business where it is necessary to indicate amount and date of purchased materials is shown in the accompanying cut.

The amount of sand, gravel, or other material is written down under the number corresponding to the date of the month on which the material was ordered. Then this is totaled after the 31, where a space is left for it. The month is written in the first column, under the word "date."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CHECKED______ SIGNED VOUCHERS______

# How to Best Construct Door and Doorways

## *Proper Methods of Constructing Door Frames—How to Build and Hang a Door*

By ERNEST IRVING FREESE

We human beings are such creatures of habit and slaves of precedent, that we continually and persistently insist upon doing certain things in a certain way for no discoverable reason other than that "our grandfathers did 'em that way."

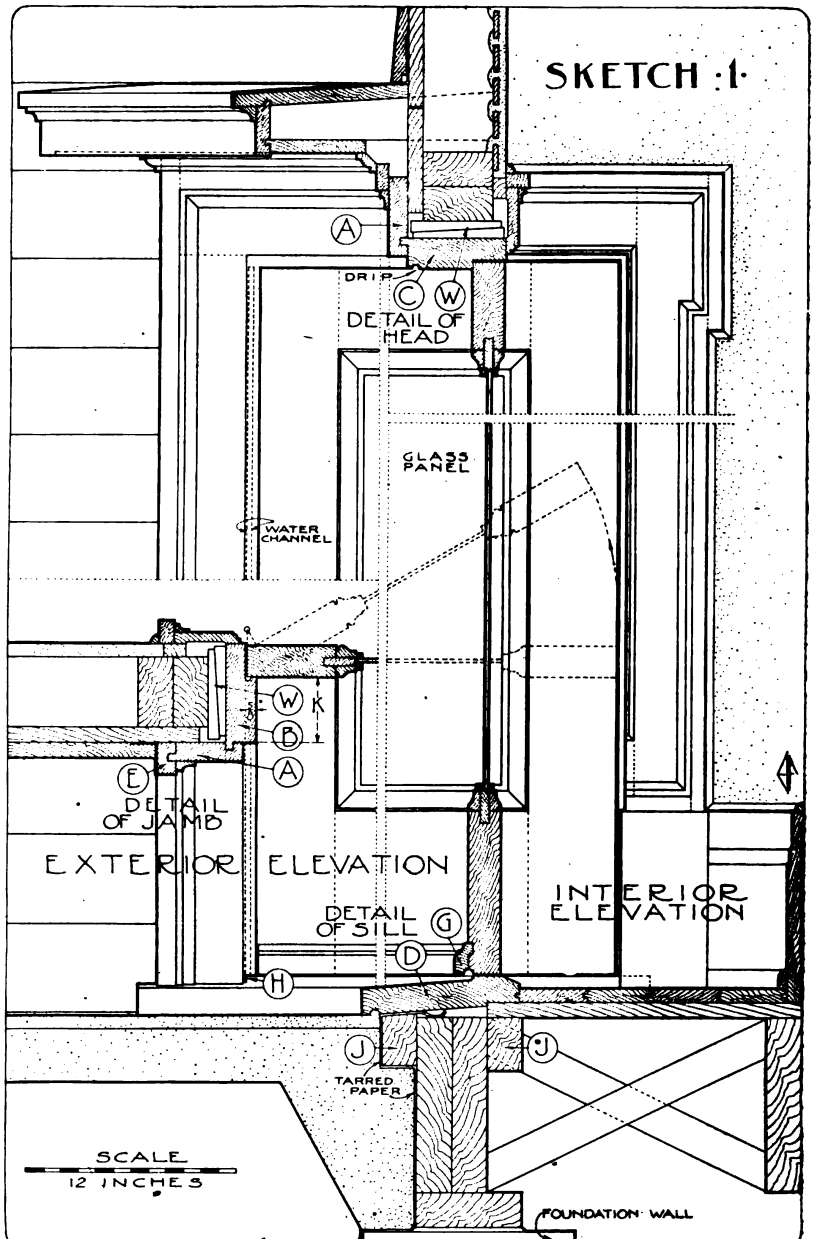
In some cases, it is to be admitted, this is reason enough, for the particular conditions under which "our grandfathers did 'em that way," still remain the same. But, in all other cases, this is no reason at all. It is merely sentiment, or laziness, or perhaps it is that magic fetish of so-called "economy" which the unscrupulous and job-hungry builder flaunts in the face of the prospective owner. Often, however, it is just plain ignorance, for, instead of conscientiously evolving a form of construction adequate to meet the conditions at hand, this or that detail is "adopted" which may have, and unquestionably did, fit the conditions of a hundred years ago. If it fits the conditions to-day, it is pure luck, not reason, that usually deserves the credit. It is seldom, indeed, that each part of the construction of a house, nowadays, receives that degree of study and consideration which modern conditions demand. And this is particularly true as regards doors and doorways.

In the houses of Colonial times, an entrance-vestibule almost invariably occurred between the outdoors and the living part of the house. This intermediate vestibule thus became an effectual barrier against the weather, as primarily intended. It was necessary to pass through *two* doors before gaining access to the interior of the house. Moreover, the outer door of this vestibule was protected by a wide-bracketed hood or else a covered porch. Hence, the conditions that would have otherwise called for the absolute weather-tightness of the outer door, did not exist. No especial provision against the entrance of moisture into the vestibule was necessary, for there it would do no harm and could penetrate no farther.

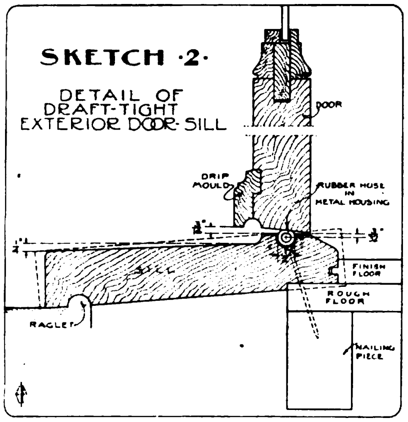
Nowadays, however, the entrance-vestibule has about become obsolete. More often, the house is entered directly into the living-room or reception-hall from an uncovered porch or "terrace." Hence, *the entrance-door, alone, becomes the only barrier to the weather.* In this case, then, should the door-frame detail of our grandfathers be "adopted?" When the necessity exists for barring the weather, should we construct our doorways in direct violation of this demand merely because "our grandfathers did 'em that way?" With the vestibule, the demand was not urgent. But, without it, the demand is *insistent.*

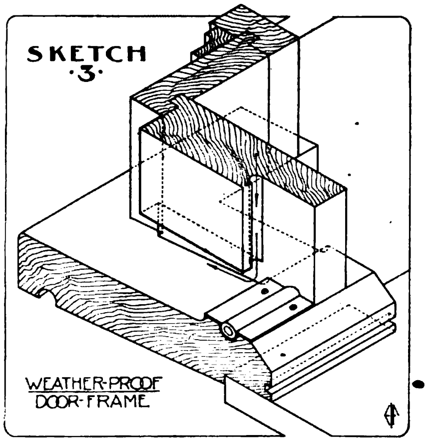
In the sketches numbered 1 to 4, inclusive, accompanying this article, is presented a method of framing for exterior in-swinging doors which, in its entirety, will render the resultant construction weatherproof even under the most adverse conditions. The details are, in no sense, commonplace or "ordinary," for the "ordinary" door-frame is sadly lacking in weather-tightness.

Referring to sketch No. 1, the exterior door-frame is seen to be composed of the outside casings "A," the side jambs "B," the head jamb "C," and the sill




TYPICAL EXTERIOR DOORWAY
FOR A 2" × 4" FRAME WALL




"D." The outside back-band "E" is not a structural requirement, but, where architectural considerations demand it, it should be grooved as shown to receive the tongue on the outside casing "A." The latter member, in turn, is grooved to receive the tongue on the jambs and, moreover, it is made wide enough to lap well over onto the sheathing, thus, in all, making the entire door-frame absolutely rigid and weather-tight. Also, to this outside casing "A," the screen door is hung, for which reason the casing is made of the same thickness as the screen door which, in no case, ought to be less than 1⅛ in. In casement *window* frames, this outside casing can be set against the *studding*. The same construction is applicable to a doorway with *sidelights*, for, in that case, only the sidelights need be screened. But, in the doorway detailed in sketch No. 1, sidelights do not occur. Hence, the doorway, itself, must be screened. And this necessitates placing the outside casing against the *sheathing*, as is shown, so as to give a greater space "K" in which the knobs of the two doors can come together opposite each other without interference.

The jambs "B" and "C" are 1¾ in. thick, tongued into the outside casings, and rebated to form a draft-tight shoulder for the door to shut against. The solid jambs preclude the possibility of the lock-bolt being "picked" from the outside because of the absence of easily-removable nailed-on stops. Moreover, the solid side jambs "B" afford an opportunity for plowing the half-round water channels in the shoulder of the rebate so as to break up capillary attraction and thus force the water, which might otherwise work its way through this joint and into the room, to drain downward onto the sill. For this latter reason, the rebate in the side jambs is made not less than ⅝ in., and the diameter of the plowed-out water channels is made equal to half the depth of the rebate, as is clearly depicted in the sktech. At the head jamb, the rebate need be only a half inch, for here a drainage channel is not required. However, a drip should be worked on the face of the head jamb, close to its outer edge, as the sketch indicates.

A space of about an inch should be allowed between the door jambs and the studding that frames the opening in order that the jambs may be solidly wedged in place, and either plumbed or leveled, as the case may be, by means of the wooden wedges "W" inserted at required points in the intervening space. Care should be exercised to see that the grounds are set well back from the edge of the framing-studs so as to not interfere with the proper bearing of the wedges against the studding.

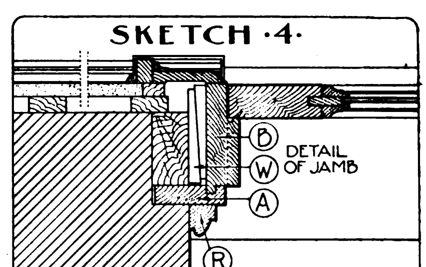
The sill "D" should always be of hardwood, preferably oak, 1¾ in thick, to withstand the constant wear to which it is subjected. Nailing-pieces "J" should be provided, as shown in the sketch, at both the inner and outer edges of the sill, so as to afford a solid bearing and anchorage at these points—thus counteracting any warping tendency as well as preventing the sill from "rocking" when stepped upon. The nailing-piece "J" at the inner edge of the sill also does duty as a support and nailing for the ends of the rough floor-boards, as is clearly indictaed in sketch No. 1. The top of the sill is set about ¾ in. above the finished floor, as shown. For safety, the outer slope of the sill ought not to exceed ¼ in., and, to prevent moisture working its way through the joint under the door, the outer slope of the sill is curved abruptly upward in a ¼ in. quarter-round underneath the door. The drip mould "G" is a prime necessity in exposed situations, as it is this member, on the lower edge of the door, that protects the joint underneath from wind-driven rain and from water that runs down the face of the door.

The sill joint shown in sketch No. 1 is *not* draft-tight, and, for this reason, it will not be absolutely water-tight if subjected to prolonged driving rain or sifting snow. The only way to render it thoroughly water-tight is to stop the *draft*, that is to say, seal the otherwise open joint between the bottom edge of the door and top of sill. Sketch No. 2 illustrates a simple and thoroughly effective means of doing this. A half-inch (outside diameter) rubber hose is embedded to a depth equaling a little more than half its diameter in a metal housing which, in turn, is screwed to the sill. The bottom edge of the door is beveled in such a manner that the door, when fully closed, comes into pressing contact with the hose, thus rendering the joint draft-tight and, hence, proof against the entrance of rain, wind, snow or dust. When the hose becomes worn, it is but the work of a minute, and requires no tools other than your hands, to pull it from its housing and replace it with a new piece of proper length. Again, this device possesses the advantage of being easily affixed to a sill that is already in place. Moreover, it is unobstrusive in appearance and offers no obstruction to the feet. The metal housing, or threshold can, of course, be omitted and the hose embedded directly in the wood sill, but this method is not as practical, nor as workmanlike, as the other.

Sketch No. 3 illustrates, pictorially, all the essential points, combined in one drawing, of the weather-tight construction heretofore described. The rubber hose threshold, combined with the water channels in the side jambs results in an *absolutely tight* job. This sketch illustrates, also, how the side jambs are cut back to the face of the door-rebate, just above the sill line, so as to provide an easy means of drainage for the water that collects, and flows downward, in the side water-channels. The course of the water is indicated by the pointing arrows in the sketch. The cutting away of the lower portion of the side jambs is also indicated, less plainly, at "H" in the exterior elevation on sketch No. 1.

Sketch No. 4 shows the application of the foregoing details to a brick jamb. In this, the outside casing "A" is set back against the masonry shoulder, and the back-band "E," of sketch No. 1, here becomes the brick-mould "R." The rest of the construction is the same as for a stud wall.

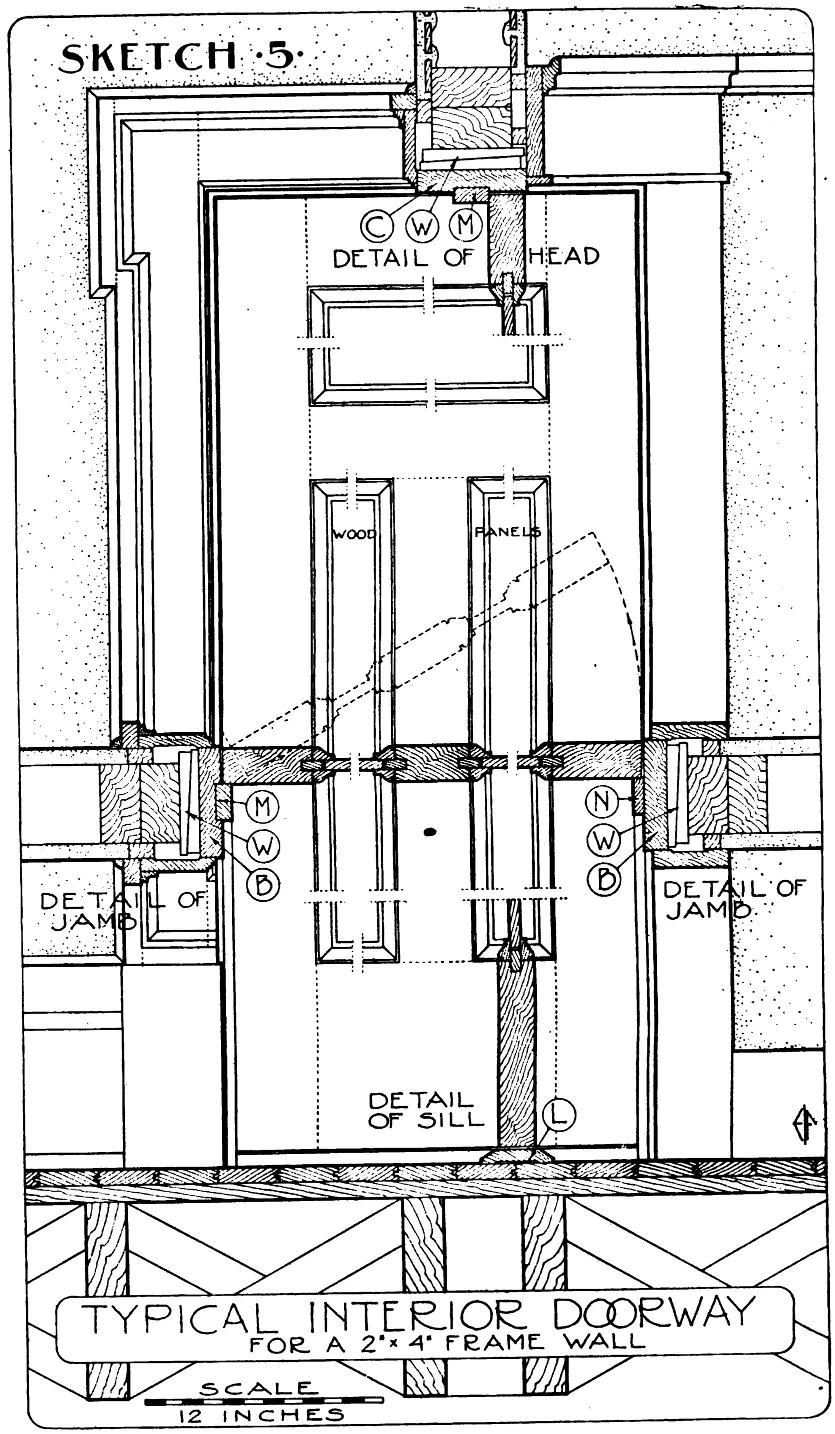
Sketch No. 5 illustrates a typical interior doorway for a 2 in. by 4 in. frame wall. The jambs "B" and "C" are here 1⅛ in. thick, although, if the door is extra large, or contains a full-size plate-glass panel, the jambs should be increased to 1¾ in. in thickness. Jambs as thin as ⅞ in. should never be tolerated, as they are liable to excessive warping, are not sufficiently stiff, and do not provide enough nailing-space for the edges of the casings nor enough thickness to hold the hinge screws firmly. In the best work, the stops "M" should be plowed into the jambs. The "nailed on" stop, shown at "N" in the jamb detail at the right hand, is excusable only on the ground of rigid economy. It is to be especially noted that the stops are placed in the exact center of the jambs.



This not only allows of the door being hung on either side but, where two doors occur in a room, one swinging in and the other out, the head casings will then be on the same line. The latter condition is always desirable for appearance sake, and often necessary as, for instance, when the picture-mould is carried around the room at the level of the head casings, as is done in the sketch. The threshold "L" should be of hardwood, ¾ in. thick, and "backed out" on the underside as shown so as to bear only on its outer edges.

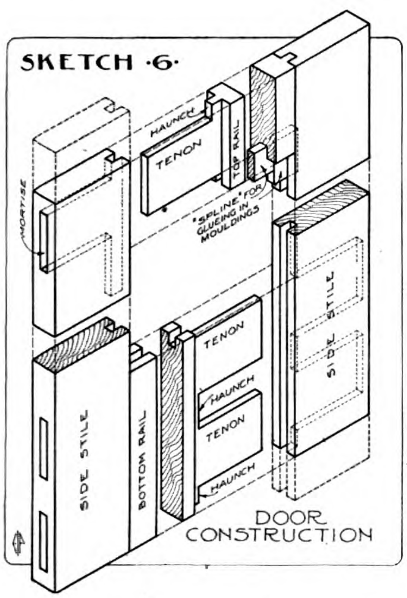
In sketch No. 6 is depicted, pictorially, the construction of the door itself. The outside rails and stiles should be mortised and tenoned together, as shown, and, in the case of the center stile, it should be mortised into the horizontal rails. The tenons should be made from one-quarter to one-third the thickness of the door, and the width should be not less than two-thirds the width of the rail or stile upon which they occur. However, no single tenon ought to exceed 4 in. in width, for a very wide tenon will be liable to shrink considerably and thus become loose and ineffective. Moreover, a wide tenon calls for a correspondingly wide mortise, which latter would weaken the frame to an unnecessary extent. If the rail or stile is over 7½ in. wide as, for example, the bottom rail shown in sketch No. 6, then the rail should have a double tenon, as is indicated. The haunch shown on the tenons has a great strengthening influence as regards the assembled frame, and it should always be insisted upon if the best results are desired. The glued-in "spline" also stiffens the door considerably. Tenons should be secured in their mortises by glueing and wedging, the mortises being cut a little large to accommodate the wedges. When a mortise comes at the end of a rail or stile, the member containing the mortise is left long and not cut off until the glue has become thoroughly hardened.

The strength of a properly built door is directly dependent upon its thickness and the number of its panels. Also, the thicker it is, and the more panels it contains, the less will be its liability to warping. In no case should an interior door be thinner than 1⅜ in., while 1¾ in. should be the minimum thickness for an exterior door. And for exterior doors, or "French windows," containing a single plate-glass panel, a thickness of 2 in., or even 2¼ in., is none too much.




In Sketch No. 7 are shown various methods of paneling for differing types of doors. In both the common "O-G" stock door at "A," and the first-class made-to-order moulded door at "B," the wood panels are inserted and held in such a way as to be *free to move* in response to their subsequent swelling or shrinking, as the case may be. Hence, they will neither buckle nor crack from these causes. In the stock door at "A" the wood panels are inserted at the time the door is assembled. The main objection to this O-G door is that the panels are liable to become loose because of the decided tendency of the "stuck" mouldings to "cup," or warp, away from the panels, as is indicated in the sketch by the dotted lines. Moreover, subsequent shrinkage of the panels will cause an unpainted and unfinished "streak" to appear next to the moulding. In the better-constructed door at "B," however, the finished panels are inserted after the door is built, and they are held in place, but left free to move, by the mouldings that are glued only to the hardwood spline and to the edge of the frame. This sketch also indicates, at "C," an excellent section for a screen door, particularly as regards the stretching of the screen itself. The latter is first tacked somewhat loosely in place so that, when the peculiar-shaped moulding is applied, the screen automatically becomes tightly stretched.

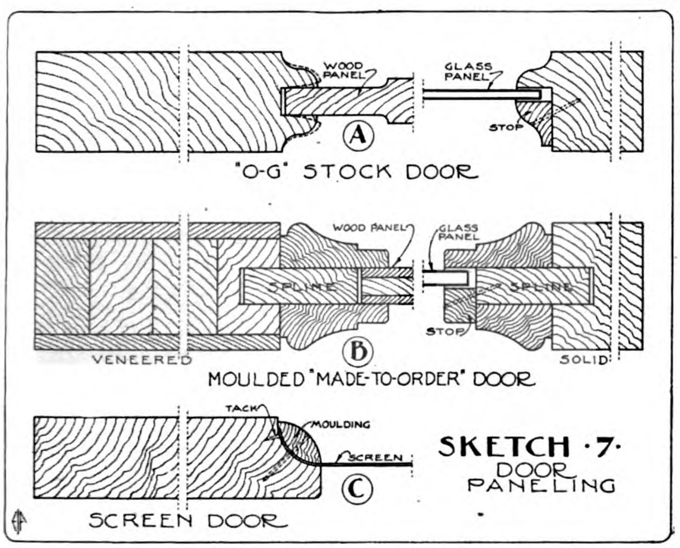
In Sketch No. 8 at "A" is shown the manner of determining the size of butts necessary to allow the door to swing back flat against the wall. The width "w" of the butt, when opened out flat, must, at least, be equal to the extreme projection "p" of the trim from the plane of the door, *plus* twice the thickness "t" of the door itself, *minus* twice the edge distance "e." Or, in mathematical language, $w = p + 2t - 2e$. If this does

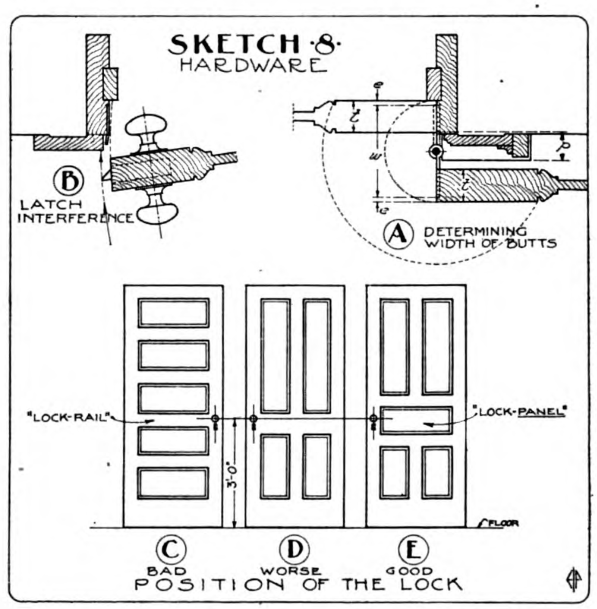



not equal a standard width or butt, then the next larger width must be used, or else the projection "p" reduced sufficiently so that the next *smaller* width can be used. The edge distance "e" should never be less than ¼ in.

Where square-edge casings are used they are usually set so close to the edge of the jamb that the projecting tongue of the door-latch strikes them before the striking-plate is reached, thus marring the casings. This faulty condition is shown graphically in Sketch No. 8 at "B." The remedy is to set the casing at least ⅜ in. from the edge of the jamb,

Practical considerations fix the height of a door-knob above the floor line at 3 ft. But practical considerations also demand that a mortise lock should not be so located as to sever the tenon of a door rail, and thus greatly weaken the door. Yet this is exactly what occurs when the old-time Colonial door is "adopted"; the lock comes at the same height as one of the rails, as is illustrated at "C" and "D" in Sketch No. 8. This is just another instance of doing things a certain way because "our grandfathers did 'em that way." The Colonial door was as it should be in our grandfathers' time, for "mortise" locks were then unheard of. On the contrary, the locks then in use were "rim" locks, screwed to the face of the door. Moreover, these rim locks, or the "latches" that were sometimes used instead, were often wider than the stiles of the door. Hence, the door was so designed that a *rail* came at the exact height of the lock. This was then known as the "lock-rail." But nowadays, with the advent of the "mortise" lock, the Colonial door becomes a gross violation of good construction. Modern doors should be so designed that a *panel*, not a rail, comes at the height of the lock, as is suggested at "E" in Sketch No. 8. And this panel might be appropriately termed the "lock-panel" in contra-distinction to the "lock-rail" of our forefathers' time. If sentiment demands the lock-rail * * * well, then sentiment ought also to demand *rim-locks, strap-hinges and hoop-skirts!*




# Zinc in the Building Industry

By E. V. PETERS

With an enormous strain on the supply of non-ferrous metals to meet present requirements, especially tin-plate and aluminum, zinc is now assuming even greater importance in the industrial world than ever before. Experiments have recently brought to light that rolled zinc particularly embodies qualities that foretell its constantly increasing use both at present and after the war.

Manufacturers for some time have been urged as a patriotic necessity to use metals other than tin-plate and aluminum in the production of certain commodities. As a result, a "Make it of zinc" slogan was adopted.

Zinc oxide also gives wearing quality to paint. This material, when used in paints with a corresponding mixture of white lead sulphate, provides toughness, lustre and color constancy to paint, qualities that are essential in this age of conservation.

In Europe, zinc, as a roofing material, has been much used in the past. In fact, the non-rusting property of zinc is a quality already attracting to this metal much favorable attention on the part of manufacturers. Weather strips made out of zinc have ben used in all climates for years and this metal has proved very suitable for such products.

For use in building hardware zinc has, likewise, demonstrated its practicability. This applies to door knobs, door casings, window sash and fixtures, opening an entirely new field for the consumption of the metal. Such uses promise to increase when building activities are again renewed on an extensive scale.

Zinc is the logical material for making leaders and gutters due to its ability to withstand outdoor wear, while in such commodities as electric fuses, this material is standard.


## How to Find the Length of a Newel Post

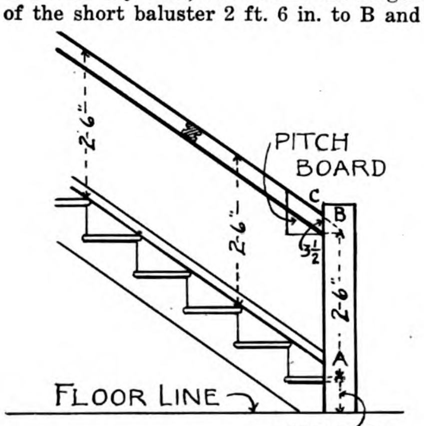
**From Colonial.** I would like to have some of the readers explain how the height of newel is found by laying the rail on nosing of steps as shown herewith.

Why the correspondent wants to lay his rail on the nosing of the steps is a bit puzzling. He will find by the accompanying diagram that the nosing has nothing whatever to do with the operation of finding the length of the newel post.

To find the length of the newel the most practical method is to draw a full size diagram representing few of the adjoining steps and measure the height of the rail from the steps as shown. Where the lines of the rail strike the newel it determines the height or rather the length of the newel post, as shown at C. It is shown in the diagram that the rail is placed at the height of 2 ft. 6 in. measuring from the top of the tread in line with the face of the riser to the upper face of the rail.

In open stringers as the one here shown, stairbuilders call this dimension the length of the short baluster, the long baluster being 4 in. longer.

It will be observed that if desired the length may be figured out as shown from the floor line to A, which is the height of I riser say 7 in., add to this the length of the short baluster 2 ft. 6 in. to B and




**Sketch illustrating proper method of finding length of Newel Post**

by using the pitch board as shown from B the length will be found at C 3½ in. higher still.

By adding these together we find the total length to be 0.7 in., 2 in., 6 in., 3½ in., = 3 ft. 4½ in.

How much longer is purely a matter of descretion. The customary rule is from 1 to 2 inches above the rail.—MORRIS WILLIAMS.

## Short Cut for Estimating Materials in Concrete

After reading the article in your January issue by Mr. Ross McLane entitled "Short Cut for Estimating Materials in Concrete," I consider that his explanations are in many respects misleading to the average man using concreting materials. The table worked out by Mr. McLane for mixtures from 1:2:4 up to 1:3:6 are practically duplicates of part of table on page 231, Second Edition of "Concrete, Plain and Reinforced," by Taylor and Thompson.

The corresponding columns in Taylor and Thompson's table are derived by using stone or gravel having 45 per cent voids or openings between the stones. Mr. McLane states a proportion of 1 cu. ft. cement to 2 cu. ft. sand to 4 cu. ft. of gravel, but does not state whether the gravel is ordinary pit run or has been screened and reproportioned. In my opinion any man using such proportions in the manner stated by Mr. McLane would be using a leaner mix than 1:2:4. For example, pit run gravel contains between 30 per cent and 40 per cent of sand, the voids in the gravel will average about 35 per cent. Now if Mr. McLane's table were used exactly as stated it would mean that 4 cu. ft. of gravel would contain $4 \times 35$ per cent $= 1.40$ cu. ft. of sand, and $4 \times 35$ per cent $= 1.40$ cu. ft. of voids in the total quantity, by adding 2 cu. ft. of sand to this gravel will actually give a mix of 1 cu. ft. cement to 3.4 cu. ft. sand to $(4 - 1.4) = 2.6$ cu. ft. stone. To actually fill all voids in the sand there would be required 1.5 cu. ft. of cement instead of just 1 cu. ft.; this shows that mixing concrete materials in accordance with this table would give an expensive concrete having a very low crushing strength and impermeability. The average man when using gravel as an aggregate for concrete only thinks in terms of so many cubic feet of gravel to one bag of cement, that is 1 cu. ft. of cement to 4 cu. ft. of pit run gravel, which is very different from a 1:2:4 mix using stone or to the table given by Mr. McLane. Gravel to be used for concreting should always be screened, the sand and stone re-proportioned to make a cement mix having the requisite strength at a lower cost for materials. I would not care to state definitely that a 1:2:4 mix based upon Mr. McLane's table would give 4.5 cu. ft. of concrete in place. Based upon 4 cu. ft. pit run gravel, the amount of concrete produced would be approximately 3.3 cu. ft.

Proportioning concrete by the method of voids is not absolutely correct, yet it will give proportions accurate enough for ordinary work. GERALD HAMILTON.

## How to Fasten Wood to Brick

**From F. S., Conn.** It is necessary for me to secure some wood work to stone and brick work. Would you please tell one how through your correspondence column?

**Answer**—Round wooden plugs are used successfully to accomplish what you want

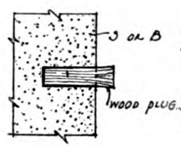



**Fig. 1 — Proper method of setting wood plug in stone wall. Make plug as small as possible**

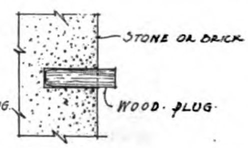



**Fig. 2—Incorrect method of fitting plug. Plugs should not be tapered, but should fit snugly**

to do, but it is only when they are properly installed. The following hints for successful installation should be taken into consideration for work of that kind:

1. The larger a wood plug is made the more the shrinkage when it dries out. They should be as small as consistent with the size necessary for holding screw or nail.

2. A proper relationship of size would be a ½-in. diameter plug for a No. 12 screw or 10-p. cut nail.

3. Wood plugs should fully fill the hole, as indicated by Fig. 1, and not be made with sharp taper as indicated in Fig. 2, which is the incorrect form of plug and the kind that easily becomes loose. W. G.

## How to Read Gas, Electric and Water Meters

**From H. F., Rhode Island.**—I would like to know how to read gas meters and electric meters. I have a book telling this, but do not seem to understand it. I am afraid our gas bills are bigger than they should be, but want to know how to read the meter myself, rather than complain if they are not.

**Answer.**—*The Gas Meter.*—Different meters vary little in the arrangement of the dials. Large meters may have five or more dials, but those used for dwellings usually have but three.

Figs. 1 and 2 show the common arrangement of dials. The small index hand on upper dial is not taken into consideration when reading the meter, but merely for testing.

The three dials which record the consumption of gas, are marked A, B and C, and in each a complete revolution of the index hand denotes 1,000, 10,000 and 100,000 cubic feet respectively.

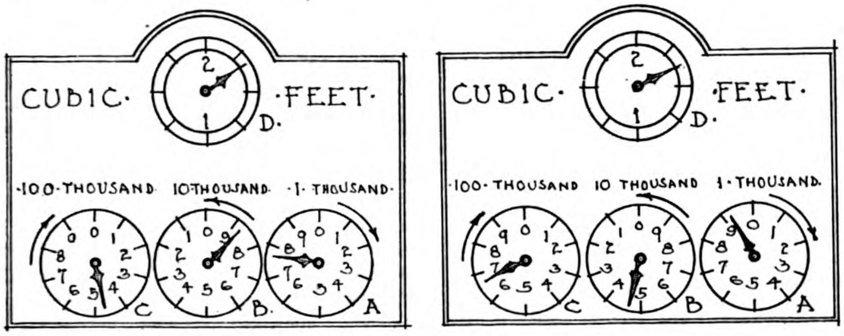


**Fig. 1 and 2—Showing the usual arrangement of dials on a gas meter**

The index hands do not move in the same direction. This will be noted on Figs. 1 and 2.

When reading a meter, annex two cyphers at the right hand of the figures indicated. The index shown in Fig. 1 reads 48,700. Suppose after being used for a time, the hands should have the positions shown in Fig. 2.

This would read 74,900 and the difference in the readings 64,900—48,700=16,200 cubic feet consumed in a given time. All that is necessary now is to multiply the amount consumed by the cost per 100 cubic feet, or whatever the arrangement the gas company may have in selling the gas, to know the amount of the bill.


**Fig. 3—Ordinary type of water meter**

*The Water Meter.*—Fig. 3 shows the ordinary arrangement of a water meter. The water meter is read in a manner similar to a gas meter. The figure taken is always that one which the pointer has just passed, not the one which it is approaching. The figure indicated upon the dial marked 10 is first put down; that is in the units place. To the left of it put down the figure indicated upon the dial marked 100; to the left of that the figure under 1,000 and so on. Thus, dials in Fig. 3 indicate 6,417 cubic feet. The small dial is not taken into consideration as it only denotes fractions of a cubic foot. To find the quantity of water consumed subtract the previous reading from the present one as described for gas.

*The Electric Meter.*—Fig. No. 4 shows a photograph of the typical electrical meter usually installed in dwellings. It will be noted that this type of meter has four dials, one marked 10, the one next to that 1,000 and one marked 10,000.

An electric meter of this type is direct reading—and is read exactly in the same manner as the water meter. For example. Let us assume that under dial marked 10 the pointer is past the 5 mark—under 100 past the 8 mark and under 1,000 past the 9 mark and still on the 0 of the dial marked 10,000. The total amount of current consumed would then be read 985 kilowatt hours, from which would be deducted the amount of the previous reading. The result will then be the kilowatt hours of current consumed in a certain interval. W. G.

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## Designing a Steel Beam

**From M. P., Newark, N. J.**—Kindly explain the method of designing a steel beam. The particular case I am interested in is that of a longitudinal beam along the center of a garage 50 ft. in width by 100 ft. in length to support the transverse beams carrying the flat roof.

**Answer**—The writer does not give sufficient information to design his particular beam in detail, but the general method of designing a steel beam will be taken up and the manner of applying it to his case will be indicated.

When a vertical load is applied to a beam it is deflected downward and the fibers at the lower face, below the neutral axis, are stretched or tensile stresses are induced, while above the neutral axis the beam is in compression.

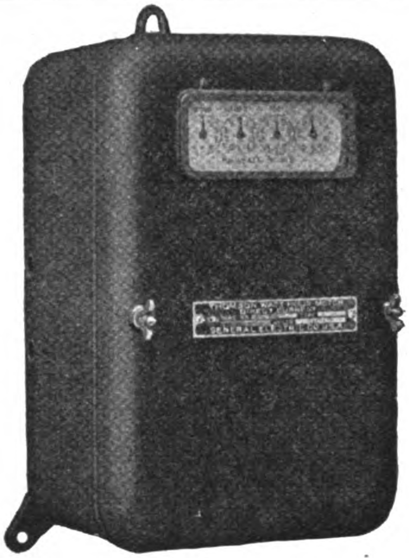


**Fig. 4—A typical electrical meter as usually installed in dwellings**

The external bending moment produces an equal internal resisting moment. This moment when derived from the common theory of flexure is expressed as follows:

$$M = \frac{k\,I}{d} \quad \ldots. \text{ (1) in which}$$

$M$ = the bending moment in inch pounds
$k$ = the extreme fiber stress in the beam
$I$ = the moment of inertia of a section of the beam
$d$ = the distance from the neutral axis to the extreme fiber of the beam.

From the equation, if the section of the beam is known and the allowable stress per square inch is given, the bending moment, which the beam can be subjected to, can readily be computed, and from the bending moment the load it will carry can be obtained.

The reverse process is generally used, as the load and span are usually given and the beam required to carry these must be found. For this purpose we will transform equation (1) to the following form

$$\frac{M}{k} = \frac{I}{d} \quad \ldots\ldots. (2)$$

and take $\frac{I}{d} = S$, the section modulus of the beam.

The section modulus of the beam is therefore the moment of inertia of the beam divided by the distance from the neutral axis to the outermost fiber of the section. This is seen to be equal to the bending moment divided by the allowable stress.

The steel handbooks, such as Cambria or Carnegie Steel Company's handbook, contain tables giving properties of I-beams, channels, etc. These tables give the size, weight, area, moment of inertia and section modulus of the different sections.

It thus becomes an easy matter to

compute the bending moment $M$ from the external loads on the beam, and dividing this by the allowable unit stress $k$, we obtain the section modulus required for the beam. A beam is then chosen from the tables which has the required section modulus.

Thus for the case under consideration. If the columns, supporting the ends of the sections of the beam in question, are assumed to be spaced 20 ft. apart and the live load on the roof is 40 lb. per square foot with the roofing material and beams weighing 10 lb. per square foot, we have the total load on the beam

$$W = 25 \times 20 \times 50 = 25{,}000 \text{ lb.}$$

It being assumed that each side wall carries one-half the load between it and the longitudinal beam, and that the roof beams are spaced so as to produce practically a uniform loading on the longitudinal beam.

The bending moment of the beam is equal to

$$M = \frac{Wl}{8} = \frac{25{,}000 \times 20}{8} \times 12 = 750{,}000 \text{ in. lb.}$$

Dividing this bending moment by 16,000, the allowable stress per square inch for steel, we obtain the required section modulus of a beam that will support the load, thus

$$S = \frac{M}{k} = \frac{750{,}000}{16{,}000} = 46.9$$

From the table of properties in the handbooks a beam can readily be chosen that has this section modulus, thus a 12-in. — 45-lb. I-beam has a section modulus of 47.6 and will suffice.

Wherever possible so-called standard sections should be used. These are the sections printed first in the Cambria handbook and printed in heavy type in the Carnegie handbook, and are the sections most easily obtainable. The other sections are called special sections and are not rolled so frequently at the mills so that there may be some delay in obtaining them.

As the 12-in. — 45-lb. I-beam is a special it would be best to use a 15-in. — 42-lb. I-beam, which is a standard section and which, while weighing less, has a greater section modulus than the 12-in. — 45-lb. I-beam.

Should the columns supporting the beam be spaced 25 ft. apart instead of 20 ft., the total load on the beam would be

$$W = 25 \times 25 \times 50 = 31{,}250 \text{ lb.}$$

and the bending moment would be

$$M = \frac{Wl}{8} = \frac{31{,}250 \times 25}{8} \times 12 = 1{,}171{,}900 \text{ in. lb.}$$

therefore the required section modulus

$$S = \frac{M}{k} = \frac{1{,}171{,}900}{16{,}000} = 73.3$$

A 15-in. — 60-lb. I-beam has a section modulus of 81.2 and will suffice.

L. Goodman, C.E.

# Adding Pigeon Coops to Garages Affords Profitable Business

One of the opportunities for business in smaller communities is in taking advantage of the instinct for keeping live stocks of some kind, an instinct strong in most people. Pigeons and chickens are two of the first things thought of in this connection. They are generally regarded as comparatively harmless by the average housewife unacquainted with them, and, therefore, she is willing to take them up as an aid to keeping down household expenses.

Many households would keep poultry of some sort if it were not for the expense of providing housing accommodations for them. When the small cost of housing is shown, they are very likely to sooner or later have the work done.

When a garage has already been built on the place, it affords opportunity for a coop to be built alongside. This reduces the expense of the latter, and frequently results in a better looking building than would otherwise be the case.

Garage and pigeon coop

This has been well done in the building illustrated. The carriage house, now a garage, has been made the storage place for feed, and an addition built to house pigeons. The addition was kept back from the front of the garage, so that room might be left for the flying yards in front, which are 12 ft. long.

The addition is divided into three main compartments, on each side of which nests are arranged. Each one of these compartments is again divided by a wire partition so as to keep pigeons separate when desired and yet to allow air to move unobstructed. Windows at both the front and back admit plenty of light and sunshine, which is important in preventing disease.

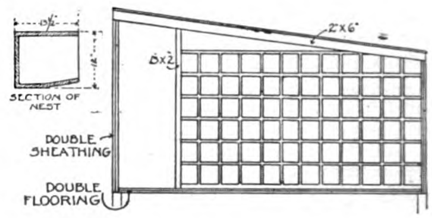
Accommodations are provided for 300 birds. The nests are sloped toward the back so as to facilitate cleaning. Feed is dropped from above upon a feed table in the garage.

The floors and sheathing are double, so as to keep rats out. Frequently wire is run between the rough and finished floor and part way up the side, thus making the coop rat-proof.

## The Best Way to Cut Glass

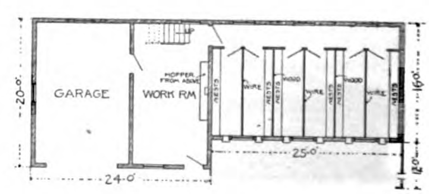
Sheet glass should always be cut on the hollow or concave side. One can easily tell the concave side by holding the glass up and then glancing down the edge. This slightly hollow or concave nature of the glass is caused through the process of manufacture.

In the manufacture of sheet glass it is first blown into cylindrical form that resembles a huge bottle. This great bottle-like structure of glass, which is from 15 to 20 ft. in length and about 3 ft. in diameter, is cut into sections approximating 5 ft. in length. These sections are split open at one point by drawing a hot iron across. They are then laid on a mould and flattened by means of heat from a coke furnace. It is never possible to make them exactly flat. The sheets are slightly concave.




Section through coop, showing arrangement of nests

There is greater resistance on the convex side than on the concave side. This accounts for the cut "running out," and invariably a spoiled sheet if the cut is made along the convex side. It is essential to safeguard against waste that the glass be cut along the hollow or concave side. But it is also very necessary that the cutting tool be kept in good condition. Care should be taken that it does not get dull, or that the bearing in which it runs does not become worn. If the cutter becomes dull it will skip in places. These little skips are danger places that often cause the cut to run out. If a wheel cutter is used the little wheel should be kept oiled. When not in use if it is kept covered in coal oil it will always be in good shape. As soon as it begins to show signs of dullness it should be discarded or the wheel should be replaced. Where a diamond is used it is always advisable for only one person to use the diamond for it is seldom that two people hold a glass-cutter in the same manner.—*Hardware and Metal.*



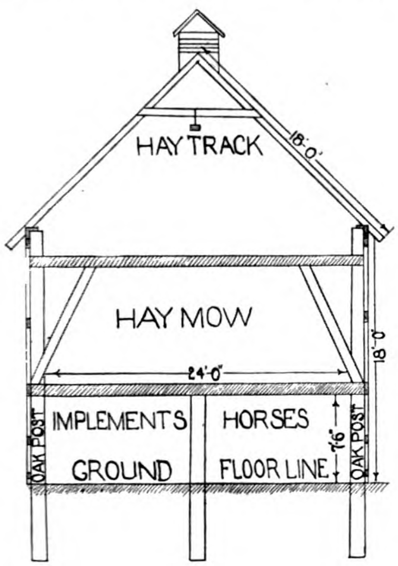

Plan of garage and pigeon coop

# Farm Improvements Mean More Business for You

## *Increase Your Profits and Make Money for the Farmer by Building Him a Hay Barn*

By HIRAM H. SHEPARD

In every progressive farming section the size of the barns increases as the section advances in agricultural efficiency. This is logical and good business, for a roof shelter for field crops and live stock pays for itself over and over again during its lifetime. In some cases, especially during unusually wet and stormy seasons, a cheap hay barn will almost pay for itself in one year in the saving of a large quantity of first-class hay. And hay now is worth from two to three times what it was a decade ago, while the cost of building has not increased in the same ratio.




**Cross section of hay barn**

Time was when hay on farms of all sizes was stacked out in the open, with the exception of what little could be stored in the small and inadequate home barn. But farmers have found that through the weathering of hay in the stack during several months from 25 per cent to 50 per cent is lost, due to decomposition and discoloration. With the very best of stacking and the stacks standing out in the most favorable hay keeping weather, hay in the stack never cures out and keeps with the same good aroma, color, palatability and feeding value for live stock as where it is stored and cured out under shelter. Both the market value and actual home feeding value of hay is greatly improved through roof storage, and there is no loss from weathering, as in stacking. Under the roof hay will keep indefinitely and, like tobacco and liquor, will ripen and improve in quality with age. In the stack outside the same good feed, ordinarily in humid climates, will become a rotten and worthless mass after a year's or eighteen months' weathering.

The hay barn enables the farmer also to hold his product to be handled at his convenience when more important farm operations are not pressing for attention, and to market when prices are good.

Not many years ago straw of all kinds was considered practically worthless, except for bedding and the roughest kind of feeding. It was, and still is in many places, left out in the weather in loose stacks to rot down and blow away, becoming almost total loss. But modern farming now recognizes the value of straw, the market price of which to-day is actually more than that of good hay a short generation ago. It, like cotton seed, has become a real farm product, instead of an almost worthless by-product as in years gone by. It is far too valuable to be allowed to weather and waste, and it pays handsomely to shelter it and save it.

The farmer whose barn is shown in these illustrations caught the notion of modern thrift and the utilization of all farm products several years ago, and this commodious barn shelters his straw crop as well as his hay crop. Thousands of farmers are now either baling their straw immediately after threshing while it is new and bright, or blowing it directly into barns from the thresher, to be fed out or baled out later.

In many cases farmers have built special hay and straw barns, and afterward built sheds at the sides for either sheltering cattle or sheep in winter for consuming the stored feed at home, or for implement shelter, or both. In fact, the special hay barn with side sheds is considerably reinforced and protected by the sheds, and in general the shed arrangement is more economical than giving up the first floor to live stock and implements.

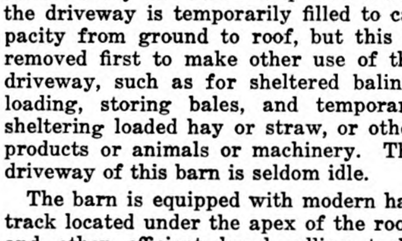
The average modern hay and straw barn is built on heavy pole supports, the poles serving as foundation and part of the frame structure. Poles practically the size of telephone poles are used, according to the size of the building. The rest of the frame work is spiked or bolted to the poles. The bracing and binding must be ample and the posts set in the ground from 3 to 6 ft., according to the condition of the soil. A footing of concrete at the base of the pole holes is sometimes used, and in some cases the portion of the pole in the ground is encased with concrete for added solidity. In the barn shown here the poles are of white oak, secured on the owner's farm. Where the farmer has no good poles of his own it is usually best to purchase cedar or similar durable poles, as they will last enough longer to more than pay the difference in cost.

This economical hay and straw barn is

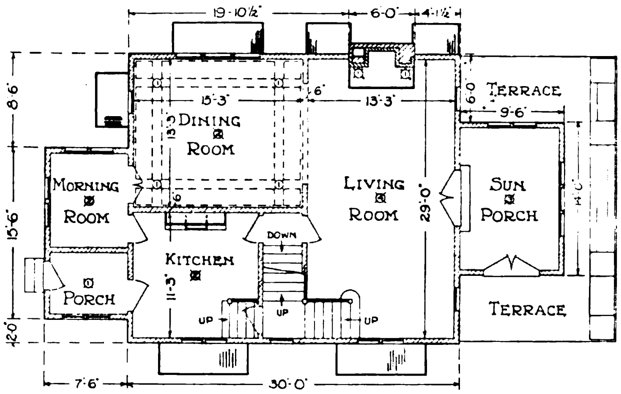
**A hay barn that cost $450. It has paid for itself many times over by the feed saved**

24 ft. wide by 52 ft. long and 18 ft. high at the sides. The roof being comparatively steep, gives large hay storage capacity immediately under the roof above the side plate line. All of the timbers, except frame poles, nail ties, braces and rafters are 2 in. by 6 in. stuff, and the cross binders, of which there are two in each bent, are 2½ in. by 10 in. All bents are the same, except the ends, which have two extra poles, one on each side of the doors in the gable ends. There are six bents, including ends, with 10 ft. space between bents, except the driveway, which is 12 ft. wide. This gives a floor space at each end on either side of the driveway 24 ft. by 20 ft. When the farmer's hay and straw crops are heavy the driveway is temporarily filled to capacity from ground to roof, but this is removed first to make other use of the driveway, such as for sheltered baling, loading, storing bales, and temporary sheltering loaded hay or straw, or other products or animals or machinery. The driveway of this barn is seldom idle.

The barn is equipped with modern hay track located under the apex of the roof, and other efficient hay-handling tools. The hay track supports also act as braces and binders for the rafters. The siding is of common boards, the roof is of a heavy grade of galvanized iron, and there are two ventilators in the roof. Hay can be unloaded into this barn from either end outside, or from the driveway inside. The lower portion of the walls are not sided when designed for hay and straw alone, and no lower doors are used or needed. The end of the barn used for sheltering horses is sided down to the ground line and equipped inside with simple and inexpensive feedway and mangers. The animal room ceiling is lower than is commonly used in a regular live stock barn. The total cost of this barn five years ago was $450, the owner hauling the material and furnishing the frame poles.




**Plan of barn**




First floor plan, scale 1/16" = 1'. Note the economical stair arrangement and the placing of the sun porch in the front of the house.

# Stucco House Showing Popular Western Tendencies

*Moldings Used to Break Up Exterior Walls—Wide Overhang Keeps Sun from Interior*

In the West, individualistic types of architecture are rapidly being developed. Whereas in the East the tendency is toward the severe Colonial or the English type, Western architects are striking out in unconventional, often faddish, directions.

The house illustrated takes advantage of a tendency to ornament the exterior by moldings planted on. These moldings serve to relieve a surface that might otherwise be too plain, and also serve to "tie" together windows and other openings so that they balance better. By using such moldings it is also possible to provide inside wall space for furnishing and yet have a broken-up outside surface. The moldings must, however, be very carefully handled so as to secure good balance, otherwise the effect would be decidedly unpleasing.

The flat roof with wide overhang is the result of another tendency. A wide overhang such as this serves to protect the windows from the glare of the sun, thus tending to make the house cooler in summer.

The house itself is suitable for a narrow lot, being 26 ft. in width. The sun porch at the front is conveniently placed so as to afford a view of the entire street. Placing a front porch with this consideration in mind is always desirable, as it adds much to the livability of the home.

From the sun porch, which also serves as a vestibule, entrance is had directly into the living room. This is practically one with the dining room, the two being only partially separated by a cased opening. The beam ceiling in the dining room serves to give this room an individuality, taking it apart from the living room.

The morning or breakfast room serves as a communicating link between dining room and kitchen. Such a breakfast room is especially desirable in small families, as it is more convenient for serving breakfast and tending to the children at noon time.

The enclosed kitchen porch is a worthwhile feature.

The stair arrangement is economical. It is of the combination type, serving both living room and kitchen. The stairs are placed so as to avoid the necessity for a hall, which is often regarded as waste space in a small house. Communication between living room and dining room is established by a small passage or hall, from which is had entrance to the cellar. Headroom over the main stairway is so handled as to permit a spacious closet to be placed so as to serve one of the bedrooms, the closet being up one step.

The bath room is placed over the kitchen so as to permit of economical plumbing.

Three bedrooms and a sleeping room or sleeping porch complete the second story layout. Each of the bedrooms has an exceptionally large amount of wall space, thus making it easier to arrange furniture.

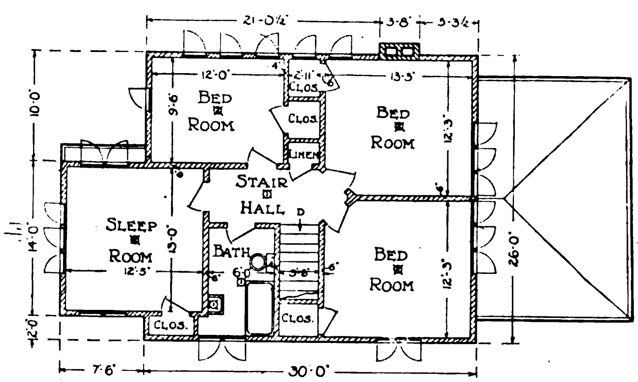
Windows throughout are of the casement type, swinging outward. Such windows are especially desirable where it is desired to afford good ventilation during the summer.

This house is located at Indianapolis, being designed for the Jose Balz Home Builder Co., Indianapolis, Ind.

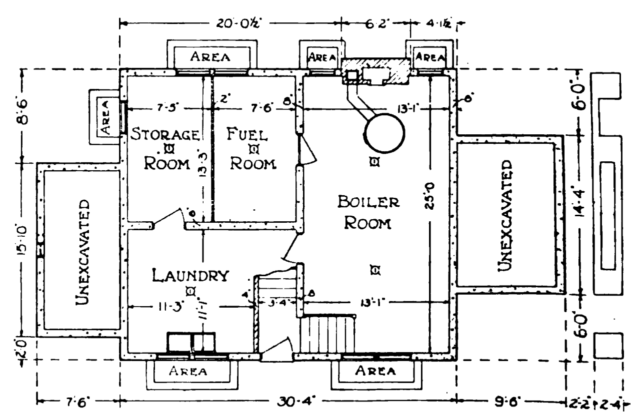
## Drafting Room Kink

By L. H. CHRISTEN

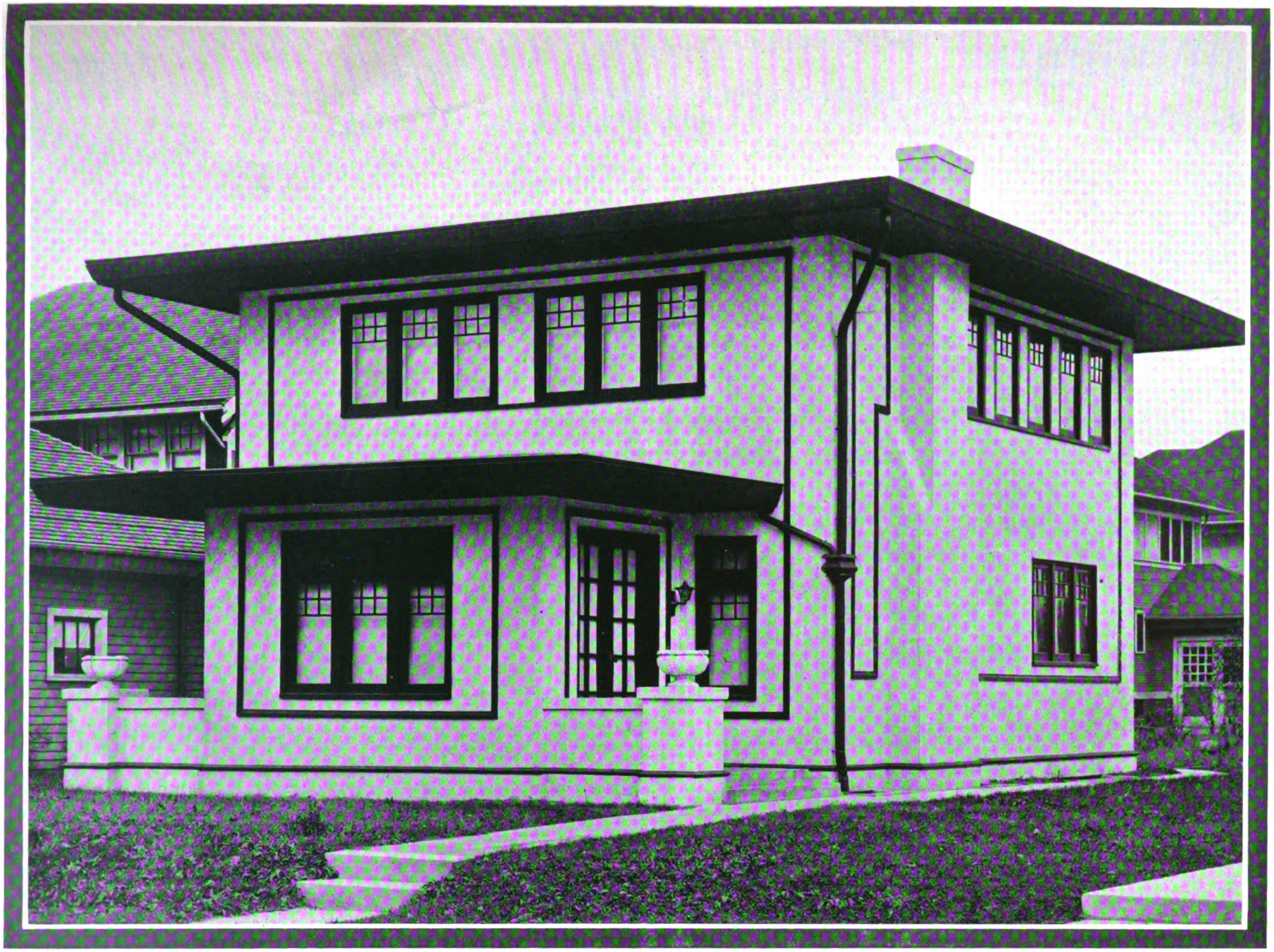
On very hot days in the summer I have found that the ink from the ruling




Second floor plan, scale 1/16" = 1'. The placing of the bedroom closet over the stairs, with one step up to gain sufficient head room, is interesting




Cellar plan. Front and rear extensions are unexcavated except for foundations. Plenty of space is afforded for all cellar purposes, the arrangement being especially good



*Supplement to Building Age, March, 1919*

**Elevations, scale 1/16" = 1 ft.**

**Note how the moldings are placed to relieve the plainness of the wall surface**

pen is attracted very easily to the edges of the triangle, running under the latter and causing disagreeable blots, which destroy the neatness of the tracing and very often the disposition of the draftsman.

In order to avoid all these difficulties, simply take a pocket knife and shave off all sides of the triangle to a bevel extending about one-third the thickness of the material.

By this little scheme, blotting of the cloth becomes almost impossible, and I have found also that the bevel is useful in case it should be found necessary to trace a line immediately adjacent to another wet line, the bevel covering the wet line without smearing it, and the draftsman is able to reach to desired line with his pen.—*Concrete.*

# Making Better Collections

## *A Kink That Will Help Bring Your Money in Quicker*

By EDWARD H. SCHULZE

The way to prevent worries about unpaid accounts is not to let the account run too long. That does not mean you should be too persistent. It means that you must show your customers that you expect to be paid for what you sell them. If you do this in a pleasant way you will find that you will be paid more promptly, and even at the expense of some merchant who is not as up to date in handling his collections as you are.

Most builders merely send a bill after completing the job. That is mistake No. 1. Attached to every bill you render should be a nice little letter something like this:

"Dear Sir (or Madam):

"The customer who pays his (or her) bill promptly is naturally a favored customer.

"The reason is obvious:

"Much of the cost of our work is for labor. Labor must be paid every week. If we are paid promptly we can, in turn, pay our labor promptly and everybody is satisfied.

"Then, when the time comes and you want something done in a hurry, we remember your kindness in meeting payments due us and we instinctively feel that nothing we could do for you would be too much. You become a favored customer.

"Besides, it is a satisfaction to pay a bill and get it off your mind. Then you don't have to think about it again. So long as you must pay eventually, do it now and it will help us both.

Now, if that letter does not help bring you prompt collection, you should send with your statement a letter like this:

"Dear Sir (or Madam):

"Among the early settlers were Adam and Eve.

"In fact, they were the first family of early settlers.

"Later there came Captain John Smith, who, while he did not marry Pocahontas, married somebody and built up the first family of Smiths. How big this family has grown is shown by an inspection of any city directory.

"But the early settlers that we like best of all are the customers who pay their bills promptly on receipt of statement.

"When they 'settle' we are in turn able to settle our own bills. If they fail to settle it makes it harder for us to render good service and merchandise.

"Become an early settler by paying the attached item. Please.

"Sincerely yours."

These letters are tactful and will go a long way toward getting the money in on time. Don't make the mistake of just sending out bills and then if you fail to get the money go to the other extreme and write threatening or "nasty" letters.

Remember that when people get your bill they either pay it—or lay it to one side for later action. If you send them a nice letter with the bill you will offset the natural inclination to let the bill wait; they are likely to do as you ask if you ask it in the right way.

# Practical Methods and Details of Roof Framing—VI

## *How to Get Cuts on an Octagon Shaped Roof—Obtaining Cuts When End of Roof Is Out of Square*

By LAWRENCE S. KEIR

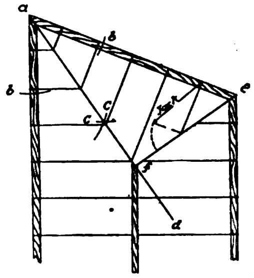


Fig. 34—Illustrating how to determine where ridge pole and upper ends of hips will meet when end of roof is out of square

Fig. 34 shows how to determine where the ridge pole and upper ends of hip rafters will meet when the end of a roof is out of square. With the corner (*a*) as a center and with any convenient radius strike the arcs (*b*) and (*b*) and with the points where the arcs cross the outside edge of the plate as a center, strike the arcs (*c*) and (*c*). Draw the line (*a*) (*d*) of indefinite length, and passing through the intersection of the arcs (*c*) and (*c*). Do the same thing on the corner (*e*) of the plan. The point (*f*), where the two hips meet, will be the end of the ridge. In this kind of a roof it is preferable to run all jacks square with the plates as shown. Length and cuts of hips and jacks can be developed, as was done in Fig. 27. Fig. 35 is an octagon roof. On one-half of the plan is shown hips and common rafters. On the other half there are two jacks spaced between the hips instead of one common rafter.

Draw the square (1) (2) (3) (4) each side being 14 ft. long. Draw the width (4) as a center and (4) (*x*) as radius strike the arcs (5) and (5) with (3) as a center draw the arcs (6) and (6). From (1) draw (7) and (7), and from (2) draw 8 and 8, connect the points where 7 and 5, 8 and 6, etc., cut the sides of the square and we have an octagon 14 ft. wide.

The drawing of the rafters on the plan should require as instructions and the elevation is also nearly self explanatory. The toe of the common rafter comes directly over the line 1, 3 of the plan. To find the toe of the hip on the opposite side take *x* as center and *x*, *a* as radius and swing the point *a* up to where it connects with the horizontal line at *b* and the toe of the hip will be directly over the point *b*.

Where the jack connects with the hip at *c*, *d* on the plan, carry lines from these points up to *e* and *f* on the elevation. Where the lines cross the common rafter at *e* and *f* will give the length and side cut of the jack.

By measuring with the scale from *g* to *h* and from *h* to *i* will be found that while the common rafter has a rim of 7 ft. the hip has a rim of 7 ft. 7 in., or 13 in. for every 12 in. of the rim of the common rafter. So if it is desired to get out the rafters by use of the square instead of the draft we can make good use of this fact.

Common raftetr has 7 ft. run to 10 ft. of rise; 10 ft. divided by 7 = 17 1/7 in., which will be the amount of rise of common rafter to 1 ft. of rim. Therefore 12 on tongue and 17 1/7 on blade applied to the rafter 7 times will give length of common rafter, the tongue will give the foot cut and the blade the plumb cut. Half the diameter of the center pole will require to be measured square back from the plumb cut.

Its octagon hips run 13 in. for every 12 in. rim of common rafter, take 13 on the tonge and 17 1/7 on the blade and apply 7 times for length and cuts of octagon hip. The octagon jacks are so spaced that they cross the plate two-thirds of the distance from the foot of the hip to where a full length common rafter would cross, or, to make it more clear, they are two-thirds of the distance from (*j*) to *k* on the plan. They will then have a rim equal to two-thirds of the rim of a common rafter, or 4 ft. 8 in. The square applied four times with the numbers used on the common rafter and after the fourth time slid along the line an additional 8 in. will give length foot cut and plumb line of jacks.

Another way would be to represent two-thirds of rise of common rafter, or 6 ft. 8 in. on one side of the square, and two-thirds the rim, or 4 ft. 8 in. on the other side. This would give the cuts, and measuring across the square from 6 3/12 in. to 4 8/12 in. would give the length of the jack.

If the length of common rafter for 1 ft. of rim which, in this case, is 20⅞ in., is taken on the blade, and 5 in. is taken on the tongue, then the blade will give the side cut of jack to fit against octagon hip when the square is laid across the back of the jack.

In a round roof all rafters are common rafters or parts of common rafters, as shown at Fig. 36, where there are eight common rafters and eight half rafters. The short rafters butt against headers cut in between the common rafters. As the faces of these headers are to stand plumb when in place, the ends of the headness will have the same bevel as shown on the plan. All rafters, long or short, have the same plumb and foot cuts.

With the foot of the compass in the exact center of the plan draw an arc from the top end of the short rafter until it strikes the line (*a*) (*b*) and then carry this line plumb up until it crosses the rafter in the elevation above the plan. This gives the length of the short rafter.

Observe that the first pair of rafters will be full length, the second pair will be shorter by half the thickness of a rafter measured square across, and the next four rafters will be shortened one-half the diagonal thickness of the rafters, and will require side cuts. Fig. 37 shows a 12 in. square and an octagon 12 in. wide overlapping each other. In-

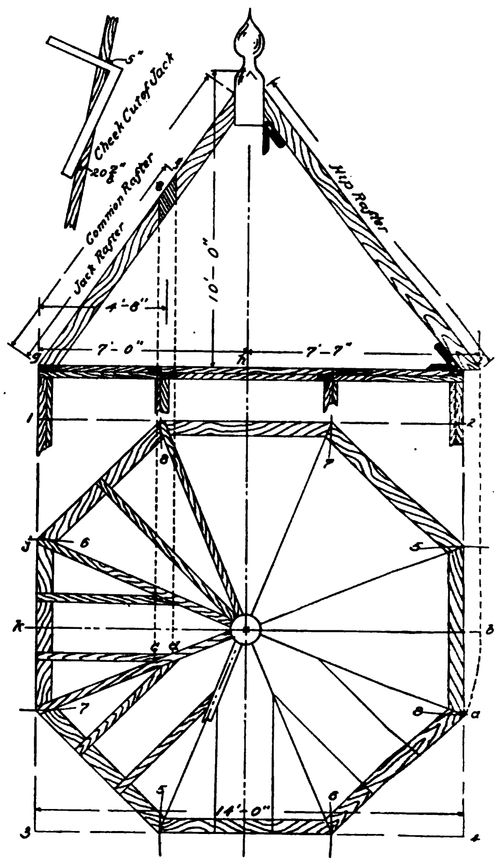



Fig. 35—How to proceed when getting cuts of rafters on an octagon roof

spectors of this drawing will make clear why a common rafter has 12 in. rim to the foot, a common hip or alley has 17 in. rim to the foot of common rafter rim, and an octagon hip has 13 in. rim.

Many beginners have trouble in understanding why length and rim cut on rim gives cheek cut of jack. I have tried to make this clear in Fig. 38, where is shown a box 12 ft. square and 8 ft. deep. The line (*a*) (*b*) gives the length and slope of a common rafter on a one-third pitch roof, while the line *a*, *c* would be the length of a hip rafter on a one-third pitch roof.

If the hip rafter crossed directly over from *a* to *d*, it would, of course, be 17 ft. long, as shown on the 12-ft. square drawn below the box; 12 and 12 taken on the steel square would bisect the angle of the corners on the square figure shown. But the hip does not run bevel across. Instead it runs from the lower corner on one side to the upper corner diagonally across on the other side, and bisects not the angle of a square but thus diagonally across the plan (*a*) (*b*) *c*, *d*, and this plan is run of common rafter, or 12 ft. on each side, and run of common rafter, or 14½ ft., on the other side. This plan has been carried down to the lower part of Fig. 38, where it is shown laid down flat, and a square with the proper figures marked on it gives the line *f*, *g*, or the cheek cut of jack against hip.

One corner of the square in the middle of Fig. 38 is shown with dotted lines to form an octagon corner, and the steel square at this corner shows that while 12 and 12 bisects the angle formed by a square, 5 and 12 will bisect the angle of an octagon. It is evident that an octagon jack must rise the same as a common rafter on the same roof in the same length of rim. Therefore octagon cheek cut will be length of common rafter for 1 ft. of rim taken on blade and 5 taken at tongue of square. The blade gives the cut. In the case of the roof in question, for instance, the cheek cut would be 14½ and 5 cut on 14½ for octagon jacks and 14½ and 12 cut on 14½ for common jacks. Side cut of hip would be 18¾ and 17 cut on 18¾. The draft of a curved or o-gee roof is shown at Fig. 39. Half the roof has square corners and half has octagon corners. First draw the elevation of the common rafter (*a*) (*b*) and divide the rim *a* (8) of common rafter into any convenient number of divisions, and from these points erect the lines 1, *x*, 2 *x*, etc., cutting the line of the common rafter at *x*, *x*, *x*, *x*, etc.

Drop the rim of the hip rafter (8) (*c*) down to (*d*), using (8) as center and (8) (*c*) as radius. Then erect the line *d*, *c*, and continue the base line of common rafter from (*a'*) to (*c'*). Divide the line (8) (*c'*) into the same number of parts, as was done with the common rafter, and from these points erect the lines (1) (*x'*), 2, *x'*, 3, *x'*, etc., making them to correspond in length to 1, *x*, 2, *x*, etc., of the common; its curve drawn through the points *x'*, *x'*, *x'*, etc., will give the curves and length of the hip rafter on the square corner.

The rim of the octagon hip 8, *e*, is swung up to the line 8, *d*, and from this point dropped down to *e'*. Then 8, *e'* will be the base line of the octagon hip. The length and curves of the octagon hip can now be worked out, as was done with the common hip. Dotted lines show how length curve and cuts of common and octagon hips are found.

Now if the beginner has been careful to study what has been gone over until he was sure he understood it, and will then memorize the following short list, he will find himself able to handle most any of the every-day problems in roof framing. He will in a short time pick up many new things, and some of them will be kinks that he has found out by himself and will give him a more personal interest and pride in his work than is possible when working under some other fellow's instructions.

Plumb cut is run and rise cut or rise.

Foot cut is run and rise cut on run.

Rise and 12 gives length of common rafter per foot of run.

Rise and 17 gives length of hip rafter per foot run of common rafter.

Rise and 13 gives length of octagon hip per foot run of common rafter.

Side cut of jacks against common rafter is 12 and length of common rafter per foot run cut or length.

Side cut of jacks against octagon hip is 5 and length of common rafter per foot of run cut or length.

Side cut of common hip is length of common hip per 17 in. of run, and 17, cut or length.

When hip runs between two roofs having different pitches, take length of common rafter on side jack is to go on and run of common rafter on opposite side length gives side cut of jack.

*(The End)*

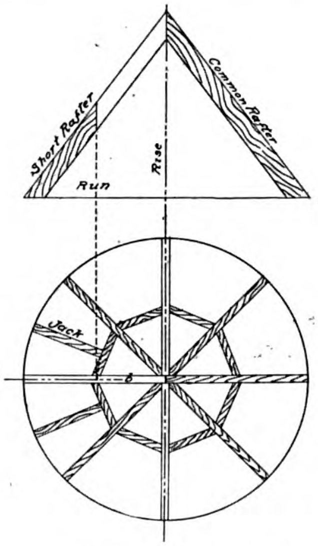



Fig. 36—Getting cuts for a round roof

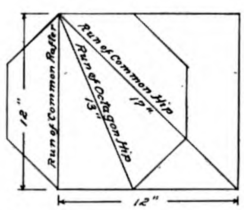



Fig. 37—A twelve-inch square and an octagon 12 in. wide, overlapping each other

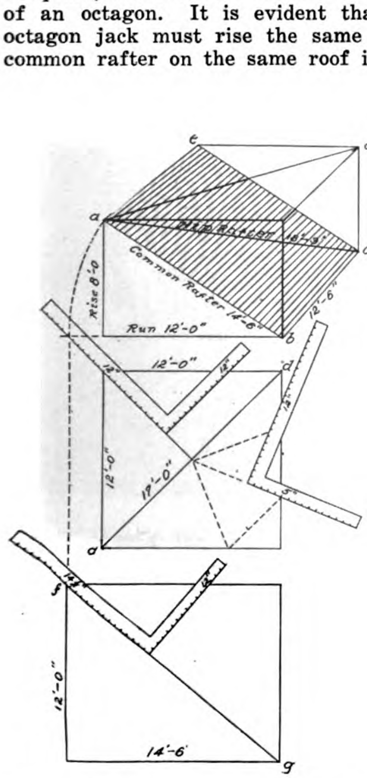



Fig. 38—Illustrating how to find octagon jack cuts

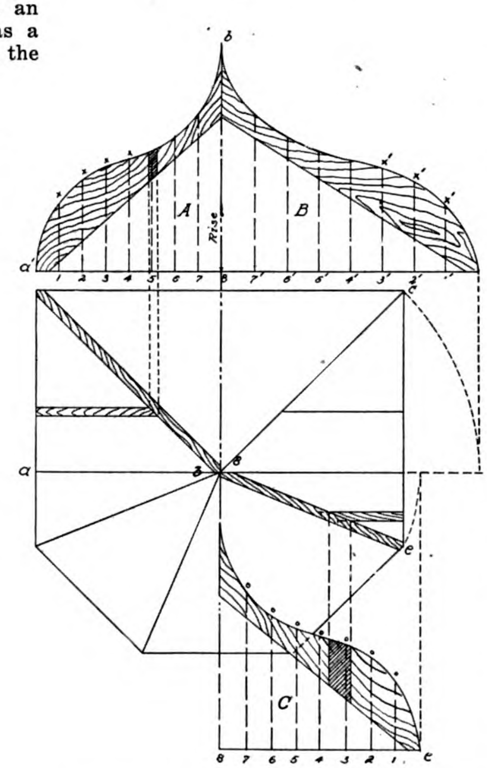



Fig. 39—Showing the proper method of getting cuts on an ogee roof

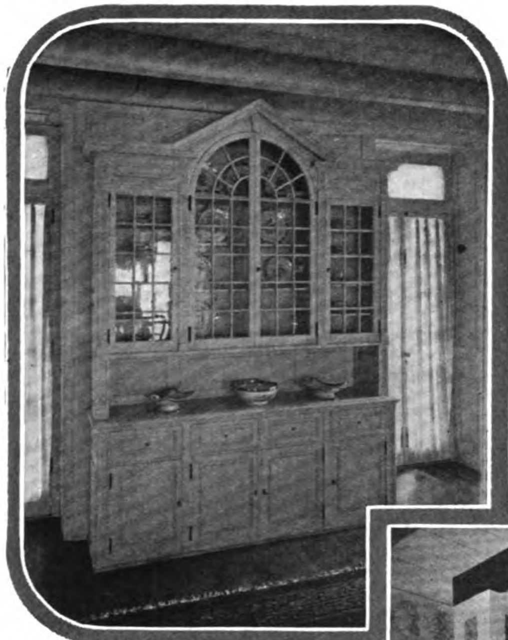
# Beautiful Interiors Suited to the

*Every Room Should Be Planned*

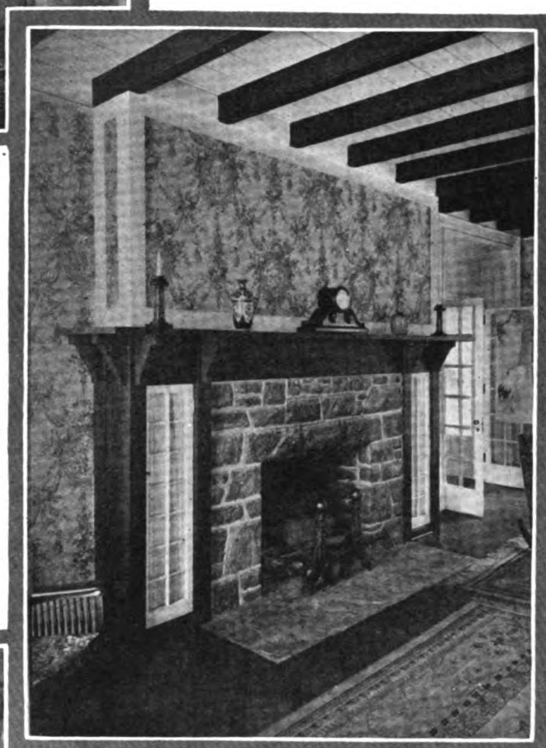
*the Eye Will Be*

*A Few Such*

*Shown on*

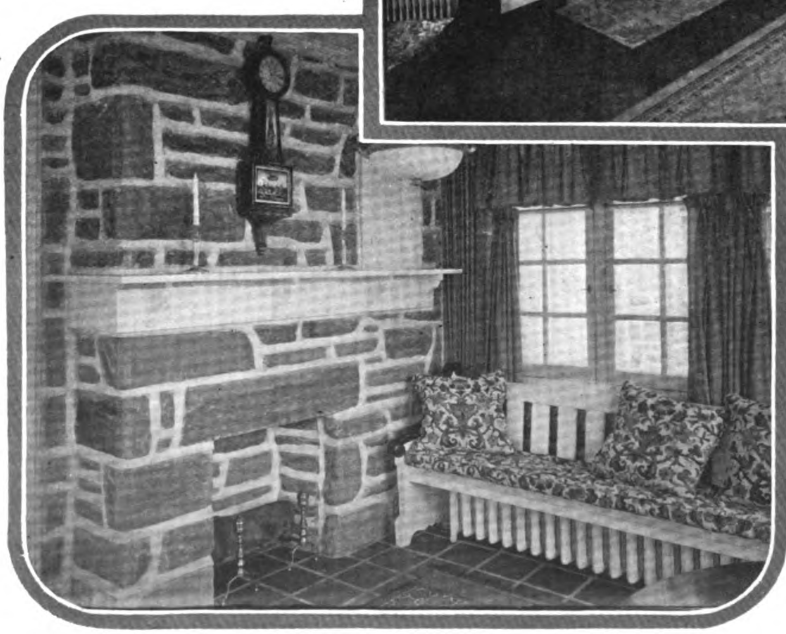


A china closet that is individual in design. House of Hon. P. C. Knox, at Valley Forge, Pa. E. Okie, Architect



Note the bookcases placed effectively on each side of this well-proportioned fireplace. House of Hon. P. C. Knox, at Valley Forge, Pa. E. Okie, Architect

A well proportioned stairway in the house of H. N. Flannagan, at Englewood, N. J. Davis, McGrath & Kissling, Architects



A dainty breakfast room that breathes forth cheerfulness. House of R. A. Scott, at Germantown, Pa. E. Okie, Architect

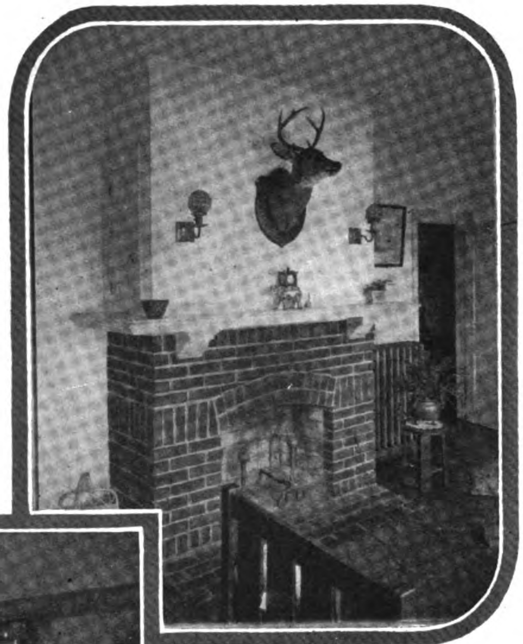
# That Are Well
# Small Home

*with a Main Feature to Which*

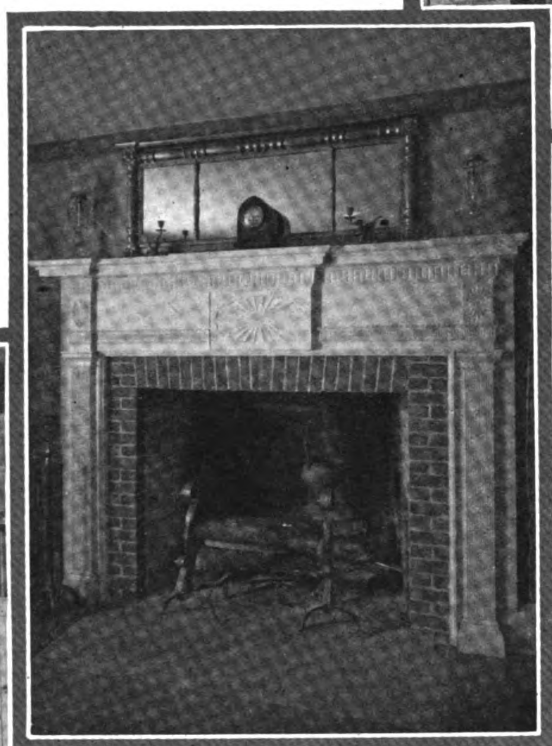
*Instinctively Attracted*

*Features Are*

*This Page*

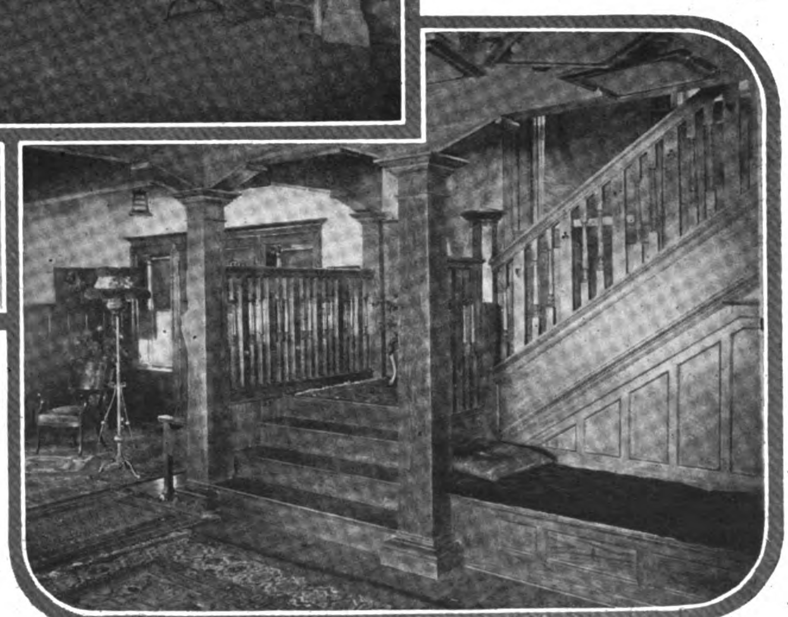


A brick fireplace which goes well with a small room. Note the small closet at the left side of the chimney breast. H. R. Stackhouse, Architect



A Colonial type of fireplace well suited to a formal room. C. E. Schermerhorn, Architect

A simple Colonial stairway that is very effective. W. H. Thomas, Architect



Unusual stairway in the home of J. A. Jocum at Bryn Mawr, Pa. C. E. Schermerhorn, Architect

# Legal Department

### Are Mechanic's Liens Allowed Before Lien of Money Lender?

In every State, in every month, numerous mechanic's lien cases come before the courts.

In the New York Supreme Court just recently in a case of this character it was decided that a contract for the lending of funds to enable a construction company to erect several buildings should be construed as a building loan contract and not as a mere agreement to make an agreement for a building loan, and that therefore, the liens of laborers and materialmen came before the lien of the lender of the money, when the contract was not recorded.

Suit was instituted to determine the superiority of several lines on buildings which had been erected. It appeared that on Oct. 13, 1915, a mortgage company had entered into an agreement with the construction company that the former was to convey property worth $126,000 to the latter, and that the latter was to erect about ten buildings on it. The construction company afterward entered into an agreement with another company to take over the work and the mortgage company consented to this transfer. The original agreement was never recorded, so the court held that the notices of lien filed by laborers and by materialmen all came prior to it.

---

### Is Contractor or Sub-contractor Liable for Injuries of Workmen?

The question of whether a general contractor or a sub-contractor is liable for injuries sustained by an employee of the latter is a question which is constantly coming up to the perplexity and bewilderment of both parties. Naturally enough the general contractor always thinks and contends that the sub-contractor is the responsible party, while the sub-contractor thinks the damages ought to be borne by the general contractor.

In a recent case in New York, where a workman plasterer was employed by a master plasterer, who had a sub-contract from the general contractor, was injured, the court decided that the general contractor was not responsible for the workman's injuries, and need not pay damages to him when it appeared that the only thing the general contractor did was to exercise a general supervision to see if the work of the sub-contractor was in accordance with his contract.

Suit was started by the workman plasterer for his injuries which were sustained while he and another employee were hanging a ceiling which fell, injuring both of them.

The court dismissed the employee's complaint against the general contractor, as he was unable to show that the latter had taken any part in the work other than to see that it was being properly done.

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### Are Penalties Part of the Completed Cost?

**From C. J., Newfoundland.**—Where a building contractor is, by agreement with the owners, under a penalty of a certain amount per day after the term of his contract has expired is the amount recovered by the enforcing of the penalty to be considered as part of the cost of the building? And can the architect claim the same percentage of the amount recovered as he was paid of the contract price and extra work?

The architect, who was also superintendent, had to look after the building until the completion of the work, and was to be paid a certain percentage on the actual cost of the building.

**Answer.**—In answering your question, I must ask another question. What does your contract provide? Any attorney can draw up a contract providing that the architect should recover part of the penalty for the extra time he put in on account of the work being delayed. Any attorney could also draw up a contract under which the architect would have no right to any part of the penalty. What your contract provides, of course, I do not know.

As a general proposition "actual cost" does not include a penalty, provided for in the contract. Actual cost is the cost to the owner. It is the sum the owner has to pay, and not the sum the contractor has to pay, on which the architect's fees are based.

In a recent interesting case, somewhat along this line, decided some time ago, an architect agreed to furnish a city with plans for a viaduct and supervise the construction for "5 per cent of the total cost of construction." After the viaduct was completed and accepted, and the contractors were paid a certain sum, the architect rendered the city a bill for 5 per cent of the sum, was paid the same and receipted the bill in full.

Thereafter the contractors recovered judgment against the city for the amount they had had to pay for building materials for such viaduct in excess of what they would have had to pay had the city allowed them to commence and prosecute the work as provided in their contract.

It was decided by the court that the amount of such judgment was not part of the cost of construction on which the architect was entitled to a commission. —Boller vs. City of New York, 102, N. Y. S. 729.

**From C. J. M.**—In answer to your question, "What does your contract provide?" would say that there is no written agreement between the architect and owners, as such an agreement was not considered necessary, as the architect's terms were generally known to be a certain percentage on the actual cost of the building to the owner. Now, the contract price is not always the cost of the finished work. There is pretty nearly always a certain amount of work to be done that was not included in the contract, and sometimes the agreement between contractor and owner gives the owner the

**Put your legal problems up to our legal advisor, George F. Kaiser, LL.B. He will answer direct by mail, the service being free to subscribers. Such of the questions and answers as are of general interest to the trade will be published in this department. No names will be published, only initials or a chosen nom de plume.**

**Inquiries must be accompanied by the name and address of the correspondent. Questions must be pertinent to some branch of the building trades.**

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power to leave out part of the work contracted for, or change it for work less costly, thus lowering the amount of the contract price and the cost of the building being thus lowered, the architect has to be satisfied with less than he calculated on. In the other case, he has more than he at first expected, as the cost of the building is raised above the contract price by extra work.

Now, if the contractor who is under a penalty presents a bill for extra work outside of his contract actually done on the building sufficient to cover the amount of the penalty he is under for loss of time to the owner, would not the amount of that bill be part of the cost of the building upon which the architect's fees were based? Would he not be entitled to his percentage on the amount of that bill, and would he not have an equal claim on the amount of the penalty where there was no bill for extra work?

When the building operations exceed the time limit agreed upon in the contract the architect loses a certain amount of valuable time as well as the owner. The owner is secured by a penalty clause in his agreement with the contractor. Is there no way in the absence of an agreement by which the architect can recover for his lost time?

Answer — You say in your letter. "An agreement was not considered necessary as the architect's terms were generally known to be a certain percentage on the actual cost of the building to the owner."

I know of no way by which the architect could claim a percentage of a penalty imposed upon the contractor for not having the work completed in time, even though there may be added remuneration where there is extra work, etc., as in the latter case there is an increased "actual cost of the building to the owner."

# Country House Details

*Framing Cornices and Gutters in the Best and Cheapest Way*

By A. BENTON GREENBERG, *Architect*

The two types of cornices used in building construction are the open cornice, in which the rafter ends are exposed, and the box cornice, in which the supporting timbers of the roof are concealed. The open cornice, although costing less to construct than the box cornice, does not make so warm a house as the latter. However, it provides better ventilation than the box type, dries out more quickly and needs repair less frequently.

In general, after the skeleton of the roof (rafters, lookouts, etc.) is erected, the entire surface is covered with sheathing boards, and the roofing material (shingles, tin, copper or tile) is applied. For the present we shall concern ourselves only with shingles as a roof covering.

Shingles may be laid on sheathing boards or on shingle laths, sometimes called "battens." The laths are preferable because they provide better ventilation and prevent the shingles and the roof timbers from rotting. Shingle laths are 1¼ in. thick and 2 in. or 3 in. wide. They are set at right angles to the rafters, from 4 in. to 8 in. on centers, depending upon the "gage" of the shingles, that is, the exposure to the weather.

Sheathing boards for roofs are from 6 in. to 10 in. wide. The wider the board the more apt is it to warp and curl up at the edges. Matched boards are best as a roof covering, although surfaced boards also give a satisfactory job. When sheathing boards are used one or two plies of tarred or other waterproofing paper should be laid over them before the shingles are applied. This will insure a watertight construction.

The first or lowest course of shingles should overlap the gutter about 1½ in., and should always be laid double, with broken joints. Each shingle should be fastened with two nails, which should be galvanized to prevent rust. The usual exposure of roof shingles is from 4 to 5 in.

Each course of shingles should be painted as it is laid. The general practice of painting the roof after all the shingles are nailed in position is to be condemned because by this method little lumps of paint are formed, which retain the rain water and cause the unprotected portions of the shingles to decay.

A gutter is a contrivance whereby the water on a roof is collected and carried down, by means of conductors or leaders, to the street. It is made wholly of metal (copper, tin or galvanized iron) or of wood covered with any of these metals. All gutters must have a uniform fall to the outlet of about 1 in. in every 20 ft. to properly discharge its function as a drain.

The standing gutter, Fig. 1, and the hanging gutter, Fig. 3, are very common forms. The standing gutter, as its name implies, consists of strips of wood, about 1½ in. x 4 in., set on edge and nailed to the roof directly over the shingles. Sawed brackets, set about 3 ft. apart, help to support the gutter. The upright board which forms the side of the gutter should be placed either on the second or third course of shingles. The entire gutter is then lined with tin, which should start and be tacked to the upper edge of the standing board and carried over the semi-circular strip and under the shingles about 5 in. The pitch to the outlet may be obtained in either one of two ways: If the gutter is made of one piece, the end nearest the outlet is dropped. Or, if made up of more than one length, the gutter may be kept horizontal and small wedge-shaped pieces of wood, reducing gradually in thickness as the down-spout is reached, may be inserted at the bottom before the tin is nailed down.

The main objections to the use of the standing gutter are (1) that it breaks up the continuity of the roof plane, and (2) that it retains snow and so clogs up quickly.

Galvanized-iron hanging gutters are extensively used because of their cheapness and the facility with which they can be erected. They are suspended from the edge of the roof by adjustable hangers or iron straps about 1¼ in. x ⅜ in., placed at intervals of 6 ft. Hanging gutters are used only on cheap work, for, as ordinarily set up, they are pitched toward the outlet, and in that way mar the design of the cornice. Their appearance, however, could be greatly improved and their construction made more rigid if they are placed inside of another metal trough. The outside trough is set parallel to the eaves of the roof and is so molded as to make it appear as part of the cornice design. The inner trough is then given its required pitch, the fall being concealed by the outer trough. See Fig. 3.

Wood gutters are worked out of solid cypress and are usually semi-circular in section, as shown in Fig. 2. The pitch is obtained by deepening the channel as it approaches the outlet. The gutters should be in as long lengths as possible. Where joints occur, these should be covered with sheet metal. The most common sizes for wood gutters are 4 x 6, 5 x 7 and 5 x 8 in.

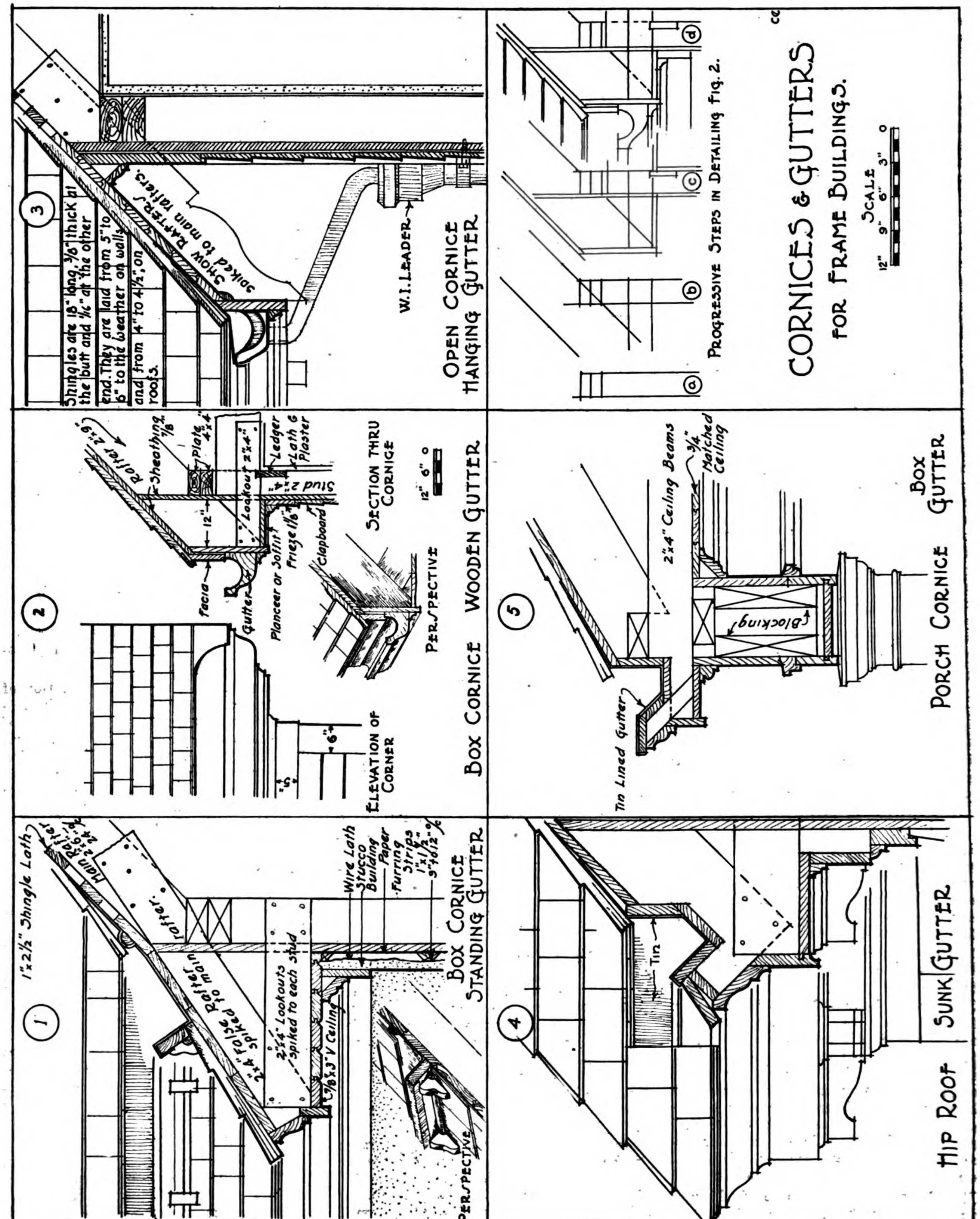
Sunk gutters, Fig. 4, are formed by cutting a groove near the ends of the rafters, covering it with ⅞ in. surfaced boards and lining it with sheet metal. They are durable, serviceable and pleasing in appearance.

A box gutter, Fig. 5, is a variation of the sunk gutter. It differs from the latter in that it is built up with a series of lookouts and other supporting timbers. The sunk gutter is merely a depression in the roof, while the box gutter forms the eaves of the roof and is an integral part of the cornice of the building. The fall in a box gutter is obtained either by reducing the width of the lookouts toward the outlet or by keeping the lookouts of equal width and nailing small strips, of gradually decreasing thickness, to the upper edge of the lookouts. The metal lining should be nailed to the crown molding and should run up underneath the shingles about 8 or 10 in.

It is poor construction to have the sides of the gutter in either Figs. 4 or 5 parallel to each other. For, if the ice that settles in the gutter should expand, it would probably burst the sides and injure the lining.

With very little modification any of the cornices and gutters described above for frame buildings may be used equally well for brick or other masonry structures.

To develop the drawing of a cornice, and for that matter any other building detail, think of the different stages of its actual construction and proceed along the same lines. The stud, therefore, is drawn first. Then the plate is shown. The rafter is indicated next, giving it the required pitch and projection. The ribbon, floor joist and lookouts are then represented in the order mentioned. The skeleton of the cornice now being completed, we are ready to put on the finish. The sheathing on the studs and the boarding on the roof are now drawn. This is followed by the gutter, bed mold and facia. Finally shingles on the wall and roof are shown, and plaster line indicated.




# How to Build and Fireproof with Hollow Tile—XI

## *Best Types of Flat Arches to Use, and How to Construct Them—Kind of Reinforcement Needed*

By J. J. COSGROVE

To the casual observer, hollow-tile arches seem lacking in strength on account of the cellular structure of the blocks. It is generally a surprise even to experienced builders who have done but little fireproofing work to know what they will stand.

The following table will give an idea of what can be expected of flat arches of short spans built of blocks of different depths. The weights of the arches have not been deducted from the safe loads in this table, therefore the weight of the arch must be deducted to obtain the net safe live load for any arch and span.

The depth of the arch must be proportioned to the span between beams, and to a certain extent to the load to be carried. The spans given and the loads the arches will carry, as listed in the table, will be found perfectly safe, as they possess a factor of seven.

A couple of facts about the strength of arches it will be well to keep in mind when designing hollow-tile floors are the effect on the strength of an arch of the depth and span. For instance, doubling the length of span, the depth and weight of block remaining unchanged, will reduce its strength, not one-half, but to one-quarter of that of the shorter span. Conversely, reducing the length of span by one-half multiplies the safe load it will sustain, not by two, but by four.

Increasing the depth of an arch strengthens it in even greater proportion. For instance, adding one inch in depth to a 6-in. arch will increase its weight-bearing capacity on an average about 150 lb. per sq. ft.; while doubling the depth of an arch multiplies its strength by more than three.

When a cinder fill is laid above a flat arch, the weight of cinders and fill must be deducted from the safe bearing strength of the arch. In order to find what the permissible live load should be the way to figure the safe load of an arch can be found by studying the following example:

*Example:* What load will an 8-in. arch carry with a factor of safety of 5, in a span of 5 ft. 6 in., the arch having a weight of 36 lb. per sq. ft.

*Solution:* In the table an 8-in. arch has a strength of 228 lb. for a weight of 32 lb. Therefore, $32:36 = 228:256$, and $256 \times 7 + 5 = 358$ lb. total load. $358 - 36$ lb. dead load $= 322$ lb. live load, which must be further reduced by the weight of fill over the arch, finished flooring and plastering to get the new safe live load.

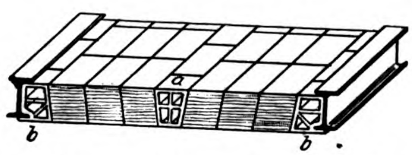



**Fig. 82—a and b are the places where greatest pressure occurs in an arch. The tile at these places should be well strengthened by reinforcing webs**

For practical building construction it will be well to bear in mind that the deeper the tile, within reasonable limits, the stronger the arch will be, and for the same depth of beam the lighter and cheaper will be the floor construction. For instance, a 12-in. hollow-tile arch will weigh less per square foot than a 10-in. hollow tile arch with 2 in. of concrete fill, and the 12-in. arch will cost less than the 10-in. arch and 2-in. cinder fill.

The depth of arch required for any span, whether for side construction, end construction or combination side and end construction, can easily be found by means of the following simple rule:

**Fig. 84—Type of wire truss reinforcement used in building hollow tile arches. The wire is shipped in rolls, and cut as used**

*Rule:* To find the depth required for a hollow-tile flat arch of short span, multiply the width of the span in feet by 1¼ and add the projection of the tile in inches below the ceiling beams.

TABLE OF SAFE LOADS—(DEAD AND LIVE)
Factor of Safety of 7

| Arches | 6 In. | 7 In. | 8 In. | 9 In. | 10 In. | 12 In. | 15 In. |
|---|---|---|---|---|---|---|---|
| Average Weight per Sq. Ft. | 26 | 29 | 32 | 35 | 38 | 42 | 50 |
| Spans, Ft. and In. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. |
| 3–0 | 482 | 617 | 767 | 933 | 1114 | 1524 | 2255 |
| 3–3 | 410 | 525 | 654 | 795 | 950 | 1299 | 1922 |
| 3–6 | 354 | 453 | 563 | 685 | 819 | 1120 | 1657 |
| 3–9 | 308 | 394 | 491 | 597 | 713 | 975 | 1443 |
| 4–0 | 271 | 347 | 431 | 525 | 627 | 857 | 1268 |
| 4–3 | 240 | 307 | 382 | 465 | 555 | 759 | 1124 |
| 4–6 | 214 | 274 | 341 | 414 | 495 | 677 | 1002 |
| 4–9 | 192 | 246 | 306 | 372 | 444 | 608 | 900 |
| 5–0 | 173 | 222 | 276 | 336 | 401 | 548 | 812 |
| 5–3 | .... | 201 | 250 | 304 | 364 | 497 | 736 |
| 5–6 | .... | 183 | 228 | 277 | 331 | 453 | 671 |
| 5–9 | .... | 168 | 208 | 254 | 303 | 415 | 614 |
| 6–0 | .... | .... | 191 | 233 | 278 | 381 | 563 |
| 6–3 | .... | .... | 176 | 215 | 256 | 351 | 519 |
| 6–6 | .... | .... | 163 | 198 | 237 | 324 | 480 |
| 6–9 | .... | .... | .... | 184 | 220 | 301 | 445 |
| 7–0 | .... | .... | .... | 171 | 204 | 280 | 414 |
| 7–6 | .... | .... | .... | .... | 178 | 243 | 360 |
| 8–0 | .... | .... | .... | .... | .... | 214 | 317 |
| 8–6 | .... | .... | .... | .... | .... | 190 | 281 |
| 9–0 | .... | .... | .... | .... | .... | 169 | 250 |
| 9–6 | .... | .... | .... | .... | .... | .... | 225 |
| 10–0 | .... | .... | .... | .... | .... | .... | 203 |

*Example:* Find the depth of hollow-tile arch required for an 8-ft. span when the skewbacks project 2 in. below the I-beams.

*Solution:* — $8 \times 1\frac{1}{4} = 10 + 2 = 12$ in. Answer.

The tops of the key blocks, *a*, and that portion of the skewbacks, *b*, which rests

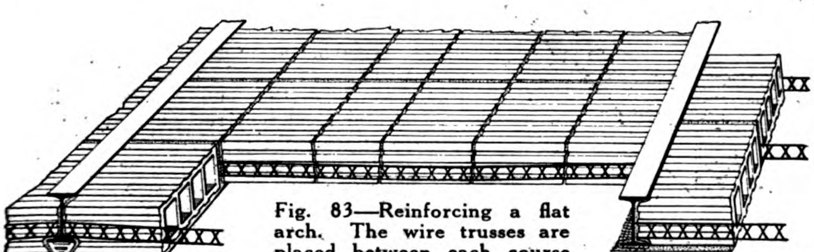


**Fig. 83—Reinforcing a flat arch. The wire trusses are placed between each course**

against the lower flange of the I-beams, as indicated in Fig. 82, are the two points of a flat arch which are subject to the greatest pressure. It is advisable in practice, therefore, to see that the hollow-tile blocks are well reinforced at these points by means of reinforcing webs or special construction of the shell, otherwise the arches are liable to fail under extra heavy loads.

Reinforcement by means of steel rods and wire trusses has become so common in building practice within recent years that it is not surprising to find it resorted to in the building of hollow-tile arches.

In Fig. 83 is shown a reinforced flat arch of short span. The arch in this case is of the end construction type, and the reinforcement consists of special wire trusses placed between the rows of blocks. The wire trusses are protected both from fire and rust by bedding them in cement mortar.

This type of arch is intended for use where a light, cheap, but strong, fireproof floor construction, with a flat ceiling, is required. It is particularly suitable for wide spans in shallow beams. Six-inch arches for 6-ft. spans, and 8-in. arches for 7 ft. 6-in. spans, may safely be accepted for live loads of 150 lb. per sq. ft.

The wire truss reinforcement used with this type of floor construction is shown in Fig. 84. It is shipped to the building in reels, and is cut to the proper length on the job as required, so there is no delay in getting the proper lengths. The open work construction of the steel wire truss enables the mortar to flow freely all about it; the joint can be thoroughly filled between the tile, and the wire is perfectly embedded in Portland cement mortar, the best rust preventive available in building practice.

In Fig. 85 is shown one form of construction to use where light floors with deep beams are necessary. A paneled effect with beamed ceiling is thus secured. It will be noticed that the arch is carried on a couple of rows of special skews which rest on the lower flange of the I-beams. The thrust of the arch in that case is against the web of the I-beams, while the weight of the arch rests on the skewbacks, which in turn are carried on the lower flanges of the beams.

Specially constructed and extra strong skewbacks, Fig. 86, are used for this form of construction, and a reinforcing web, *a*, carries the load well over on the flange of the I-beam toward the web. The entire lower portion of the skewback could be broken away and owing to this web the strength of the arch would not be weakened materially, although exposure of the lower flange of the I-beam would jeopardize this portion of the floor in case of fire.

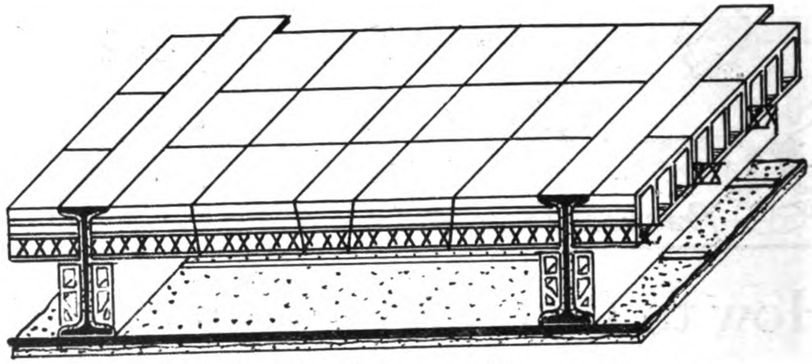


Fig. 86—Skewbacks used to fireproof the I beams in the arch shown in Fig. 85

When a flat ceiling is desired in connection with this type of construction, it can be had by means of a hanging metal lath and plaster ceiling, as shown in Fig. 87. The hanging of a wire lath ceiling is an art in itself worthy of an entire story, but as it is not part of the subject under consideration will not be treated here.

A 6-in. flat arch reinforced with wire truss weighs only 26 lb. per sq. ft. An 8-in. arch of like construction weighs only 32 lb. per sq. ft. Such extremely light floors make it possible to effect large savings in the steel skeletons of buildings, and at the same time carry loads far in excess of what would be imposed in apartment houses, hotels, office buildings and loft buildings for light manufacturing purposes. Load tests made to determine the ultimate strength of a 6-ft. span showed that the weight under which it failed was 1600 lb. per sq. ft. This gives a safe live load of over 250 lb. per sq. ft. with a factor of safety of six. It will be remembered, however, that the safe live load an arch will support includes the weight of the arch itself, the fill and flooring above. In this case the arch tile weighs 26 lb. per sq. ft. On top of arch tile is generally placed a few inches in depth of cinder concrete, and on top of the concrete a wood or cement floor. It is safe to figure, therefore, that the weight of the floor and arch construction is 50 lb. per sq. ft., and this amount must be deducted from the safe live load the arch is designed to carry. In the case of a 6-in. arch this would be 250 lb. less 50 lb., or 200 lb. net safe live weight the construction will carry.

Comparison sometimes serves to show the relation between parts and the strength of different structures used for the same purpose. It shall now be used to show the saving in space, weight and money effected by reinforcing an arch. For an ordinary arch, a span of 6 ft. requires a depth of 8 or 9 in.; while if the arch is reinforced, the depth for a 6-ft. span need be only 6 in. The weight of 6-in. tile is 26 lb. per sq. ft. The weight of 9-in. tile is 35 lb. per sq. ft. The difference in weight between the two constructions is 9 lb. per sq. ft.

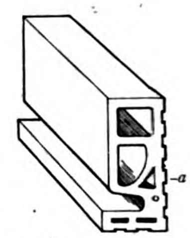



Fig. 87—A hanging ceiling used in connection with the arch shown in Fig. 85. Rods or channels are carried across the arch, spaced according to span and kind of lath used for plastering. Metal lath is fastened to these cross bars by wires or special clips

Let us assume a building 100 ft. square and ten stories high. The difference in weight would then be 900,000 lb., or 450 short tons, which would be equal to 45 tons on each floor of the building.

Height is another element in building which must be considered, for the higher the walls and floors go the more expensive it is to build them. A 6-in. tile arch saves three inches at each floor over a 9-in. tile arch; and in a building ten stories high the difference would be 30 inches.

A saving of 30 inches of wall and partition; a saving of 45 tons of tile to each floor, and the saving effected in the lighter steel construction required ought to appeal to every practical builder and show the advantage to be gained by studying intimately the strong and weak points of every type of hollow-tile construction on the market.

*(To be continued)*

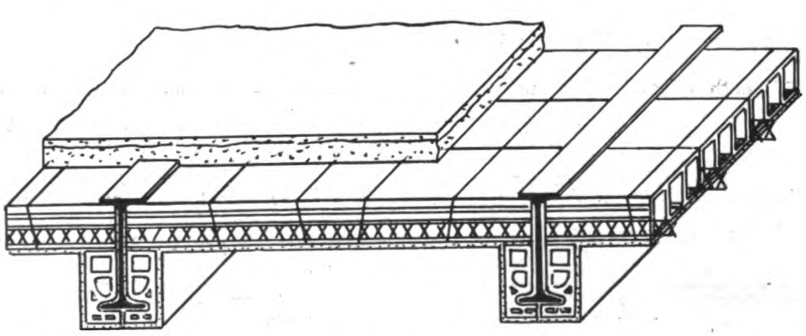
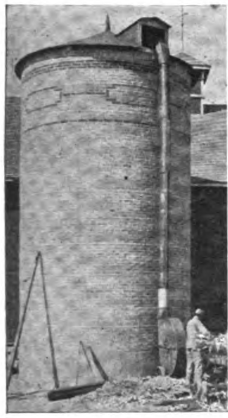
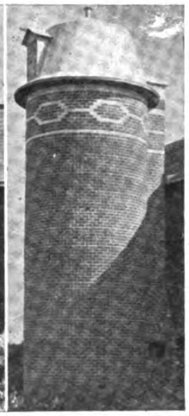


Fig. 85—When light floors with deep beams are necessary, this type of construction is good



A brick silo being filled. The feed door is continuous, being made air tight by metal strips



These silos are 4 in. thick, being reinforced by 3 in. steel bands embedded every 24" in height

# Building Brick Silos That Won't Crack

The two brick silos illustrated are of a type of construction a bit different from that in general use. The main feature is a 4-in. brick wall reinforced by steel bands, with inside plastered.

Strength is secured by the steel bands, which are 3 in. wide and embedded in the wall every 24 in. in height. The thickness of the bands varies according to the size and requirements of the silo. The bands are corrugated and groved, thus providing for expansion and contraction. Being laid flat, they form a sort of washer, taking the stress upon their edges, this minimizing danger from cracking of the wall. As the bands are embedded in the joints of the silo danger of rust is reduced to a minimum.

The footing is of concrete 6 in. thick and 18 in. in width. The first course of brick is laid as a header course, being embedded in the concrete footing.

The door is continuous, air being excluded by means of a galvanized metal strip.

Materials needed for a 14 x 40-ft. silo (a popular size) are as follows:

| | |
|---|---|
| Brick, 11,000 | Cement, 8 bbl. |
| Lime, 10 bbl. | Two masons, 8 days |
| Gravel, 2 cu. yd. | Sand, 8 cu. yd. |

18 steel Christensen reinforcement bands
36 ft. of doors and door equipment.

Paving brick, especially that which will not stand the test for paving purposes, can be used. Any ordinary brick, such as that commonly used in factories, etc., will give good results.

In order to insure a tight silo, the bricks are plastered on the inside. If the plastering is done correctly, there is little danger of its peeling or chipping.

This type of silo can be built with a double wall having zig-zag connecting flues, which carry the stable ventilation around the silo walls to the top, thus tending to keep a constant stream of warm air flowing up through the silo walls and eliminating freezing. A small fireplace is also made, connecting with the flue, so that a fire can be built during very cold spells so as to avoid freezing of the silage.

The silos described are of a type patented by the J. P. Christensen Silo Co., Racine, Wis., which manufactures the steel bands and miscellaneous equipment. Of the two silos illustrated, one cost $400 complete and the other $460, being erected in 1916.

The following table gives interesting data on silo capacities and construction of this type of brick silos:

**Table Estimating Silo Capacity, Material, Etc.**

| Size | Tonnage | Brick Single Wall | Bands Required |
|---|---|---|---|
| 12 x 30 | 75 | 7,260 | 14 |
| 12 x 35 | 100 | 8,470 | 16 |
| 12 x 40 | 130 | 9,680 | 18 |
| 14 x 30 | 100 | 8,490 | 14 |
| 14 x 35 | 125 | 9,915 | 16 |
| 14 x 40 | 170 | 11,320 | 18 |
| 14 x 45 | 200 | 12,745 | 21 |
| 16 x 30 | 120 | 9,690 | 14 |
| 16 x 35 | 145 | 11,305 | 16 |
| 16 x 40 | 190 | 12,920 | 18 |
| 16 x 45 | 230 | 14,535 | 21 |
| 18 x 30 | 150 | 10,860 | 14 |
| 18 x 35 | 185 | 12,170 | 16 |
| 18 x 40 | 230 | 14,480 | 18 |
| 18 x 45 | 285 | 15,790 | 21 |

# Making Old Houses Desirable by Overcoating with Stucco

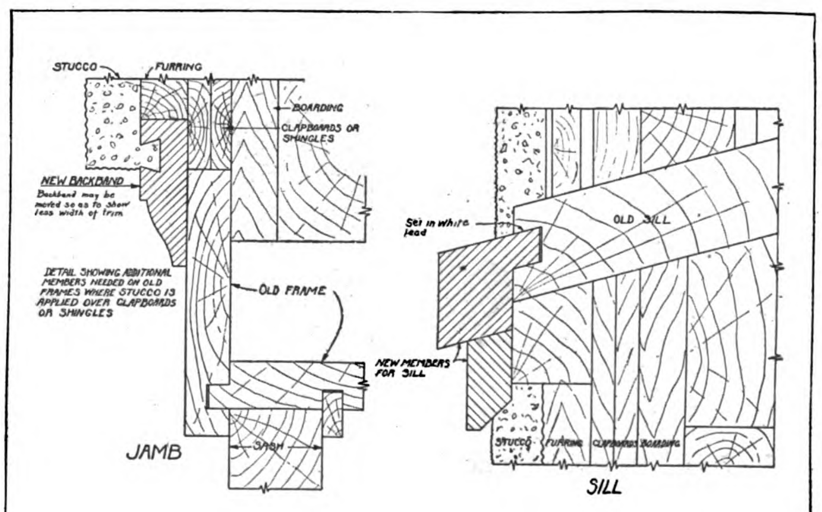
The man who can take a sound but perhaps unsightly old building erected a score or more of years ago, and by deftly altering interior and exterior transform it into a pleasing modern dwelling, adapted to present-day requirements, is accomplishing a praiseworthy work.

That in handling work of this character devious problems must be met and solved is not gainsaid. Hence interest attaches to the following suggestions of a well known Boston architect for stucco overcoating over weather boards and shingles.

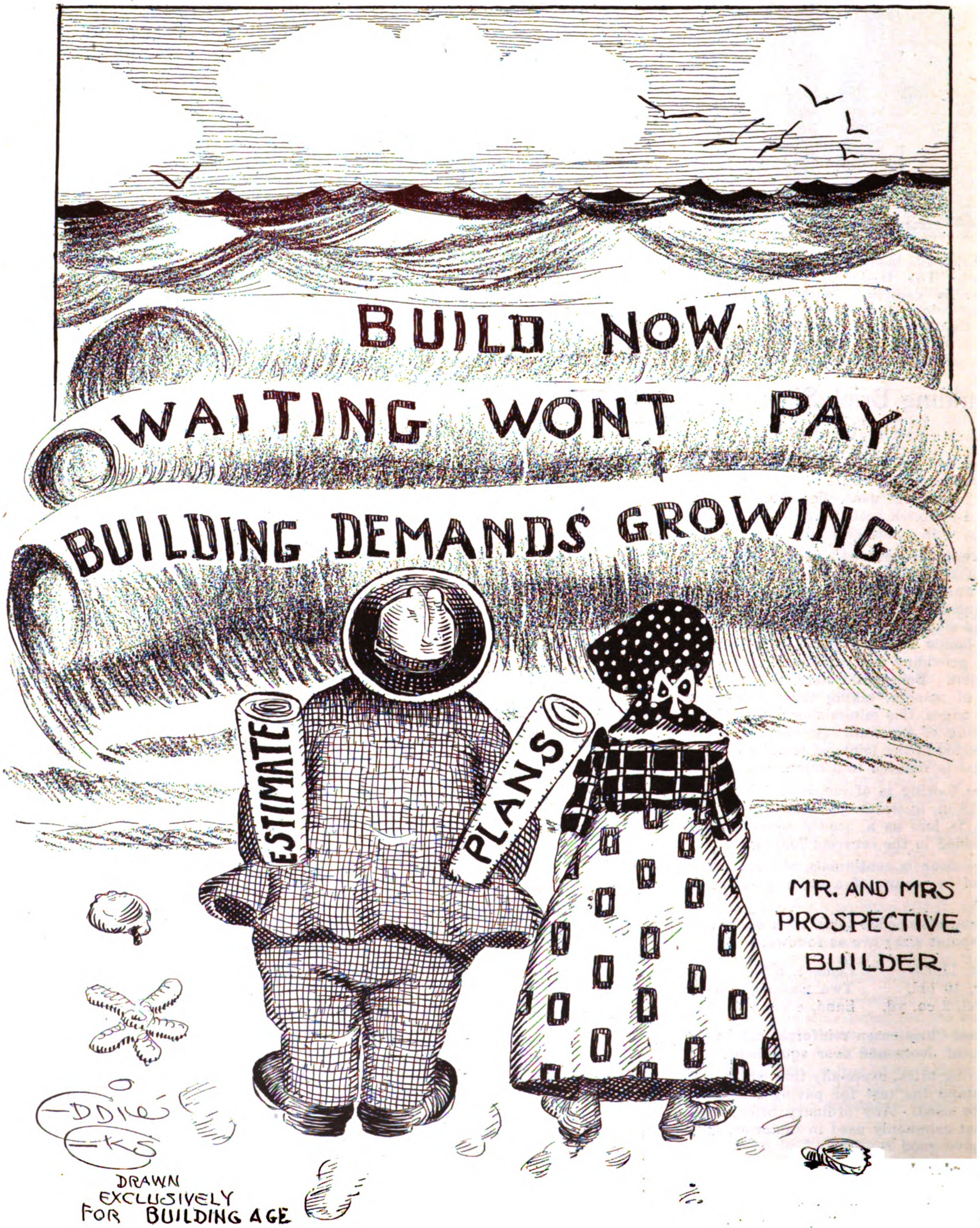
The problem was the remodeling of an old frame building about 40 years old and of what is known as the Queen Anne style—the pet abomination of the modern architect.

The walls were part clap-boarded and part shingled and the ornamentation of the jig saw type with fancy turned piazza columns. Nothing daunted, Mr. Thayer's first step was the removal of all the "excrescences"—the jig saw ornaments, fancy posts, etc. Contrary to the usual method of procedure, the shingles and weather boards were left on for the additional warmth and protection they insured. The walls were next furred, and the metal lath and stucco applied the usual way.

The point then to be considered was the treatment of window sills and door frames. How satisfactorily this was handled is shown in the accompanying sketch. By reference to this diagram it will be noted that the stucco formed a reveal. This was easily accomplished by nailing a ground to the back board and bringing the stucco up flush with it. When the stucco was sufficiently set the ground was removed and a straight and true reveal was made, which added considerably to the appearance of the building by giving the effect of extra thickness and stability to the walls. This method of treatment presents interesting possibilities to those of our readers who have hitherto deemed it necessary to remove shingles and weatherboards before overcoating.—*Expanded Metal Construction.*




Practical method of treating window frames in overcoating old houses when siding or shingles are not removed


BUILD NOW
WAITING WONT PAY
BUILDING DEMANDS GROWING
ESTIMATE
PLANS
MR. AND MRS
PROSPECTIVE
BUILDER
DRAWN
EXCLUSIVELY
FOR BUILDING AGE

# What Is Holding Back Building Now?

## *State of Mind Throughout the Country—Factors That Will Bring Increased Activity*

Uncertainty is the only word that describes the situation in both the lumber trade and the building field. Both are united in solving a mutual problem—spurring building activity.

The lumber trade and the building fraternity are to each other as the head of an arrow is to its shaft. That is, one is complimentary to the other; one dependent upon the other. What affects one is sure to have its effect upon the other. In short, the lumber dealer is just as vitally interested in spurring building operations as the builder and contractor. The condition of the building market has its effect on the lumber market just as much as conditions in the lumber trade have on building. Both are working in one cause, that of spurring building activity for the builder's benefit, the lumberman's welfare, and the prosperity of the entire nation.

### Watchful Waiting Hinders Building

At present the lumber and material market is quiet and lumber dealers are assuming a "watchful waiting" policy, "keeping their ears to the ground." With the advent of spring the lumber dealer confidently expects that the prospective builders will realize that prices are not going to appreciably decrease and that he might just as well build now. Prices are holding up well, not because of demand, but because the manufacturer and wholesaler with high-priced stocks on hand are reluctant to dispose of them at a loss. As to future prices, when the high-priced stocks on hand are disposed of, an idea of the future can be gained from the fact that many eminent building and material authorities insist that no marked decrease in material prices may be expected for the next five years. They assert with some positiveness that pre-war prices on building materials will not be reestablished for several years, if ever. These assert that persons who delay building in the hope of marked reduction in building costs probably will be disappointed and will have denied themselves the use of needed property and the revenues which would be derived therefrom.

### No Advance in Freight Rates?

In response to the Department of Labor's inquiry as to future rates on building and construction materials, the U. S. Railroad Administration asserts there is to be no general 30 per cent advance on freight rates for sand, gravel, crushed stone and slag. The rumor that such advances were contemplated was arousing anxiety in the Central West. Under date of Jan. 20 the railroad administration put out a circular which says "There is no foundation for the report that the Railroad Administration has given or is giving any consideration to any increase in present basis of rates."

Some idea of the building deficiency is shown by the statement that it will take approximately $500,000,000 expended in buildings in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and New York to make up the building deficiency incident to the war. This construction work must be in addition to the normal current requirements of 1919.

**Building, being a basic industry, will stimulate general business and is, therefore, very vital to continued financial prosperity. The national economic loss resulting from the idleness of thousands of men cannot be permitted and its injurious effects escaped. Present building costs are not so high that they equal in the aggregate the wealth that the country loses through the idleness following in the wake of building stagnation. Homes are needed, business quarters are needed, public works are needed! The United States is the wealthiest country in the world! The most reliable authorities in the country assert that unprecedented prosperity is ahead! Why longer delay the revival of building?—Department of Labor.**

What the building deficiency is all over the country is a question, but taking the figures of the six states mentioned as a basis, the building deficiency will run into the billions.

With this immense building deficiency, what then is holding back building and construction work? the builder and lumber dealer both ask.

More than five hundred opinions on this question have been received in the last two weeks by the Information and Education Service of the U. S. Department of Labor. Many building and lumber authorities blame Congress, others charge the financial interests of the country with responsibility. In the Central West freight rates are said to be exerting an injurious influence. In the main, high costs of materials are held to be the chief obstacle. These opinions are interesting and some of them are given herewith.

"Don't expect private capital to build merely for the sake of furnishing jobs for workmen," writes a well-known architect from Buffalo. "That is the obligation of the Government, be it local, state or national. Let public works be started at once for the benefit of the public. The cost will be high and the public will have to pay the price, but the public will reap the benefit in the reduction of unemployment and absorption of the products of many industries and the use of much work of which there is great need."

### Inability to Procure Loans

From Passaic, N. J., comes the following statement "I am greatly hindered in progress of this work by not being able to procure loans by way of mortgage, in large amounts, say, in the neighborhood of $150,000. The banking institutions and mortgage companies are making only small loans around here and even where there is ample security will not consider investing a large amount of money in one place."

Labor conditions and demands are held to be unfavorable to immediate building operations by many of the authorities writing to the Information and Education Service. An architect, writing from Lincoln, Neb., makes the following statement, typical of the complaints along this line:

"Construction work in these parts is now and has been impeded not a little, due to the unreasonable demands of labor not only for exorbitant wages, but more by the fact that certain very undesirable trade rules are being enforced by labor organizations, which run up enormously the cost of doing work."

Many of the contractors and builders in the Central West assert freight rates are the chief trouble. Typical of these arguments is the following from Greenville, Ohio:

### Complaint From Central West

"We have no complaint to make in the matter of securing credits, building materials and labor. It is true that wages are quite high and yet not prohibitive. The greatest detriment to our industry through the Central West is prohibitive freight rates on sand and gravel. It is not only threatening to destroy our industry, but at the same time it is impeding highway construction and other building projects which demand a high grade of these basic materials."

Lack of co-operation on the part of financial interests seems to be the outstanding obstacle in New York. One of the best authorities in the building industry in New York City sums up the situation there in this fashion:

"We have in the United States serious difficulty owing, principally, to the unwillingness of financial interests to cooperate in building projects with the material and labor market in its present condition. We are working on a total of nine industrial projects involving approximately 6000 workmen's homes, to be carried out by private interests in various important industrial centers, but in each case we are hampered by the building loan situation. The only definite work we expect to carry out without delay is located outside of the United States."

From St. Louis, Mo., a well-known architect writes: "I am firmly convinced that the one thing the building public wants to know is the cost of building today as compared to the next three to five years. If they could be assured that the cost will not drop within that time there would be a tendency to proceed with the needed work."—A. C. S.

# How Much Paint Is Needed?

## *Covering Capacity of Paints—How to Make an Accurate Estimate*

By A. ASHMAN KELLY

Many careful tests have been made to determine the covering capacity of paint, due consideration having been made for the fact that conditions and surfaces vary, so that a fair average has been secured. This will be found very useful in making estimates when arranging for the painting of structures.

Paint makers usually give to their prepared mixed paints a covering capacity of about 600 sq. ft., two coats, on a good surface. But this is claiming more than what may be termed the average capacity, for it requires a perfectly non-porous and smooth surface, such, for instance, as that presented by a good surface of old paint. Let us remember, in all estimates upon covering, that the thinner the paint the greater its covering power. And also, right here, let me add that it is not covering power alone, but spreading power that we now are considering. For instance, linseed oil alone will spread farther than when pigment has been added to it, and the more pigment it contains the less will be its spreading power. It is estimated that 1 gal. of raw linseed oil will cover or spread over 1200 sq. ft. of non-absorbent surface, while an ordinary good mixed paint will not cover over two-thirds that amount of surface. A black paint made from lampblack and raw linseed oil will come very near covering as well as will the oil alone. This is because lampblack is the bulkiest and finest ground of the pigments.

### Quantities of Paint Required

Taking 10 lb. of paint of average consistency we find this quantity will cover so many square feet, according to the condition of nature of surface and nature of paint or its fluidity. On wood 10 lb. of red lead paint will cover, first coat, 112 sq. ft.; second coat, 252 sq. ft. White lead paint, first coat, 221 sq. ft.; second coat, 324 sq. ft. Zinc white paint, first coat, 378 sq. ft.; second coat, 453 sq. ft. Iron oxide paint, first coat, 453 sq. ft.; second coat, 540 sq. ft.

On metal surfaces 10 lb. of paint will cover: Red lead paint, 447 sq. ft.; white lead paint, 678 sq. ft.; zinc white paint, 1134 sq. ft.; oxide of iron paint, 870 sq. ft.

Here is another interesting table: 100 lb. of red lead, mixed with 6 gal. of raw linseed oil, will cover 500 sq. yd.; 100 lb. of white lead and 6 gal. of raw linseed oil will cover 550 sq. yd.; 100 lb. of zinc white and 10 gal. of raw linseed oil will cover 800 sq. yd.; 100 lb. of yellow ochre and 27 gal. of raw linseed oil will cover 800 sq. yd.; 100 lb. of lampblack and 200 gal. of raw linseed oil will cover 800 sq. yd.

Then we have a table showing the covering or spreading capacity of 1 lb. of white lead, mixed with oil, with time required to apply it.

Priming coat: 1 lb. of white lead mixed with 6 oz. of oil, covers 40 sq. ft., and requires 20 min. to apply.

Second coat: 1 lb. of white lead mixed with 4 oz. of oil, covers 51 sq. ft. and requires 15 min. to apply.

Third coat: 1 lb. of white lead and 4 oz. of oil covers 66 sq. ft., and takes 15 min. to apply.

### Appropriate Covering Capacities

Such estimates are, of course, merely approximates, and serve simply as guides. Not only will the condition of the surfaces vary, but even white leads vary, some covering better than others, though all may be perfectly pure basic carbonate leads. And when coloring is added the colors or colored pigments will be found to vary, some being very short and not covering well; some spread well but do not cover well. Also it must be remembered that the mixing of a paint affects its covering capacity according to amount of liquid used or manner of mixing. Strained paints cover better than those not strained.

A coat of paint is an indefinite quantity. Coats of paint will be found to vary from 1-1000 of an inch to 1-5000 of an inch. These variations are not entirely due to amount of thinners or pigment, but may be due also to the manner in which the brushing on is done, whether rubbed out well or not. Also, the coating may vary from very thin to quite thick, due to want of uniform spreading.

The following table embraces various paints, varnishes, etc., and will be useful as a guide in estimating.

A gallon of mixed paint applied to a primed surface or to an old painted surface in good condition will cover 600 sq. ft.

A gallon of red lead paint applied to structural steel, or other metal work, will cover from 500 to 720 sq. ft.

A gallon of interior enamel paint will cover to the gallon 630 to 720 sq. ft.

A gallon of floor paint, on average floor surface, will cover 400 sq. ft.

A gallon of roofing paint on metal will cover 500 sq. ft.

A gallon of ochre priming paint will cover, on an average surface, 400 sq. ft.

A gallon of oil stain on an average will cover 800 sq. ft.

A gallon of liquid stain filler will cover about 500 sq. ft.

Hard oil over liquid filler, a gallon, will cover 600 sq. ft.

Hard oil over paste filler, a gallon, will cover 500 sq. ft.

A gallon of varnish stain will cover about 400 sq. ft.

Red flat brick paint, 5 lb., will cover 350 sq. ft.

Buff flat brick paint, 5 lb., will cover 300 sq. ft.

Asphaltum varnish, a gallon, will cover 350 sq. ft.

A gallon of heavy bodied varnish will cover 720 sq. ft.

An interior varnish of light body will cover about 850 sq. ft.

Bronze paint will cover to the gallon from 700 to 800 sq. ft.

The covering capacity of paint over wood and plaster is about equal, on the average. A gallon of suitable paint will cover about 500 sq. ft. of bare wood or plaster surface. The second coat will cover about 570 sq. ft., the paint in both cases being mixed with oil, with a very little turpentine added. The third coat may be put down at about 650 to 675 sq. ft. Interior paint applied over a coating of oil paint will cover at the rate of about 1 gal. to 750 sq. ft. Applied over a flat painted surface, it will cover less, about 75 sq. ft. or so.

There is a method for estimating the amount of paint required for painting bridges or other steel structures by the ton of metal used in the structure. The following data are given us by a large contracting firm. Taking a heavy railroad bridge for an example, it is estimated that the fortieth of a gallon of usual bridge paint will do two coats. Here is how they arrive at this conclusion: The first coat requires .24 of a gallon, and the second coat .16 of a gallon, making altogether .40 of a gallon to the ton. For light road bridges they figure that it takes .70 of a gallon for the two coats; that is, .40 for the first coat and .30 for the second coat. To paint a heavy railroad bridge three coats require about .50 of a gallon—that is, .24 for the first coat, .16 for the second coat, and .12 for the third coat. For light highway bridges they figure that it will take .80 of a gallon, as follows: .35 for the first coat, .25 for the second coat, and .20 for the third coat.

Thus it will be seen that for each ton of metal entering into the construction of the bridges a certain amount of paint will be required, as illustrated further in the following example.

Taking a light highway bridge weighing, say, 600 tons of metal, to be painted three coats, each ton calls for .80 of a gallon of paint, and 600 times .80 gal. equals 480 gal. for the three coats.

Light steel structural work will average about 250 sq. ft. to the ton of metal, and heavy structural work will run about 150 sq. ft. to the ton of metal. Corrugated steel (No. 20) has 2400 sq. ft. of surface to the net ton.

When estimating on ordinary painting of dwellings or similar structures you may allow from 5 to 6 gal. of raw linseed oil to 100 lb. of white lead in oil. One pint of the best turpentine drying japan will do for the paint made from these quantities of lead and oil. Most painters use two or three times this quantity, but without reason. Zinc white requires about 50 per cent more oil in the mixing than white lead does, and being a poor drier, zinc white will need at least twice as much japan driers to make it dry properly. Both white lead and linseed oil are good self-driers, yet need some japan to hasten the drying.

Taking a mix of 100 lb. white lead and linseed oil, we find that a quantity of paint is produced amounting to the liquids added, and the white lead, whose quantity is about 2.8 of a gallon. The white lead in oil will run about 650 cu. in. to the 100 lb., or 2.8 gal. as stated. If to this you add 5 gal. of oil, with a pint of japan, it is easy to figure how many gallons of mixed paint you have.

# THE EDITOR'S PAGE

## What a Live Town Is Doing to Boom Building

There are a few progressive communities which are not waiting for conditions to pick up. Instead, they are so imbued with the spirit of get-aheadiveness that they are making every effort to stimulate local building now. And they are succeeding!

Live movements need only a leader to overcome the natural inertia that binds the populace. Given such a leader, one who will bend every effort to stimulate activity, and business will boom beyond the wildest expectations. Why not start a small circle of the most wide-awake spirits in your own locality and see what you can do to bring more money into the pockets of you all?

There are few localities which are not behind in their building program. The work is there. It is waiting for you to develop it by convincing people that it is advisable to build now. You *can* stimulate building in your town if you approach the problem with intelligence and energy.

This problem has been successfully solved in Huntington, Ind. How successfully is revealed by the fact that in this town of 20,000 inhabitants there were more new houses built, according to population, than in any other city in the State of Indiana.

The way in which this remarkable result was accomplished is explained in the following letter, which was written me by J. M. Triggs, president of the Majestic Company:

"I have been reading with a great deal of interest your articles published in behalf of encouraging building conditions at this particular time, and it prompts me to write you and give you a little information in regard to our own local situation, which I am sure will be interesting to you.

"One year ago several of our progressive builders and supply dealers and lumbermen thought of a novel idea and a very good one to help to increase the interest in the building situation in our own locality. We organized what we called the Huntington Community Development Club. The organization was made up of the lumber dealers, building supply dealers, hardware merchants, plumbers, electrical contractors, sheet metal contractors, furnace dealers, furniture dealers; in fact, any class of people in our community who were interested in the sale of material entering into the building of a modern home.

"We elected a president, secretary and treasurer, and an advertising committee. Our plan was for each member to subscribe a small amount toward a fund to be used for educating our people to the fact that they should build homes NOW. We used a full-page space in our two daily papers, and the result, we are confident, was that we encouraged a great many people to build homes which were badly in need in our city at that time, and are still just as badly in need.

"The plan worked out so well and we had such a good reputation last year that we have re-organized our committee again this year and have added a number of other firms to our list, including real estate dealers, building contractors, such as carpenters, masons and cement contractors.

"In raising this fund we have no contribution larger than $25 and nothing less than $10. This gives us a fund of between $500 and $600, which we will invest in full-page space in our two daily papers. You can readily see that this is a very small expense to any one of the firms interested, but on the whole it will amount to fine publicity in increasing the interest and building conditions in our own locality.

"You understand, of course, that the advertisements refer simply to general building conditions and does not advertise any one particular commodity.

"We had some mighty fine copy in our last year's campaign and I think we could furnish any one who would be interested with duplicates of our copy if they would care to adopt the same plan. Furthermore, if any of your readers wish to go into this matter and adopt the Huntington plan and will correspond with the writer he will be very glad to put them on a mailing list and send them copies of our local papers as our advertisements appear.

"I am confident that if all of the smaller cities would adopt this plan, which would not be a very expensive one owing to the small rate for advertising space in cities of this size, that we would create a great deal of interest throughout the United States and encourage a great deal more building than would be possible if the attention of the people was not called to it through a sane and careful advertising campaign."

What do you think of this scheme? Why not write Mr. Triggs and get in touch with the methods which have brought such excellent results in Huntington? The plan is a good one and has proved its result-getting possibilities. Why not try it in your town?

## Post Yourself on Labor-Saving Equipment

Conservatism, real conservatism, is the foundation for every real success. Only too often, however, is conservatism merely a camouflage for ignorance, prejudice and timidity.

The conservative business man is one who ponders carefully before deciding on a purchase or on a policy. He weighs it in his mind, looks at it from all angles, and then bases a decision on his findings. He will not take a chance which may bring wonderful results but which may also just as possibly bring utter failure to himself. He will not risk his all, no matter how tempting is the prospect of gain.

But conservatism is not the cause nor reason for waiting till every builder in the neighborhood has bought a new type of equipment. It is not the cause for hesitation in using a new material because no one has tried it out thoroughly. The cause in such cases is either timidity or ignorance.

Timidity deprives a man of many an advantageous opportunity of which he could avail himself had he the courage. He wants to wait, to be absolutely sure before grasping it—consequently opportunity escapes his grasp.

Timidity is usually caused by ignorance, and by a distrust of one's own capabilities. The man who can form proper opinions of his own need not wait for the crowd to point the way; he can seek out the sign post and blaze the trail for others.

Prejudice against a machine or a material because of previous fault or limited experience helps to keep mistakes from being grasped and understood. Again, improvements may have remedied a previous quality or practical lack.

These three things, camouflaged under the term "conservatism," are the real reasons why labor saving equipment and new materials are never made use of by many otherwise successful builders who are passing up larger profits. The fact that a man has been progressive enough to buy a concrete mixer does not absolve him from the necessity of knowing that there is a possibility that accessories to that mixer, such as a loader, will speed up its work. Perhaps by proper and intelligent investigation the man who needed three mixers for his work may find that the one he already owns may be made to do the required work; there is a chance that only one more may be needed, intelligent buying eliminating the third.

The merits of various mixer capacities, mixer accessories, types of mixers, etc., should be at the disposal of every builder who contemplates a mixer purchase. Knowing what he must accomplish, he can then buy wisely.

When a saw rig, a hoist, a truck, or some other device is required, it is worth while for a builder to investigate thoroughly before he buys in order that he may know just what equipment will best do the work for which he requires it.

Knowledge such as this is essential if the initial investment and running expenses are to be kept at a minimum. Yet so comparatively few builders make it a point to keep posted by sending for, reading, and filing manufacturers literature that one in thorough touch with the needs of the trade must realize big opportunities are often slipping by unnoticed by the very men in need of them.

Not only is it wise to post yourself thoroughly before making a purchase, but it is even wiser to study the equipment field in order that nothing worth while may be overlooked. Perhaps a labor saving tool or bit of equipment may make its cost and more on the very next job you handle—if you know that it is made.

## Make Your Office Reflect Busy Prosperity

One of the biggest office assets in creating confidence is a photographic record of jobs done. This record can take the form of progress pictures and pictures of the finished jobs.

Most of the big city builders realize the value of this sort of display in their offices. The largest jobs, of course, are the ones most prominently displayed.

Some firms keep a record of all their jobs in a neat leather bound book, carrying their name in gold on the front cover. This book is prominently placed on the table in the office. Naturally, waiting visitors pick it up, turn over the leaves, and obtain a respect for the builder's ability and reputation that is worth real money in the later interview. This creating confidence by a display of past jobs is worthy the careful consideration of even the smallest builder.

While many small builders cannot afford to keep an office, yet it is important that they have some place in which to receive people. This place should have the appearance of being the office of a reliable, progressive builder.

It is usually possible to arrange some room in one's home to serve as an office. Pictures of houses, colored photographs such as are inserted in BUILDING AGE, photographs of jobs done, etc., all help to lend the proper atmosphere. If you use a drawing table, it should be placed in this room. Reference books, magazines, etc., help to create the impression that you aim to keep in touch with the very latest ideas.

Even when one's own home must serve as an office, the room chosen must never appear to be a place used to transact occasional business. It must look prosperous and busy if your importance as a reliable, experienced builder is to be emphasized.

# Building Activity in the United States

Beyond question, the building situation is improving. There is still considerable pessimism, but in the main building departments of the various cities throughout the country look expectantly forward to constantly improving conditions.

Country and suburban towns as a whole will probably feel the stimulus sooner and to a greater extent than will the big cities. This is due to the fact that the housing shortage is acute in all sections of the country, perhaps the greatest shortage being residences. Naturally building will resume first in the direction where exists the greatest shortage, and that is dwellings.

The country as a whole shows a loss of 14 per cent, 169 cities reporting; during January, 1919, permits issued show the total estimated construction to be $24,323,026, as compared with the January, 1918, total of $28,310,111. Out of the 169 cities reporting 93 show gains as against 76 showing losses.

Cities in the Eastern section of the country show a loss of 19 per cent for January, 1919, compared with the same period last year; 37 out of 62 cities report gains. Cities in the Middle States report a loss of 14 per cent, 25 out of 48 cities showing gains; Western cities report 16 per cent loss, 10 out of 20 cities showing gains; and Southern cities report a loss of only 3 per cent, 21 out of 39 cities showing gains.

This is an improvement over the past few months, and conditions indicate gradually increasing activity. Strikes and other causes which hinder building will very shortly be settled, and the country can look forward to the greatest

**period of building activity that has ever been known.**

**Material prices can fall but little further, if at all; labor costs are still uncertain, but there is a decided tendency upward. The shortage of building is *now*, not five years hence, and the structures put up this coming year will be snapped up so quickly that there is little danger of money being lost by investors who build to-day. Costs may be lower five years from now; the investor who builds this year may spend more, but he will also reap a quicker and a larger profit than if he waited an indefinite length of time for costs to fall. This consideration and the certainty of sure profits to-day, due to the big demand, is causing many wide-awake investors to "build now." This tendency is a healthful one which will do much to ease the present strain.**

CITIES IN EASTERN STATES

| | December, 1918 | | | | December, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Albany, N. Y. | 99 | $86,965 | ... | ... | 105 | $141,275 | ... | ... |
| *Allentown, Pa. | 9 | 43,345 | ... | ... | 4 | 1,900 | ... | ... |
| Altoona, Pa. | .. | ... | 8 | 1,538 | 1 | 300 | 11 | 5,085 |
| *Atlantic City, N. J. | 7 | 56,750 | 91 | 127,128 | 3 | 1,525 | 54 | 73,862 |
| *Auburn, N. Y. | 11 | 13,850 | ... | ... | 4 | 7,275 | ... | ... |
| Bayonne, N. J. | 3 | 1,175 | ... | ... | 5 | 7,685 | ... | ... |
| *Binghamton, N. Y. | 41 | 49,417 | 72 | 22,088 | 20 | 9,565 | 50 | 12,161 |
| *Boston, Mass. | 22 | 137,754 | 230 | 574,258 | 13 | 278,250 | 145 | 283,032 |
| *Bridgeport, Conn. | 47 | 74,610 | ... | ... | 16 | 175,185 | ... | ... |
| Brockton, Mass. | 11 | 16,485 | 11 | 3,435 | 6 | 4,210 | 6 | 22,600 |
| Buffalo, N. Y. | 100 | 172,800 | 36 | 33,200 | 76 | 418,400 | 15 | 18,600 |
| *Easton, Pa. | 1 | 3,300 | 6 | 9,700 | 1 | 900 | 4 | 10,245 |
| *East Orange, N. J. | 20 | 38,345 | ... | ... | 9 | 32,255 | ... | ... |
| *Elizabeth, N. J. | 12 | 32,350 | ... | ... | 5 | 7,513 | ... | ... |
| *Erie, Pa. | 41 | 76,035 | 22 | 40,999 | 16 | 27,700 | 9 | 14,610 |
| *Harrisburg, Pa. | 3 | 20,000 | 10 | 12,000 | 3 | 14,300 | 5 | 3,150 |
| *Hartford, Conn. | 17 | 256,000 | 15 | 42,178 | 9 | 123,450 | 9 | 129,895 |
| Camden, N. J. | 25 | 96,905 | ... | ... | 15 | 193,165 | ... | ... |
| *Hoboken, N. J. | 2 | 1,750 | 9 | 12,055 | 4 | 9,550 | 3 | 4,000 |
| *Holyoke, Mass. | 2 | 1,300 | 3 | 18,825 | 1 | 500 | 2 | 2,800 |
| Jersey City, N. J. | 10 | 25,850 | 23 | 16,050 | 8 | 47,650 | 15 | 123,825 |
| *Lawrence, Mass. | 8 | 32,600 | 6 | 4,428 | 2 | 2,700 | 3 | 3,700 |
| *Manchester, N. H. | 11 | 21,625 | 18 | 10,580 | 5 | 10,045 | 11 | 6,945 |
| *Mt. Vernon, N. Y. | 12 | 135,375 | 5 | 24,025 | 2 | 40,200 | 5 | 2,100 |
| Newark, N. J. | 105 | 164,968 | ... | ... | 76 | 219,554 | ... | ... |
| *New Bedford, Mass. | 31 | 107,550 | ... | ... | 9 | 90,775 | ... | ... |
| *New Britain, Conn. | 12 | 46,075 | 13 | 8,385 | 6 | 29,450 | 1 | 450 |
| New Haven, Conn. | 73 | 49,425 | ... | ... | 32 | 1,038,377 | ... | ... |
| New York: | | | | | | | | |
| Manhattan | 16 | 1,151,050 | 189 | 682,215 | 17 | 1,481,700 | 182 | 696,091 |
| Bronx | 12 | 184,940 | 112 | 45,565 | 9 | 478,850 | 71 | 20,521 |
| *Brooklyn | 175 | 2,025,960 | 318 | 265,870 | 73 | 1,369,150 | 329 | 900,914 |
| *Queens | 349 | 540,258 | ... | ... | 120 | 223,225 | ... | ... |
| Richmond | 37 | 122,635 | 29 | 9,718 | 19 | 153,275 | 11 | 48,275 |
| *Niagara Falls, N. Y. | 13 | 68,875 | ... | ... | 5 | 7,325 | ... | ... |
| *Nutley, N. J. | 5 | 4,435 | 3 | 1,820 | ... | ... | 3 | 430 |
| *Passaic, N. J. | 9 | 14,205 | 2 | 950 | ... | ... | 3 | 4,350 |
| *Paterson, N. J. | 15 | 32,302 | 53 | 61,045 | 1 | 200 | 20 | 8,894 |
| Philadelphia, Pa. | 105 | 302,545 | 246 | 381,960 | 99 | 1,491,950 | 151 | 192,560 |
| Pittsburgh, Pa. | 65 | 120,582 | 64 | 160,989 | 51 | 265,290 | 34 | 49,125 |
| Portland, Me. | 2 | 2,560 | 16 | 36,700 | 5 | 10,150 | 10 | 36,675 |
| *Quincy, Mass. | 39 | 56,965 | ... | ... | 19 | 21,715 | ... | ... |
| Reading, Pa. | 6 | 5,300 | 82 | 23,775 | 3 | 2,600 | 39 | 33,525 |
| *Schenectady, N. Y. | 8 | 2,425 | 9 | 11,775 | 3 | 512 | 6 | 5,540 |
| *Scranton, Pa. | 11 | 16,250 | ... | ... | 8 | 15,600 | ... | ... |
| *Springfield, Mass. | 61 | 97,510 | ... | ... | 30 | 38,390 | ... | ... |
| *Syracuse, N. Y. | 10 | 24,650 | 42 | 45,660 | 12 | 20,000 | 31 | 44,600 |
| *Trenton, N. J. | 25 | 42,796 | ... | ... | 10 | 17,270 | ... | ... |
| Troy, N. Y. | ... | ... | 11 | 4,555 | 2 | 5,000 | ... | ... |
| Wilkes-Barre, Pa. | 23 | 9,472 | ... | ... | 29 | 23,952 | ... | ... |
| *Fitchburg, Mass. | 3 | 8,710 | 3 | 7,000 | ... | ... | 1 | 1,200 |
| Worcester, Mass. | 14 | 16,680 | 21 | 10,835 | 7 | 106,375 | 16 | 31,585 |
| York, Pa. | 2 | 115 | 13 | 3,732 | 2 | 2,300 | 3 | 7,085 |
| Lowell, Mass. | 8 | 7,200 | 16 | 5,155 | 10 | 47,610 | 22 | 63,060 |
| *Lancaster, Pa. | 13 | 8,275 | ... | ... | 3 | 1,600 | ... | ... |
| *Newport, R. I. | 2 | 10,500 | 14 | 8,940 | ... | ... | 5 | 4,790 |
| Rochester, N. Y. | 35 | 85,935 | 38 | 29,998 | 13 | 40,600 | 23 | 76,070 |
| *Chelsea, Mass. | 9 | 111,150 | ... | ... | 7 | 15,250 | ... | ... |
| *McKeesport, Pa. | 8 | 12,975 | ... | ... | 4 | 1,850 | ... | ... |
| Salem, Mass. | 10 | 4,135 | ... | ... | 9 | 5,245 | ... | ... |
| Somerville, Mass. | 8 | 6,450 | ... | ... | 5 | 10,000 | ... | ... |
| *W. Hoboken, N. J. | 6 | 2,675 | ... | ... | 2 | 1,800 | ... | ... |
| Yonkers, N. Y. | 16 | 31,200 | ... | ... | 7 | 39,800 | ... | ... |
| | 1855 | $6,894,319 | 1859 | $2,750,129 | 1040 | $8,832,838 | 1308 | $2,942,350 |

CITIES IN EXTREME WESTERN STATES

| | December, 1918 | | | | December, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Berkeley, Cal. | 19 | $52,136 | 42 | $18,200 | 8 | $17,500 | 31 | $18,000 |
| Denver, Col. | 48 | 54,800 | 55 | 23,400 | 62 | 163,100 | 57 | 50,650 |
| *Colorado Spgs., Col. | 3 | 7,600 | 8 | 11,120 | 7 | 4,025 | 5 | 2,680 |
| Eureka, Cal. | 6 | 2,200 | 6 | 2,485 | 8 | 2,450 | 800 | 2,250 |
| *Fresno, Cal. | 37 | 79,375 | 42 | 9,272 | 45 | 46,150 | 48 | 11,695 |
| *Long Beach, Cal. | 217 | 242,101 | ... | ... | 146 | 143,690 | ... | ... |
| *Los Angeles, Cal. | 373 | 648,757 | 276 | 164,070 | 314 | 508,122 | 259 | 140,870 |
| *Oakland, Cal. | 116 | 206,374 | 71 | 54,865 | 129 | 168,745 | 80 | 27,086 |
| Pasadena, Cal. | 16 | 7,407 | 54 | 15,078 | 29 | 15,758 | 69 | 19,366 |
| *Portland, Ore. | 170 | 148,145 | 200 | 51,935 | 124 | 73,705 | 143 | 53,085 |
| *Pueblo, Col. | 26 | 31,383 | ... | ... | 18 | 10,955 | ... | ... |
| Sacramento, Cal. | 51 | 29,514 | ... | ... | 44 | 175,016 | ... | ... |
| Salt Lake City, Utah | 30 | 37,350 | ... | ... | 40 | 150,525 | ... | ... |
| San Diego, Cal. | 45 | 43,640 | 54 | 17,060 | 31 | 67,425 | 58 | 90,855 |
| San Francisco, Cal. | 52 | 367,803 | 201 | 124,403 | 50 | 456,563 | 303 | 119,536 |
| *San Jose, Cal. | 23 | 23,720 | ... | ... | 19 | 8,395 | ... | ... |
| Seattle, Wash. | 359 | 282,045 | ... | ... | 418 | 443,390 | ... | ... |
| *Spokane, Wash. | 21 | 6,535 | 34 | 22,737 | 14 | 3,970 | 20 | 9,000 |
| Stockton, Cal. | 51 | 66,100 | ... | ... | 51 | 86,150 | ... | ... |
| Tacoma, Wash. | 110 | 61,118 | 106 | 25,610 | 91 | 153,817 | 57 | 41,811 |
| | 1773 | $2,398,10[illegible] | [illegible]149 | $540,235 | 1648 | $2,699,451 | 1930 | $586,884 |

CITIES IN MIDDLE STATES

| | December, 1918 | | | | December, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Akron, Ohio | 112 | $293,113 | 27 | $29,185 | 49 | $73,495 | 4 | $101,050 |
| *Canton, Ohio | 42 | 98,683 | ... | ... | 16 | 45,125 | ... | ... |
| *Cedar Rapids, Iowa. | 10 | 18,000 | 4 | 6,000 | 5 | 9,000 | 1 | 1,000 |
| Chicago, Ill. | 99 | 1,630,350 | 309 | 151,360 | 58 | 3,388,600 | ... | ... |
| Cincinnati, Ohio. | 27 | 10,675 | 146 | 94,060 | 26 | 696,360 | 63 | 73,065 |
| *Cleveland, Ohio | 113 | 761,200 | 318 | 166,700 | 47 | 242,800 | 215 | 120,660 |
| *Columbus, Ohio | 46 | 91,555 | 49 | 31,805 | 19 | 32,815 | 20 | 45,700 |
| Davenport, Iowa | 12 | 2,655 | ... | ... | 19 | 21,315 | ... | ... |
| *Dayton, Ohio | 69 | 127,425 | 22 | 9,947 | 34 | 90,785 | ... | ... |
| *Decatur, Ill. | 15 | 70,675 | 9 | 9,750 | 3 | 23,800 | 5 | 5,000 |
| Des Moines, Iowa | 43 | 122,300 | ... | ... | 55 | 305,475 | ... | ... |
| Detroit, Mich. | 333 | 1,040,710 | ... | ... | 196 | 1,608,765 | ... | ... |
| Dubuque, Iowa | 9 | 49,550 | ... | ... | 6 | 37,350 | ... | ... |
| *Duluth, Minn. | 21 | 35,100 | 17 | 74,118 | 20 | 30,200 | 12 | 8,485 |
| East St. Louis, Mo. | 13 | 16,925 | ... | ... | 5 | 18,075 | ... | ... |
| *Evansville, Ind. | 26 | 14,480 | ... | ... | 7 | 11,600 | ... | ... |
| *Ft. Wayne, Ind. | 9 | 9,975 | 11 | 12,650 | 9 | 16,675 | ... | ... |
| Grand Rapids, Mich. | 51 | 32,081 | ... | ... | 21 | 312,860 | ... | ... |
| *Indianapolis, Ind. | 114 | 116,723 | 184 | 102,492 | 27 | 34,762 | 52 | 33,310 |
| Joplin, Mo. | 4 | 2,075 | 5 | 2,450 | 7 | 6,540 | 8 | 2,420 |
| Kansas City, Kan. | 15 | 8,435 | ... | ... | 9 | 123,820 | ... | ... |
| Kansas City, Mo. | 121 | 196,450 | ... | ... | 67 | 218,250 | ... | ... |
| Lincoln, Neb. | 18 | 38,274 | ... | ... | 17 | 52,500 | ... | ... |
| Milwaukee, Wis. | 79 | 226,857 | ... | ... | 44 | 228,490 | ... | ... |
| Minneapolis, Minn. | 163 | 181,320 | ... | ... | 146 | 242,070 | ... | ... |
| Omaha, Neb. | 69 | 169,015 | ... | ... | 47 | 240,450 | ... | ... |
| Peoria, Ill. | 11 | 37,200 | 12 | 4,150 | 13 | 43,300 | 9 | 28,800 |
| *Richmond, Ind. | 3 | 11,700 | 10 | 11,950 | 3 | 4,000 | 1 | 500 |
| *Saginaw, Mich. | 29 | 564,430 | ... | ... | 3 | 5,039 | ... | ... |
| *St. Louis, Mo. | 97 | 382,785 | 255 | 124,230 | 33 | 79,700 | 174 | 87,619 |
| St. Paul, Minn. | 94 | 179,272 | ... | ... | 124 | 193,102 | ... | ... |
| Bay City, Mich. | 3 | 2,740 | 4 | 1,150 | ... | ... | ... | ... |
| *Sioux City, Iowa | 23 | 116,700 | ... | ... | 15 | 42,599 | ... | ... |
| *South Bend, Ind. | 41 | 39,404 | ... | ... | 22 | 25,254 | ... | ... |
| *Springfield, Ill. | 10 | 24,325 | 17 | 8,765 | 4 | 6,930 | 5 | 2,025 |
| *Superior, Wis. | 27 | 52,380 | ... | ... | 27 | 34,229 | ... | ... |
| *Terre Haute, Ind. | 26 | 16,765 | ... | ... | 7 | 6,145 | ... | ... |
| *Toledo, Ohio | 100 | 139,086 | ... | ... | 25 | 62,635 | ... | ... |
| *Topeka, Kan. | 7 | 44,035 | 3 | 4,075 | 5 | 28,250 | 10 | 3,925 |
| Wichita, Kan. | 30 | 81,045 | ... | ... | 35 | 170,350 | ... | ... |
| *Youngstown, Ohio | 62 | 122,750 | ... | ... | 40 | 108,650 | ... | ... |
| Hamilton, Ohio | 3 | 3,500 | 6 | 5,202 | 3 | 28,500 | 1 | 250 |
| Joliet, Ill. | ... | ... | ... | ... | 4 | 15,500 | ... | ... |
| Jackson, Mich. | 22 | 18,485 | ... | ... | 6 | 565 | ... | ... |
| *Kalamazoo, Mich. | 5 | 12,200 | 1 | 11,200 | 2 | 7,000 | ... | ... |
| *Lansing, Mich. | 15 | 33,505 | 2 | 1,800 | 1 | 95 | ... | ... |
| Springfield, Mo. | 8 | 6,350 | ... | ... | 8 | 8,400 | ... | ... |
| Springfield, Ohio | 2 | 1,600 | ... | ... | 4 | 4,725 | ... | ... |
| | 2248 | $7,256,618 | 1407 | $861,889 | 1343 | $8,987,045 | 580 | $513,8[illegible] |

CITIES IN SOUTHERN STATES

| | December, 1918 | | | | December, 1917 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Lexington, Ky. | 20 | $10,300 | ... | ... | 5 | $14,000 | ... | ... |
| *Atlanta, Ga. | 76 | 236,785 | 74 | 32,800 | 33 | 99,586 | 51 | 20,195 |
| *Baltimore, Md. | 73 | 114,058 | 483 | 162,120 | 27 | 92,717 | 333 | 90,898 |
| *Birmingham, Ala. | 231 | 54,721 | ... | ... | 175 | 43,947 | ... | ... |
| *Charleston, S. C. | 18 | 4,274 | 4 | 6,980 | 4 | 5,348 | 3 | 235 |
| *Charlotte, N. C. | 19 | 41,400 | 7 | 15,525 | 14 | 11,375 | 6 | 4,183 |
| Chattanooga, Tenn. | ... | ... | 125 | 31,845 | ... | ... | 147 | 49,910 |
| *Columbia, S. C. | 9 | 26,050 | 80 | 11,277 | 1 | 2,000 | 61 | 5,675 |
| *Corpus Christi, Tex. | 9 | 3,885 | ... | ... | 7 | 930 | ... | ... |
| Dallas, Tex. | 30 | 102,400 | 16 | 7,425 | 23 | 138,841 | 32 | 243,100 |
| El Paso, Tex. | 95 | 39,250 | ... | ... | 72 | 56,340 | ... | ... |
| Jacksonville, Fla. | 8 | 7,750 | 22 | 17,613 | 12 | 18,575 | 37 | 35,100 |
| Houston, Tex. | 66 | 127,050 | 74 | 25,458 | 59 | 340,947 | 109 | 37,609 |
| *Huntington, W. Va. | 16 | 26,815 | ... | ... | 11 | 25,000 | ... | ... |
| *Louisville, Ky. | 66 | 95,801 | ... | ... | 19 | 34,075 | 9 | 4,300 |
| *Memphis, Tenn. | 46 | 122,760 | ... | ... | 43 | 79,450 | ... | ... |
| *Portsmouth, Va. | 20 | 70,455 | ... | ... | 9 | 15,994 | ... | ... |
| Miami, Fla. | 54 | 70,000 | ... | ... | 57 | 107,500 | ... | ... |
| Macon, Ga. | 43 | 14,270 | 18 | 2,832 | 53 | 41,106 | 21 | 5,313 |
| Montgomery, Ala. | 7 | 1,905 | 71 | 13,000 | 11 | 6,444 | 95 | 17,010 |
| *Nashville, Tenn. | ... | ... | 303 | 69,287 | ... | ... | 94 | 45,874 |
| New Orleans, La. | 8 | 18,400 | 11 | 9,395 | 19 | 62,540 | 16 | 13,545 |
| *Norfolk, Va. | 40 | 96,235 | 9 | 10,650 | 17 | 80,528 | 5 | 9,945 |
| *Oklahoma City, Okla. | 38 | 333,000 | 8 | 16,185 | 35 | 127,250 | 6 | 32,200 |
| *Richmond, Va. | 18 | 89,754 | 52 | 56,607 | 7 | 49,500 | 32 | 22,596 |
| *Roanoke, Va. | 27 | 70,385 | ... | ... | 7 | 10,335 | ... | ... |
| San Antonio, Texas | 211 | 127,942 | ... | ... | 233 | 302,210 | ... | ... |
| Savannah, Ga. | 17 | 31,025 | 3 | 700 | 8 | 41,285 | 1 | 300 |
| *Shreveport, La. | 27 | 66,400 | 45 | 15,815 | 12 | 8,265 | 26 | 9,588 |
| Tampa, Fla. | 17 | 14,130 | 50 | 18,320 | 17 | 29,255 | 63 | 14,410 |
| *Washington, D. C. | 226 | 208,720 | ... | ... | 127 | 202,125 | ... | ... |
| *Wilmington, Del. | 47 | 280,284 | ... | ... | 31 | 31,796 | ... | ... |
| *Fort Worth, Tex. | 30 | 69,125 | 29 | 23,600 | 13 | 25,560 | 11 | 29,990 |
| Galveston, Tex. | 22 | 42,044 | 44 | 2,047 | 24 | 55,550 | ... | ... |
| *Muscogee, Fla. | ... | 8,000 | ... | ... | ... | 2,000 | ... | ... |
| Pensacola, Fla. | 7 | 8,750 | 93 | 13,380 | 5 | 24,180 | 82 | 24,180 |
| Sioux Falls, S. D. | 6 | 8,075 | ... | ... | 3 | 152,500 | ... | ... |
| Wheeling, W. Va. | 33 | 81,450 | 440 | 326,724 | 62 | 243,940 | 584 | 430,584 |
| Knoxville, Tenn. | 41 | 8,500 | ... | ... | 29 | 18,000 | ... | ... |
| | 1704 | $2,732,148 | 2061 | $889,585 | 1285 | $2,600,994 | 1824 | $1,146,740 |

# New Catalogs of Interest to the Trade

**Colorblende Roof.** H. W. Johns-Manville Co., New York City.—Booklet showing in colors effects which may be gained by the use of Johns-Manville colorblende asbestos shingles. These shingles are thicker and have more irregular butts, thus overcoming the chief artistic objections advanced against the use of asbestos shingles by artistic architects.

**Spencer Super-Standard Heaters, Steam, Vapor, Hot Water.** Spencer Heater Co., Scranton, Pa.—Gives illustrated description of the types of heaters manufactured by this concern, together with a wash drawing showing the manner of installation for the average dwelling house. Contains pictures of buildings in which this equipment has been used, together with testimonials from the builders thereof. Contains illustrations of various types of heaters manufactured by this company, together with valuable facts about coal and an article giving hints on chimney construction. A short article gives the factors determining boiler capacities.

**McCray Refrigerators in American Homes.** McCray Refrigerator Co., Kendallville, Ind.—Illustrates various types of refrigerators for country houses together with suggestive plans for their installation. Contains numerous pictures of houses in which these refrigerators have been used.

**Conveniences for the Home.** Hill Clothes Dryer Co., Worcester, Mass.—Describes clothes dryers, ash sifters, etc.

**Contractors Atlas.** Atlas Portland Cement Co., New York, N. Y.—The January number contains stucco questions and answers, which gives valuable data on this subject. An article on the construction of a monument erected in Centerville, Md., is also contained. This monthly house organ will be sent to any rated contractor or architect.

**Self-Sentering.** The General Fireproofing Co., Youngstown, Ohio.—Illustrates and describes various purposes for which Self-sentering can be used, such as in the construction of floors, roofs, partitions, culverts, etc. Drawings illustrate the application of this material in various kinds of floor construction, etc. Numerous construction pictures show the material on the job, illustrating how it does away with forms in concrete construction.

**Service Sheet.** Sedgwick Machine Works, 156 West Fifteenth Street, New York City.—Sheet giving working drawings showing the installation of dumbwaiters, together with standard specifications for their installation.

**The Art of Stippling.** Western Brick Co., Danville, Ill. — Describes various kinds of stippled brick, together with numerous illustrations showing the beautiful effects which may be gained by the use of this type of brick.

**Ready to Answer the Call of Reconstruction.** T. L. Smith Company, Milwaukee, Wis.—Booklet describing and illustrating various types of mixers manufactured by this company.

**How to Lay Oak Flooring.** Oak Flooring Manufacturers' Association, 1603 Union Trust Building, Cincinnati, Ohio.—Folder describing and illustrating the method of laying oak floors, scraping them and caring for them after completion. Describes kind of oak flooring best suited for various purposes.

**Why Contractors Buy Hess Welded Steel Furnaces.** Hess Warming & Ventilating Co., 1201-L Tacoma Building, Chicago, Ill.—Describes and illustrates various types of furnaces manufactured by this company. Also contains numerous testimonials.

**Space and Speed in Steel Buildings.** Milliken Bros. Mfg. Co., Woolworth Building, New York. — Describes the standardized truss unit system for industrial buildings as developed by this company. Contains cross sections showing the types of construction to which this system may be applied, and photographs of buildings erected by this system.

**Triangle Mesh Concrete Reinforcement.** American Steel & Wire Co., 30 Church Street, New York City.—Contains valuable tables showing area of steel required per foot of width for slabs of various thicknesses. Also weights and areas of square and round bars and circumferences of round bars, together with other valuable data of a like nature.

**Alpina Gives Perfect Ventilation.** Milwaukee Corrugating Co., Milwaukee, Wis.—Describes the essential nature of good ventilation and gives numerous photographs of important buildings in which the Alpina system has been used.

**Airdry.** Groton Electrical Devices, Groton, N. Y.—Describes a convenience for doing away with towels in drying the hands, being suitable for use in department stores, theaters, etc.

**No Man Hath a Better Lath Than Netmesh.** Milwaukee Corrugating Co., Milwaukee, Wis.—Folder describing the advantages of diamond netmesh, together with a description of the sizes in which it comes.

**Universal Safety Tread.** Universal Safety Tread Co., 40 Court Street, Boston, Mass.—Catalog describing various kinds of stair treads manufactured by this company, together with the proper manner of application.

**Edge Tools.** Price List and Reference Book, No. 12. Buck Bros., Millbury, Mass.—Catalog illustrating and describing various kinds of chisels, planes, irons, drawing knives, reamers and similar tools of interest to wood workers.

**Andes Stoves, Ranges and Furnaces.** Philips & Clarke Stove Co., Geneva, N. Y.—Describes and illustrates the various kinds of ranges manufactured by this company, together with gas attachments therefor, stoves, furnaces, etc.

**The Ideal Interior Finish for Walls and Ceilings.** Harrison Works, Wilmington, Del.—Describes this sanitary paint together with directions for applying it on various materials. Contains colored pictures of attractive interiors.

**Fuel Facts.** United States Fuel Administration, Washington, D. C.—A government publication containing valuable data on coal together with worthwhile information on how to get the most out of various kinds of heating equipment.

**Craig Reinforced Screwbore for Portable Concrete Construction.** 70 Broad Street, Boston, Mass.—Describes a type of lag screw suitable for use in concrete structures, and especially applicable to concrete structures that are made portable.

**Multisize Portable Concrete Buildings.** David Craig, 70 Broad Street, Boston, Mass.—Describes the type of portable concrete houses, which effect various economies by means of standardization; contains plans of the type of house developed.

**Gilt Edge-Ings.** R. J. Schwab & Sons Co., Milwaukee, Wis.—House organ for January and February, describing recent improvements in this company's line of furnaces. Contains an interesting kink on locating check drafts.

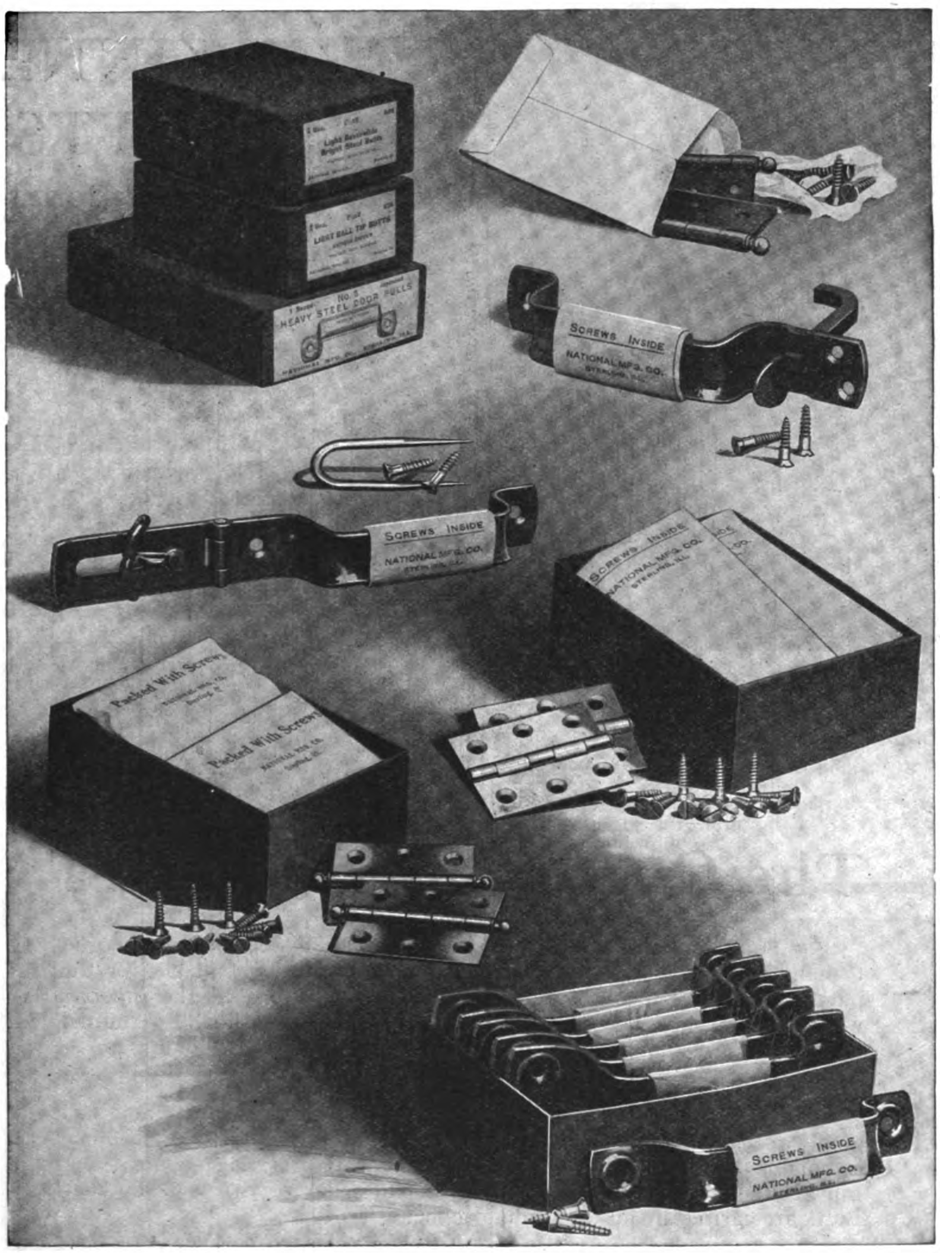
**Corr-Plate Floors.** Corrugated Bar Co., Buffalo, N. Y.—Booklet describing the design of these floors, accompanied by valuable tables and results of experiments conducted by the research department. Also contains standard specifications for these floors, together with tests on completed structures, showing the strength, etc. Illustrates numerous buildings in which the floors have been used, together with partial list of architects and contractors who have used this material.

**Any of these catalogs will be furnished by the manufacturers. Or, if you prefer, we will see that you receive any that you desire. Just check the catalogs you want, tear out the page, and mail it to Building Age, 243 West 39th Street, New York.**

**What About the Price of Wall Board?** Upson Company, 166 Upson Point, Lockport, N. Y.—Interesting talk on prices of building materials in general and wall board in particular. Contains table showing cost of various building materials in December, 1918; November, 1918, and December, 1917. Forecasts future prices in wall board.

**The New Idea Pipeless Furnace.** Utica Heater Co., Mohawk St., Utica, N. Y.—Folder describing and illustrating type of pipeless furnace manufactured by this concern.

# Builders Appreciate National Methods of Packing Goods

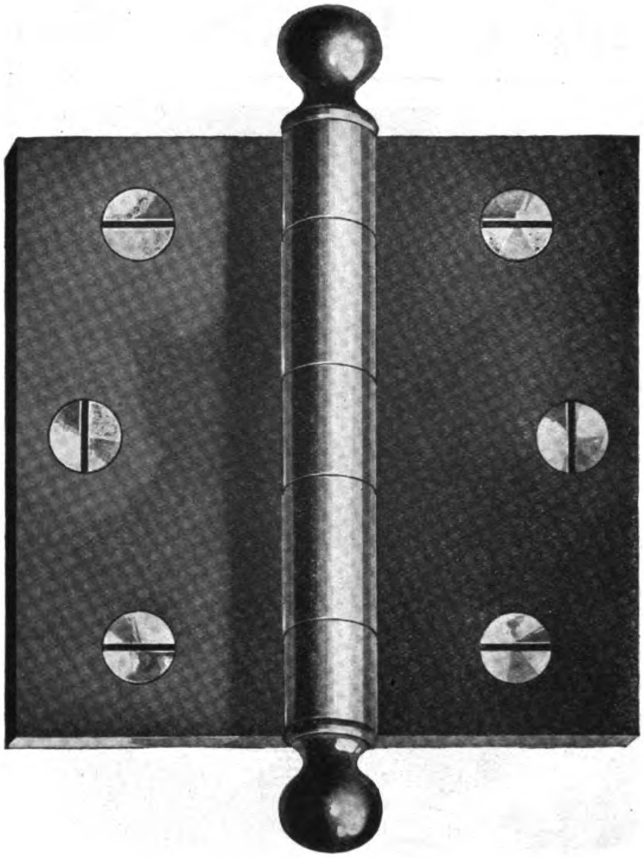



We pack our hardware in the most convenient method for the builder's use.
The small sizes of Butts and Hinges are packed one pair in an envelope with screws.
The larger sizes are packed in boxes with screws. This method saves time required in counting screws, the loss from careless counting, etc.
In addition to Door Butts and Hinges, the following goods also are packed with screws:

| | | |
|---|---|---|
| **Barn and Garage Door Latches** | **Foot Scrapers** | **Door Pulls** |
| **Strap and "T" Hinges** | **Handle Hinge Hasps and Staples** | **Garage Door Hardware** |
| **Safety Hasps** | | |
| **No. 35 Automatic Hasps** | **Hinge Hasps** | **All Plate Goods** |

Barn Door Hangers are packed one pair in a box with bolts.
A perfect product, perfectly packed, properly presented, produces pleasing profits.
Write for our catalog and give dealer's name.

**National Mfg. Co. Sterling, Ill.**



# No. 3 ~ Deck Roof Designs


## TARGET & ARROW ROOFING TIN

MANY buildings with Deck Roofs are so situated that their roof surfaces are visible from the ground, or from surrounding buildings, or near-by ground of greater elevation.

The Deck Roof covering should, therefore, be of pleasing appearance, and its color should harmonize with the roof surfaces with which it is surrounded—yet its lack of pitch prevents the use of all types of roof coverings, depending on the mere lapping of their parts to prevent the entrance of rain or snow. A *light weight* covering is also very essential for, due to the nature of the design, a heavy Deck means exceptionally heavy supporting members and consequently high cost.

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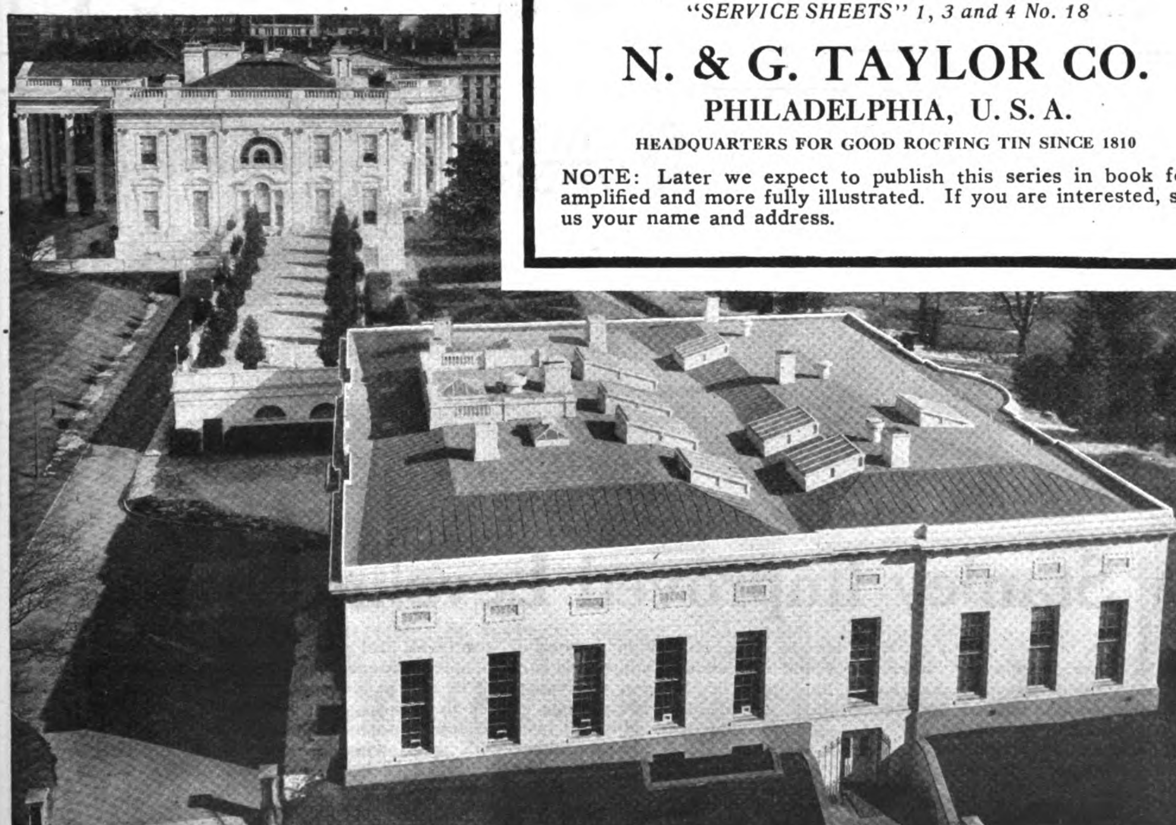

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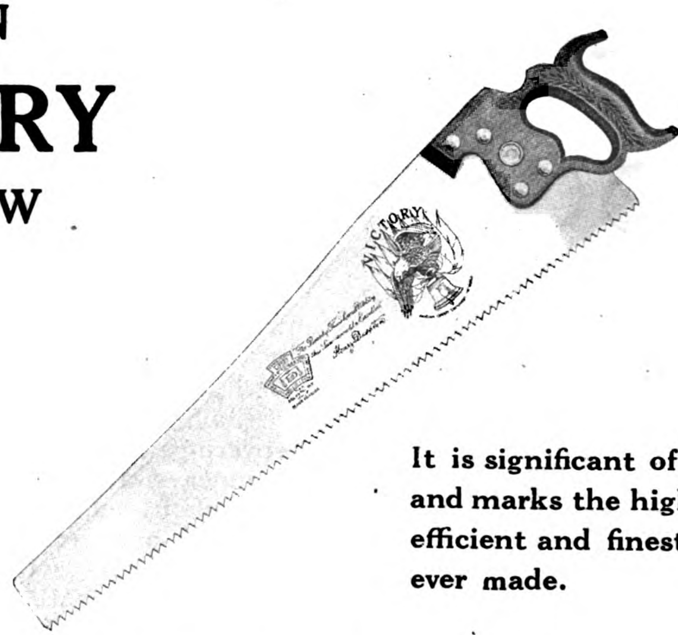

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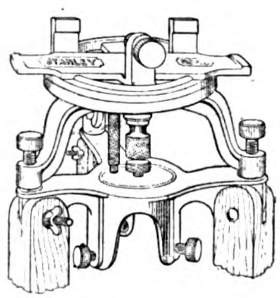

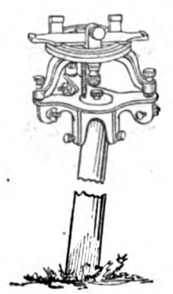

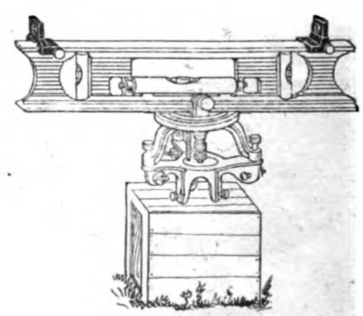

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The tables of the properties of structural shapes, of safe loads for columns, beams and girders have been revised and many new tables added.

Many of the tables have been rearranged so as to read across the page instead of lengthwise as heretofore. A large number of illustrations have been added and the diagram used from the last edition have been redrawn and some have been printed with lines of different colors to make the demonstrations clearer.

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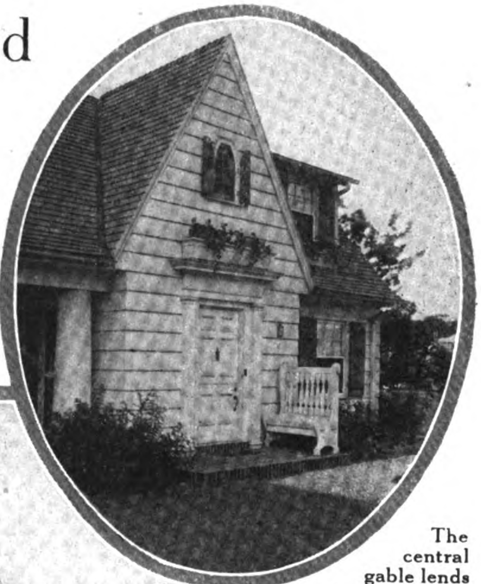
# BUILDING AGE

NEW YORK, APRIL, 1919

## Well Designed Clapboarded Gambrel Roofed House

### *Three Bathrooms, Maid's Quarters Entirely Separated from the Rest of the House and Numerous Entrances Are Features of This House*



The central gable lends an interesting touch of individuality, striking a dominant note in the design. A domestic touch is given by the flower box, which serves to relieve the plainness of the gable.

The style is a Modified New England Colonial, with a suggestion of the Dutch.

The doorway with its well proportioned pilasters is attractive by reason of its very simplicity.

THE long lines of the lower part of the gambrel roof and the well proportioned gable and dormers lend an interesting touch to this suburban home. Fenestration, or window treatment, is well handled, and indicates that adequate air and light are provided.

In the porch at the left is an effective solution of making the overhang appear well supported; two stucco columns evidence ample appearance of strength. This porch floor, as well as that of the others, has a border of red brick surrounding a cement center, lined off.

The entrance feature, which is purely modern in the treatment of the peaked gable end, is made interesting by a flower box over the doorway, breaking up the stiffness of the cornice and adds to the domestic character of the design. The small irregular headed window above, with its green blinds, forms a spot of interest. The hardware was well selected to fit in with the Dutch door, and effectively carries out the period style.

A view of the front and right elevations of the house.

An unusual treatment of the rear elevation is the carrying out of the main dormer to house line and connecting with it. This is a picturesque treatment, and is a good solution of the problem of providing good headroom in the second story where the roof is low.

The roof and shutters are of a warm green, an added touch of color being given by the red chimney pots topping the stucco-coated chimneys. Lattice is placed on either side of each chimney so as to afford opportunity for climbing roses to add their fragrant beauty.

Wide clapboards, well proportioned to the height of the house, form the exterior wall covering.

In studying the rear elevation, note the entrance arrangements, which are unusual in their number. The living room and study are separately reached from the back porch; the kitchen may be entered either from a grade entrance or from the kitchen porch.

One enters the front of the house through an entry containing a closet for guests' wraps. An attractive vista is presented up the main stairs, and through the living room and dining room, which are at the left and right respectively; one also has a view through French doors out onto the front porch.

A study is placed at the end of the hall and communicates with the rear porch.


The feature of the living room is a large open fireplace flanked by bookcases, above each of which is a window.

The kitchen is unusually large, having ample cupboard space. Both kitchen and pantry are provided with a sink.

Arrangement for a maid's quarters is well planned, her room being reached by a back stairway. The maid's bedroom is provided with a separate bath, and is shut off entirely from the rest of the house. This is a feature that will appeal to many.

The second floor hall receives light from a large window on the landing, where there is a window seat. A large owner's bedroom is provided with separate bath, while the other three bedrooms are served by a bathroom placed in the front gable.

Floors throughout are of oak. Trim is painted white. The walls are rough sand finish, tinted. Heating is hot water.

This house was erected at Philipse Manor, New York, for Chas. C. Mul'aly, in accordance with plans and specifications preferred by Dwight James Baum, architect, Riverdale-on-Hudson, New York.

The back of the house. Note the three porches, which add to outdoor summer comfort.

# Closet Space Attracts Women Buyers

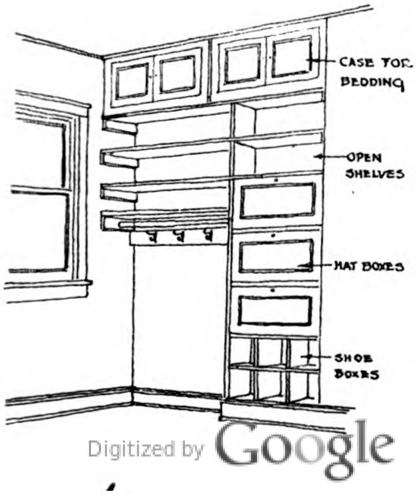
## *Homes Sell Quicker With Adequate Closets —Planning Closets That Attract*

By H. VANDERVOORT WALSH, Architect

In the planning and arrangement of the house, one of the most essential features is a careful study of the closet problem. Too often the builder or architect fits the bedroom closet in as an after-thought, without much consideration for the practical nature of this part of the house which is very important to the average woman. Many a time a house would have sold, if it had not been that the feminine bargainer could find no satisfactory closet space. Perhaps the builder knows of many houses where he could correct this difficulty and thereby make a more attractive bid to the next lady buyer.

There are really two kinds of bedroom closets. One type is for use in connection with the owner's bedroom, and another for those bedrooms which are intended either for the rest of the family or for guests. This difference is not appreciated, and in most cases closets of the type shown in Figs. 1 and 2 are the most commonly seen. As a matter of fact, these closets are only satisfactory for guest rooms, because they are in no way fitted to meet the requirements of the ones who live in the home all the time. Yet there are very few plans which you can pick up that do not show these types connected with the master bedroom. They are too narrow, crowded and clumsy to be of very personal comfort. After all, they are merely the means by which a closet can be best secured without sacrificing much floor space.

In fact, Fig. 2 is about the most compact type possible, and would be of no use at all if wardrobe doors were not placed on the outside, because it is necessary to pack clothes into it in a flat way. However, in connection with the guest room and also as a result of cramped space, it is a better solution than the corner closet, which is often seen and which is of practically no value at all.




Indeed, a corner closet is evidence of an absolute disregard for the practical requirements of a bedroom closet.

We have in Fig. 1 the typical arrangement of closets which you will find on almost any plan. The closet should never be less than three feet in depth

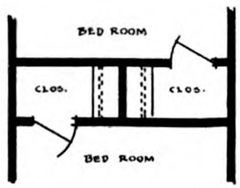



Fig. 1—A type of closet frequently met with, but wasteful of space. Closets should be at least 3 ft. deep if fitted with shelves and clothes bar

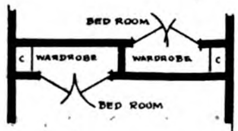



Fig. 2—A compact type of closet which is entirely too shallow

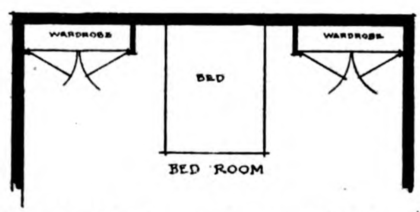
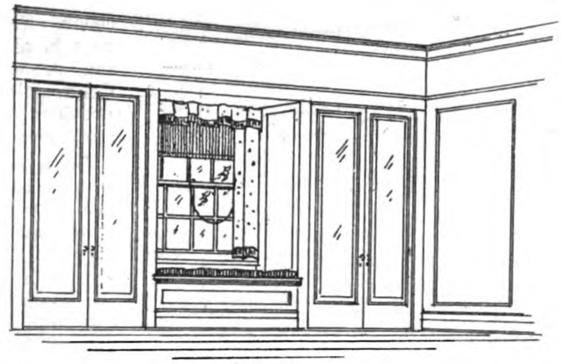



Fig. 4—Closets can be economically arranged like this. Clothes poles can be conveniently placed, and space is made most use of

if it is fitted with shelves and clothes bar, as shown in the drawing. It must be remembered that clothing which is hung on hangers needs at the very minimum a two-foot width of space. This governs the location of the clothes pole, which should be placed twelve inches, and, better, fourteen inches from the wall.

Poles for hanging clothes can be arranged in two different ways in the closet and these arrangements determine the width of the closet and the kind of door to be used. They may be run perpendicular to the rear wall of the closet and hung from the bot-


Fig. 5—A good arrangement of closet space in the master's bedroom, where an alcove can be turned to good use. This closet can be used as a dressing room



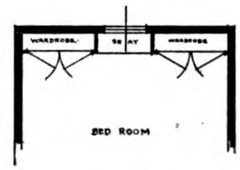
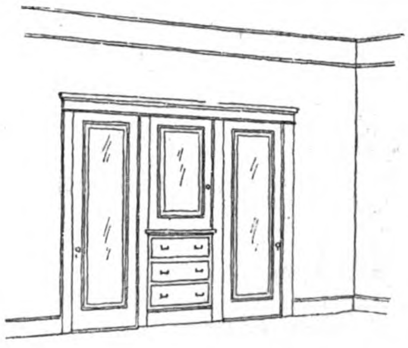



Fig. 3—Where closet space is difficult to secure, a wardrobe type placed like this is economical

tom of the shelf at the front end, thus allowing the clothes to be packed in flatways. This requires only a shallow closet, but wide wardrobe doors. The poles must be spaced twelve or fourteen inches on centers. The other arrangement is the use of one long continuous pole parallel to the rear wall of the closet. A closet of this character cannot be less than twenty-eight inches in depth to give satisfactory results, although twenty-six inches might be used in cramped positions. In this arrangement an ordinary closet door is quite satisfactory. The arrangement of the closet shown in Fig. 1 is a wasteful one and is a half way compromise. Most of the closet is empty, and it is only possible to have a clothes pole of short length and all other garments must be hung on hooks placed around the wall. It is neither a dressing closet nor a wardrobe, and certainly gives evidence of poor planning, if it is intended to save space, and yet how often it is seen.

In fact, if closet space is very difficult to secure the two arrangements shown in Figs. 3 and 4 are better. Here they are distinctly of the wardrobe type, where the clothes pole runs perpendicular to the rear wall and no space is wasted in the closet. Drawers at the bottom and shelves at the top fill the other needs of the closet, while glass doors with curtains behind them or mirror doors remove the crowded appearance which they might give to the bedroom. In fact, arranged about the window, as shown in the perspective drawing of Fig. 3, the appearance of the room is greatly enhanced. A cushioned window seat is always an addition to the room. Moreover, this type of closet could be built in any home which needed it without much cost or alteration to the plan. Should the arrangement about the window be impossible, a symmetrical placing with respect to the bed could be provided, as shown in Fig. 4. If in this case the glass doors were cut into small lights and delicate curtains hung behind them, a very charming side of the room would



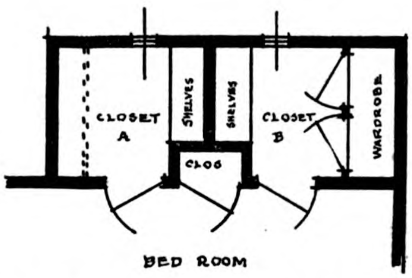



Fig. 6—Closet space for both husband and wife. The wife's side is at the right

result, and balance of arrangement would be retained. It would actually only be necessary to take off about a foot and a half of the room to make these closets possible.

A more complete and useful arrangement of the bedroom closet which is to adjoin the master bedroom is shown in Figs. 5 and 6. The shifting of a partition will be necessary to secure closets like those in a house already built, so if they can be secured in the original plan, they will not be a luxury. If space is at all cramped, it is always wise to go on the theory that a little less floor space in the bedroom is not objectionable if it goes into closets of this kind. If possible in the new plan, a window should be installed, for it adds a great deal to the use of so large a closet. At any rate an electric light bulb should be provided.

Fig. 5 shows an arrangement which is almost ideal from the standpoint of comfort. It might be a good suggestion for the alteration of some useless bedroom alcove. This closet is the combination of private toilet, cedar wardrobe and general closet. The depth is seven feet; but how much, in that space, of comfort! The view of the interior of the closet is shown in the drawing, and an idea of the arrangement can be obtained. There is a place for the hat, the shoes, shelves for the storage of heavy bedding during the summer months, and open shelves for many odds and ends. Spacious and light, it really is a dressing room. Between the toilet and the closet is a wardrobe, cedar lined. At the bottom are drawers for the linen. The doors open onto the bedroom independent of the closet, and close over the drawers to keep out the infiltration of dust. The inside of the wardrobe is lined with Florida or Alabama red cedar. Five-eighths of an inch in thickness is all that is necessary to provide the proper protection against moths. Collapsible coat and dress hangers are provided in the wardrobe for ease of arranging the clothes.

On a smaller scale, we have Fig. 6, which shows an ideal arrangement for use of both Mr. and Mrs. Housekeeper. Each have their own closet, and from the room the closets present the appearance shown in the drawing. Two large mirror doors flank each side of a small door and tier of drawers. In the mistress' side of the closet is a built-in cedar-lined wardrobe beside the shelves and wall hooks opposite. On the master's side is a long clothes pole and shelf. Boxes for shoes and hats are also provided under the shelves. The closet is quite large enough to accommodate a trunk or chest. The small closet between, placed over the drawers, is intended for articles of common use. The drawers are for the storage of linen.

Often in connection with these large closets, a smaller one may be added, due to the waste space of stairs, roof gable or chimney. An excellent shoe closet can be made out of the space over a stairway where the floor slants at an angle. Strips, nailed horizontally across, give a ladder-like treatment over which the heels of the shoes can be caught. Upon opening the door, the entire stock of shoes will be made visible and easily reachable. The slope of a gable roof may offer just enough room for a trunk closet. A useless niche besides the chimney may make an excellent space for the jewel-box. In fact, the larger the closet space that can be turned into Judged from the woman's point of view, the master bedroom the better will be the design and usefulness of that room. a large, comfortable closet is a necessity.

# How to Frame Posts and Girders

*Common Faults in Construction — Standard Practice Illustrated*

By BUILD RITE

In erecting or making alterations to factories and warehouses, lines of posts and girders are installed so that the posts above the lowest floor will rest on the cap of the post below and in addition provide supports for the girders. This is essential to obtain good construction and is in fact required by the building codes of cities. Patented caps made of steel or cast iron are sold which are very good but which the builder may not be able to obtain for some reason.

Figure 1 indicates a column cap made up of ordinary structural shapes which any iron shop will get out at short notice. A standard size channel of a length equal to the width of the post plus 12 in. to provide a 6 in. bearing for each girder is set on the top of the post and has riveted to it 6 x 4 x ⅜ in. knees. With holes drilled for bolts through flanges of channel and girder and through knees and post this will make an effective column cap for ordinary loads. This construction provides a structural tie for girders to each other and to the post. The upstanding flanges of the channel provide a well secured seat for the base of the post.

In some instances the girders are heavily loaded and a direct support on the post below is desired. As shown by Figure 2, a good and sufficient bearing on the post below can be obtained by beveling the ends of the girders and the bottom of post, care being taken that sufficient column area is provided to take care of loads transmitted from floors above. This can be calculated on the basis of the fibres being in compression, as in a short column. It is evident from an engineering standpoint that such a decrease is allowable in view of the fact that it is compensated for by the bracing effect of the girder ends. Figure 3 illustrates construction with girder on one side of post. The check piece of 1⅞ Y. P. on side of post opposite girder firmly holds base of post in position.

Figure 4 illustrates a common form of construction which is objectionable and should be condemned. There is no tie whatever provided between post and girders, which might be disastrous in the event of a settlement due to insufficient footing or to shock. Another objection is that the effect of the shrinkage in the girders on which the posts rest is cumulative and will amount to several inches in a 5- or 6-story building.

An excellent column base is illustrated in Figure 5 contrasted to a common form of column base illustrated in Figure 6. The knees riveted to base plate prevent displacement and are a protection against dirt accumulation. Holes may be drilled in the base plate for anchor bolts which are required when considering the effect of wind pressure on sides of building.

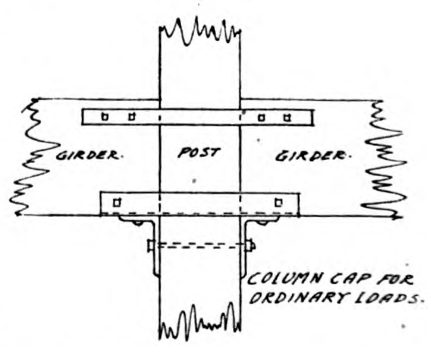



Fig. 1—A column cap made up of ordinary structural shapes

# Booming Farm Business

## *How Progressive Builders Are Profitably Working This Field*

By ROBERT F. SALADE

It does not require a stretch of the imagination for one to foresee that the year 1919 is going to be the greatest farming year in the history of the United States. There are many obvious reasons for this prediction. The principal reason is that this country now finds it essential to feed millions of people in foreign lands in addition to its own inhabitants. This means that American farmers are going to raise more fruits, vegetables, meats and poultry than ever before. The American farmers are capable of furnishing food to perhaps half of the population of the world.

### *Farmers To-day Want Efficiency*

Within the last few years remarkable changes have occurred in the farming industry of this country. The average farmer of the present day is following more efficient methods of working than those used by the farmer of the past. He is following new and better plans for farming; he is making use of labor-saving machinery; he is using power in numerous instances. Farm buildings are of more modern construction, and it is now commonplace for one to see live stock buildings on big American farms electric lighted and equipped with steam or hot water heating systems. These are some of the improvements which to-day are making farming a more profitable business.

The American farmer of these times is living in a better-built and more comfortable home than that of his predecessor. His home, in many cases, is equipped with electric lights, bath room, steam or hot water heating apparatus, and all of the modern conveniences which are to be found in first class houses of towns and cities. In cases where these improvements have not yet been done, many farmers are planning to have them attended to in the near future. These facts are mentioned merely for the purpose of demonstrating that the farmers as a class are no longer content to live and work under "old-fashioned" conditions of the past.

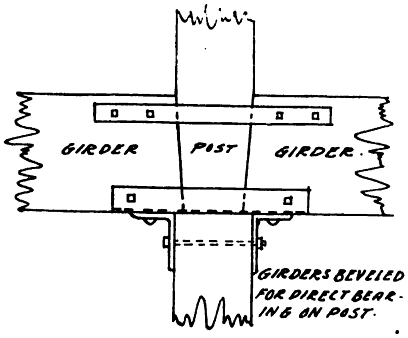



Fig. 2—Construction when it is necessary for girders to bear directly on the post

During the last summer the writer accepted the opportunity of traveling through certain rural sections of New York, Pennsylvania, Delaware and New Jersey, and while on these journeys the writer observed changes and improvements in various farm buildings which were interesting from the business point of view as well as from a sociological standpoint. A concise report concerning some of the more important improvements in the way of farm buildings, etc., will no doubt be of helpful suggestion to master builders who are in a position to do work of this kind, and that is the writer's purpose in presenting this article.

Beautiful indeed is the natural scenery through the Lehigh Valley of Pennsylvania. Here are located many of the fertile farms of the Mennonites and Dunkards, religious sects who follow the "simple life," and who wear a peculiar mode of dress somewhat like that of the Quakers. The Mennonites and Dunkards are among the most efficient farmers of the world, and although they do not believe in elegant dress or in amassing large fortunes, they do believe in owning modern homes and farm buildings whenever possible. A considerable number of the Mennonites and Dunkards now own automobiles and motor trucks for transportation of their farm products to nearby cities.

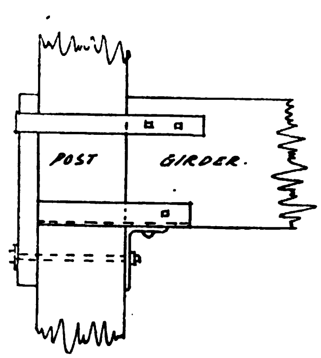



Fig. 3—Detail for end post

### *How a Profitable Contract Was Landed*

The writer enjoyed a vacation on a large farm owned by a Mennonite who accommodates boarders from the cities during the summer. It so happened that a builder from a smaller town was visiting the farm during the period of the writer's stay, and fate would have it that the builder was to receive an order from the farmer for certain improvement work. It came about in this way: For several years past the farmer's wife and two daughters had been cooking and preparing meals for the family and farm help, in addition to numerous boarders, in a comparatively small kitchen. The place was exceedingly hot and uncomfortable. One morning the builder stopped to look in this kitchen, and immediately he "had an eye to business."

"A nice, spacious kitchen would be greatly appreciated by your women folk,"

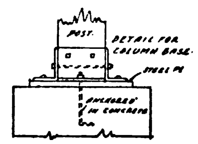



Fig. 5—A good form of column base, with knees riveted to base plate, preventing displacement

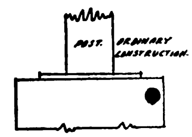



Fig. 6—Type of ordinary construction not so good as that shown in Fig. 5

the builder suggested to the farmer a few hours later, when the old Mennonite came in for dinner. "It would cost only a few hundred dollars to build a kitchen of brick, with half-a-dozen windows; there would be more light and air, and the women could do their work under better conditions. Another thing to consider, the old kitchen, being of frame, is in constant danger of fire."

"I have been so busy on the farm that I never thought of a new kitchen until you mentioned it," admitted the farmer. "A brick building would be good."

The builder then sketched a rough plan for the proposed improvement and the Mennonite was soon deeply interested. After a little talk over prices, the size of the floor space and other details, the builder secured the order to erect the brick kitchen in the fall, after the boarding season closed.

On the following day the builder, while talking with the farmer as the latter was

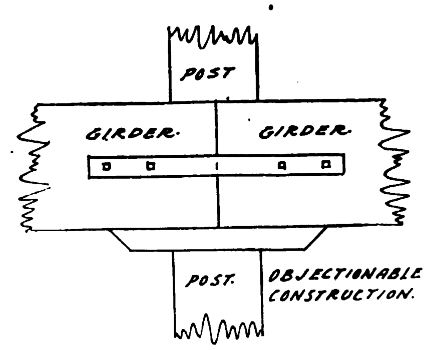



Fig. 4—A common form of construction which is not good. No tie is provided between post and girders, which might prove disastrous in case of settlement due to insufficient footing or shock

feeding live stock in the barn, gained another order. It came as a result of the following conversation:

"There is one thing about this barn that I don't like," remarked the countryman, as he hurried on with his labor. "It is a style of barn which is in general use in these parts, but there is a defect in the front construction which has caused me a loss through several cows and horses having taken sick and afterwards dying. You see, this barn is built in about the same way as nearly all of the other barns I have seen in this state. In the back, a tilted platform leads up to the upper floor where we keep our hay, straw, grain, and so forth. That's all right. The defect is in the upper part of the barn having an overhang of about twelve feet at the front.

"This overhang is for the purpose of preventing rain and snow from reaching the lower section of the front where the swinging doors open on the stalls or stable. Experience has proven to me that the overhang prevents sunlight from reaching the stalls where the live stock is quartered. This results in the lower apartment of the barn becoming damp. The dampness has caused sickness and death to several of my cows and horses, and a veterinary told me that this dampness in barns is often the cause of serious disease among animals. Now if the front of the barn was built in such a way that there would be no overhang, and if the doors to the stable were made weatherproof, with glass windows in each door, I feel sure that conditions would be better for the live stock on account of more sunlight reaching the stalls."

"I am glad that you brought out these facts," answered the builder. "To tell the truth, I had never considered the disadvantages of the overhang construction. Your ideas are very practical, and for the next barn I build I will make use of your suggestion as to eliminating the overhang, provided the farmer who orders it will be satisfied. Now if you would care to have the front of your barn remodeled with the stable doors of wood-and-glass, I can do the work when my men come to build the new kitchen." After quoting a price covering the estimated cost of this change, the builder was awarded the contract.

It was the writer's privilege to accompany this builder on a long walk through the country, and while taking time to admire golden wheat-fields, cool woodlands and other pretty scens, our thoughts drifted along business subjects.

### *Getting Remodeling Work*

"I have been making a specialty of building and remodeling work for farmers in this section," explained the builder. "And, you would be surprised over the great variety of the jobs. For example, the farmers of these days are ordering a large amount of concrete construction, such as concrete walks between the various farm buildings, concrete covers for cesspools, concrete posts for fencing, concrete steps for homes, concrete foundations for barns and porches, concrete floors for hog houses, spring houses, stables, etc. A few years ago, when farm labor was not so scarce and costly as at the present time, the farmers had been doing a lot of this work themselves, but to-day things are different. They have come to realize that it pays to have an experienced builder attend to these jobs.

### *How Letters Have Been Used Profitably*

"Imitation typewritten letters have helped me get considerable business. I keep a mailing list of all the leading farmers in this district, and I send them the form letters about four times a year. One letter covers concrete work of various kinds which can be done to advantage on the average farm; another letter goes into detail about the newest construction of hog houses; still another is devoted to the subject of remodeling work for homes, and so on. Whenever a farmer writes a reply indicating that he is interested, I call upon him personally with the aid of my touring car. When I secure an order, I make arrangements with the supply dealers to deliver material to the railroad station near the farm where the work is to be done. Often I make use of the farmer's teams in moving the material from the railroad station to the place required.

"Some of the farmers are spending money for homes of new construction. I have recently erected three good-size houses of the hollow tile type, equipped with all the modern conveniences. Last week I received an order from a wealthy farmer of Montgomery County, Pa., for the building of a spacious hog house with walls of hollow tile. The specifications call for a floor of concrete; a central passage-way with pens on either side. The troughs will be made of concrete, and the pens will be divided off with railings of gas piping. There will be numerous windows so as to allow an abundance of sunlight to reach the interior.

"Hog houses of this type are being erected in various sections of the country and they are well worth the additional cost of building over the ordinary frame hog house. The hollow tile hog house is warm in winter and cool in summer. The concrete floor and the concrete troughs keep the house sanitary, and there is a big saving in food, as the hogs secure all food which falls on the floor. A house of this kind can be washed and cleaned within a few minutes. The health of the animals is kept in the best of condition. For fine pedigree stock, a house of this model is just the thing."

While on the subject of hog houses, the writer will attempt to describe another type of hog house which seems to be very popular on farms in certain sections of Pennsylvania, New Jersey and Delaware: The house is of lumber, built in the form of a large "L," about forty feet long on each end. There is a feed mixing room in the corner of the "L." Rows of pens are on each side of the "L." The flooring is of 2-in. planking, raised about eighteen inches on concrete foundations. The yards are about thirty feet square, covered with concrete. Fencing, about four feet high, inclose the yards.

Some of the farmers who own hog houses of this design, have found it of advantage to have the floors covered with concrete, and wooden troughs have been replaced with troughs of concrete. The result has been a more cleanly house with a considerable saving in feed, as with a plank flooring there is some wastage of feed, and it is not easy to keep the place clean.

Many of the Pennsylvania, New Jersey and Delaware farmers are having new barns built with fire-proof roofs and with concrete foundations for pillars. Some of the larger barns have the walls made of tongued and grooved lumber, with the boards running vertically so that rain will not rest in the grooves. In some instances the barns are lined with wood or composition sheeting to make them warmer during cold weather. There are numerous windows so as to admit plenty of sunlight. Several of the new barns have the first floor covered with concrete.

The writer knows of one case where a farmer has had an inclosed passage-way built of lumber, leading from the farm house to the barn and stables. This passage-way is of great utility during a heavy snowfall, as the farmer has no difficulty in reaching the live stock for feeding and milking. Builders who make a specialty of farm buildings should be able to secure orders for erecting "tunnels" of this character. While the idea is not new, yet it may be that many of the farmers have not thought of the plan.

### *Concrete Work Is Profitable*

One builder is making a specialty of all kinds of concrete work for farms. He has received many orders for concrete "borders" around farm houses which are for the purpose of preventing water and dampness from reaching the basements of the buildings. This is mentioned merely to illustrate one of the many uses for concrete on farms. This builder is also working on orders for concrete fence posts, concrete foundations for various kinds of farm buildings, concrete pavements, covers for wells, etc. One of his recent operations consisted of a large spring house constructed entirely of concrete.

This builder gains new business through advertising in country newspapers in his section. The different varieties of concrete work in which he specializes are mentioned in the advertisements. The builder also makes it a practice to call personally upon the leading farmers in the district. He keeps well posted on agricultural subjects, and in talking with the farmer "in his own language" about the progress of crops, weather conditions, etc., he soon has the tiller of the soil interested in the matter of improved farm buildings. Business often comes as a direct result of this psychology.

There is actually no end of new construction work, remodeling and repairing work for builders who cultivate business from the farmers of the United States. Storm doors and windows for homesteads constitute one of the branches of the builders' business which has been increasing largely of late. The storm doors and windows are of particular advantage on farm homes which are exposed on all sides, and it does not require a long argument to secure orders from the farmers for these fuel savers.

Sleeping porches for farm homes is another builders' specialty which has been making rapid progress during the last few years. The sleeping porch is of particular benefit to the larger farm residence where boarders are accommodated during the summer. The builder should explain this advantage to the farmer. Call his attention to the fact that many city folk who spend vacations on farms are willing to pay higher rates for the privilege of taking the "open air cure" on a sleeping porch fitted up with screens.

At the present time there are hundreds of farm homes throughout the country which are in need of additional wings, summer kitchens, porches and other improvements of this class. The farmers have been enjoying good times and they are in a better financial position than ever before to have these improvements done. It remains for progressive builders to go after this business, and to receive the orders by offering helpful suggestions to the farmers.

There is another fertile field for the builder in the way of interior improvements for farm homes, such as artistic fire places of brick, window seats, enlarging parlors, living rooms, kitchens, and so forth. Mr. Builder, are you asking for this kind of business?

Figs. 1 and 2—A serviceable garage of hollow tile

# Car Owners Want Convenient Garage Doors

*Doors Most Used Part of Garage — Proper Arrangement Gives Good Impression of Builder's Ability—Types Which Have Proved Successful*

By E. J. G. PHILLIPS

The thousands of private garages which are built every year have created a distinct branch of the builders' business for this relatively new type of building, and the up-to-date carpenter should be well acquainted with the most approved construction. Although generally of simple design and modest proportions, yet many rather elaborate or more pretentious garages are being built. The garages presented herewith illustrate the average practice and cover quite a variation in style, size and construction. An experienced builder can gather enough information from photographs of simple garages to plan and execute his building operations, adjusting the dimensions to the specific case, while to the layman a photograph gives a better idea of the finished building than a set of plans.

Often the first garage is a hurriedly built, poorly designed cheap structure which must later give way to a more practical and artistic building either when the owner realizes more fully the requirements or when his purse is better able to respond to the financial requirements. Whenever possible the garage should be constructed to correspond with the residence to which it belongs.

Practically all kinds of structural materials, such as wood, brick, concrete, stucco, stone and sheet metal, are used in the construction of garages. The selection depends largely upon the surroundings, the degree of permanency, the architectural requirements and the permissible expense. The fire hazard should induce favorable consideration of non-combustible building materials.

One of the most important details of a garage are the doors. The difficulties arising from the unusual requirements of the garage doors, due particularly to the large proportions of one side of the building which must be opened, has led to the development of a number of new and unique methods of handling the doors. The photographs shown are grouped with special reference to the door design exemplifying several exceptionally good methods of hanging sliding garage doors.

Figs. 1 to 6 show garages all modest in size but large enough to accommodate two cars. The main entrances are closed by two sliding doors on parallel tracks.

Figs. 1 and 2 show a serviceable type of two-car garage 18 ft. square, of hollow tile construction, covered with stucco. The entire front is closed by two doors sliding in parallel tracks. Either half of the doorway may be opened by moving one door toward the opposite side. In No. 1 the doors are closed, while No. 2 shows the right-hand door about half open. A steel storm plate between the doors at the top serves to keep out the weather.

An artistically designed garage with pergola on front and side is shown in Figs. 3 and 4. Lower half of walls is in stucco and upper half weather stained shingles. The hip roof has low spreading bungalow type dormer. Shrubbery and hedge-lined drive make a good setting. The 9-ft. doorway is closed by

Figs. 3 and 4—A pergola on front and side makes this garage exceptionally attractive

Figs. 5 and 6—A brick garage with glass panelled doors to provide light inside two doors, one 3 ft. wide and the other 6 ft. wide. The doors slide on separate tracks, as indicated in No. 4, where the

Figs. 7 and 8—A moderate cost one car garage

Figs. 9 and 10—A good sized garage with work bench, washroom, etc.

Fig. 11—A brick garage for two cars

narrow door is shown partly open. This narrow door is used as a service door in entering the garage, and so making it unnecessary to open a large door except when the car is to be driven in or out. Both doors slide back of the front wall.

Figs. 5 and 6 illustrate a garage similar to that shown in Nos. 1 and 2 except that it is of brick construction. The doors are constructed with horizontal panels at the bottom and a large glass area at the top to provide abundant light inside. No. 6 shows the right-hand door moved to the left. When a car is to be driven into the left side of the garage the position of the doors will be reversed, i.e., both doors will be at the right side. Metal strips at the bottom of the door sliding in guides set in concrete floor prevents rain and wind from beating in.

The garages in Figs. 7 to 12 employ doors sliding singly or in pairs on a single track all inside the building.

Figs. 7 and 8 show an 18-ft. x 20-ft. garage of moderate cost designed for one car with an abundance of space on either side. The 8-ft. opening in the center is closed by a pair of sliding doors which slide inside of the building. No. 2 shows the doors open. The sliding door is especially desirable and safe because it cannot be accidentally blown shut in the face of an approaching car, neither does it require any means of fastening in the open position. Snow does not obstruct the movement of the doors and they are less likely to sag and drag on the floor.

A garage of larger size with plenty of room for two cars, for workbench and for washing is shown in Figs. 9-10. A dormer of generous proportions assists in ventilating and adds to the general attractiveness. The doors are similar to those described above except that they are much larger in size, each door being 8 ft. wide by 9 ft. high. The panels in the door do away with the barn-like appearance common to large doors. The two views show doors in different positions.

Fig. 11 is a more pretentious garage of brick construction with tile roof, which suggests stability in every detail. A separate doorway is provided for each car. The glass in the door is designed to match the windows and all the light

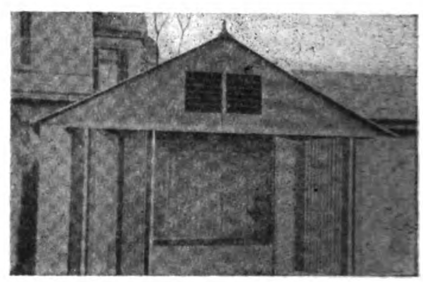
Fig. 12—An elaborate private garage with chauffeur's sleeping quarters

from the front side of the building comes from this source.

Fig. 12 is an elaborate private garage in which the living rooms for the chauffeur are located on the second floor of the central part of the building. One large sliding door is located in the center of the building.

Garages of wood, stucco and steel construction are given in Figs. 13 to 18. Doorways are closed by four or six sliding folding doors.

A considerable number of portable steel garages are coming into use. Figs. 13 and 14 are examples of this type in which nearly the entire front is composed of four doors. The doors are hinged together in pairs, one pair sliding and folding toward the left side and the other to the right side. Each pair of doors is supported by a sliding door hanger located where the two pairs of doors meet at the center of the opening. This hanger prevents sagging of the doors and dragging on the floor. The operation of the doors is plainly shown in the illustrations, Fig. 13 showing the doors partly open and in Fig. 14 the doors are entirely open.



Figs. 13 and 14—A type of portable steel garage

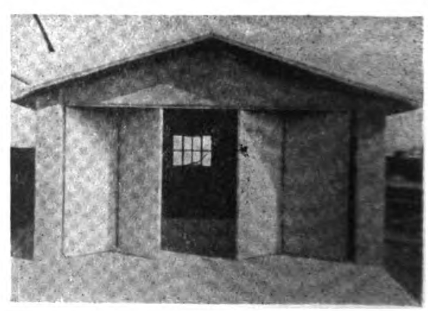
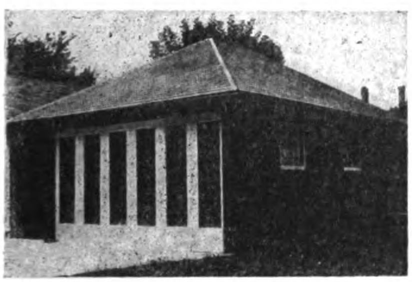


Fig. 17—A garage of concrete and stucco, doors being similar to those in Fig. 14

This garage of frame construction illustrates an extensively used type of door. They operate similar to those in Figs. 13 and 14 except that six doors are used, three sliding and folding toward each side. The long glass panels provide plenty of light and make an unusually attractive door. A particular advantage of this door is that a large opening can be obtained without using much space inside the garage to swing the doors. It is essential to use narrow doors, not exceeding three feet in width in order to obtain best results. Fig. 15 shows doors closed, and in Fig. 16 the left section of doors is entirely open and the right section partly open.

Fig. 17 shows a garage similar to that shown in Figs. 13 and 14 except that it is entirely of concrete and stucco construction including the roof. The fireproof features should appeal to prospective builders.

An unusually attractive garage of frame and stucco construction in a beautiful setting of shrubbery is shown in Fig. 18. Six sliding folding doors are used similar to those shown in Figs. 15 and 16. This view illustrates another of the desirable features and that is the service or passage door at the center which is shown partly open. It is unnecessary to open a large door to walk in or out of the building.



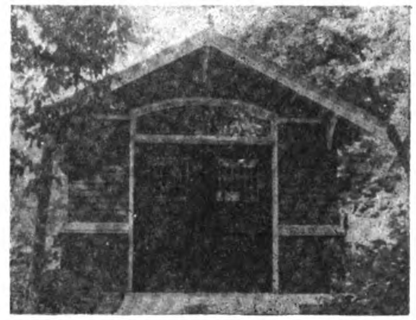
Figs. 15 and 16—A popular type of door is used on this garage

Figs. 19 to 24 is a series of good practical garages in which the doors are made to slide around the corner inside the building.

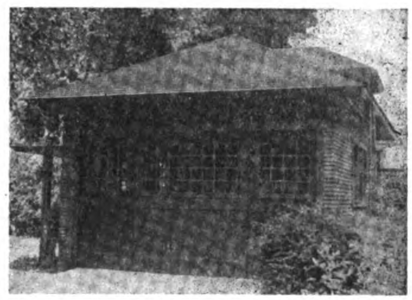
Figs. 19 and 20 are a neat, well-proportioned one-car garage of brick, frame and stucco construction. Particular attention has been given to all the details of construction, such as cornice, transom, doors, etc. The concrete foundation supports the brick walls extending to the stone belt. Above this weather stained shingles cover the space to the cornice. The gables are stuccoed. This garage illustrates a condition frequently met with where the building is not wide enough to use ordinary straight sliding doors and the best method is to slide the doors around the corner along the side walls of the building. Fig. 20 shows one door partly open. Very little space is required in which to move the doors.

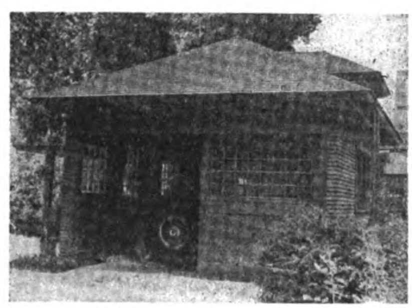
Figs. 21 and 22 show a twenty-foot square brick garage with composition shingles which was built for two cars. Each door opening has two doors hinged together which slide around the corner inside of the building and occupy positions along the side walls when open. The doors are carried by hangers which run in trolley track. The tracks are curved at the corners of the building. Fig. 23 shows one set of doors partly open. One particular advantage of these doors is that they are entirely inside and are not obstructed by snow or sleet and they cannot be blown by the wind.

It is frequently necessary to enlarge the opening in an original one-car garage, to permit the housing of two cars. Figs. 23-24 is an illustration of such a case. The narrow doors at the sides, originally closed 8-ft. opening in the center of the garage. When remodelling, the entire front wall was taken out and the two original doors were moved to the sides of the opening as in Fig. 23. They were hung on right angle door hangers and tracks so as to slide around the corner as shown in Fig. 24. It was then only necessary to make one new large door for the center, which slides either to the right or left side, after the smaller doors have been opened. Fig. 24 shows the large door moved to the right side to permit a car to enter the left side of the garage. If a car is to enter the right side of the garage, the large door is slid over to the left side of the opening.



Figs. 19 and 20—Materials are well contrasted in this garage. Doors slide around the corner space, being limited





Figs. 21 and 22—A brick garage in which doors slide around inside the building, being against the walls when open

Fig. 18—An attractive frame and stucco garage, with folding doors

Figs. 23 and 24—A garage remodeled to house two cars

# July First---What Are You Going to Do About It?

## *Saloons Must Be Remodeled to Suit Needs of Other Businesses—Excellent Profits Possible—How to Get This Work*

By BRICKSAND MOTTOR


If you've got ideas, saloon properties will swell your income. The bottle won't pour booze, but dollars, into your hat

"What preparations are you making for July 1st—outside of laying in a stock?" asked Jameson, as he and Jones were discussing the prospects for summer business.

"Why, nothing so far. I have thought of going around to see the owners of saloon buildings some time in July. Nothing much can be done about it now."

"In July you'll probably find that some other builder has been given at least some of the jobs. When you want business, you must go after it before it is fully ripe and help develop it. If you do that, there is little chance for some other builder to either cut you out, or to be selected by the owner who doesn't want his property to lie idle."

"There are twenty-five saloons in this town. Every one of them will be put out of business July 1st. And if the property owner is not going to lose money, his plans must be completed to turn that saloon into some other kind of a store. Furthermore, he must have secured a tenant by that time. There is a scarcity of buildings here, and there is not much chance for the property to lie vacant long. Of course, the twenty-fifth property owner to get started is going to find more trouble in letting his property than will the first. That's only common sense."

"What would you suggest?" asked Jones.

"I'd suggest that you send a letter to each one of the property owners, fitting it to the personal needs of each one. Something like this," and Jameson wrote out the following letter:

Have you decided what you are going to do about your property at 161 First Avenue after July 1st? On that date there are going to be twenty-four other saloons vacant; the owners of each one of these buildings is going to be on the lookout for a tenant, and ready to offer big inducements.

Why should you wait till July 1st to look for a tenant? If you start now, you will get ahead of the other twenty-four property owners who have leased buildings for saloon purposes.

I have specialized in business tendencies here in Woodhull, and know just what businesses there are a demand for. Probably I can give you some good suggestions as to how a tenant may be secured.

Of course, some remodeling will be necessary when the tenant is secured. I shall be glad to prepare sketches and plans showing just how the building can be fitted to meet the needs at the lowest cost. These sketches and plans will prove of decided help in securing a tenant. Then with all this preliminary work done before July 1st, tenant secured and plans for remodeling made, the new store can open on August 1. I can promise you such a quick job because I have specialized in remodeling and have developed methods of doing such work in a remarkably short time.

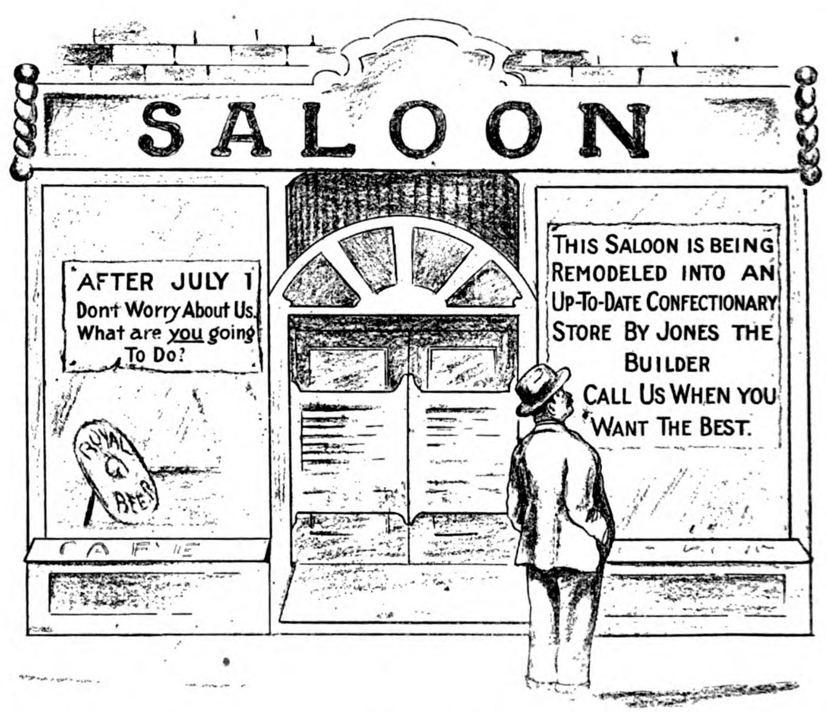
Thus, by acting now, you will only lose one month's rent, and will escape the inevitable cut-rent competition that will occur if twenty-five saloons are offered to tenant at the one time.

I shall take the liberty of calling on you Friday, April 18th, at 10:30 a. m., if convenient to you. Then we can go into details and I can probably make some suggestions which will help you to secure a tenant quickly.

Sincerely yours,

"That letter covers about the main points that should be brought out," said Jameson. "What the property owner is interested in is securing a tenant soon, and getting the store remodeled quickly so that he won't lose rent by having it stand idle longer than necessary."

"Another thing, the letter makes it very hard for a man to say 'No.' You




Well, Mr. Builder, is your name going to be down as doing the remodeling?

take it for granted that he will be sufficiently interested to see you, appoint a time when you will call at his home, and give him a good reason why he should see you. Of course, if he has an office here in town, it would be better to see him during the day; but if he commutes, then the evening is probably the only time to see him."

"I'd also suggest that for a short time all your newspaper advertising be built up around the idea of remodeling. This is good general publicity, and will help convey the idea to these store owners that you have done more remodeling than any other builder in town."

"Of course, if you promise to have the remodeling done by August 1st, you must keep to your word. If jobs accepted previously will prevent you from completing the work in time, say so frankly. Keep your reputation clean, even if it means turning down a job."

"If you've done any work for any of these property owners, I'd suggest that you give them the first chance at your services. And, of course, you'd try to land the bigger jobs first."

"Jameson," said Jones, "I think that there is a mighty good prospect for some profitable contracts in what you have told me. I don't see however, just how I am going to help the owner find a tenant."

"When you've got anything to sell," explained Jameson, "the best way is not to try to sell it broadcast, but to pick out individuals who may need what you have to offer. Show them that you have what they need, make them want it, and you will carry the sale without trouble."

"Now, in looking for a tenant, your knowledge of what businesses are needed here will prove valuable. For instance, last time I was here you told me that you had heard that a chain grocery store man had been around looking for a good location. Now, he couldn't get a better location than Hannegan's saloon. Suggest to Harvey, the owner of the building, that he write to the grocery people about his store. Of course, these people have standardized store fronts, but they need a local builder to do the work."

"Where you don't know of any possible tenant, you can inquire among your friends in the real estate business. If any of them happens to know of a prospect, you can tell the owner that so-and-so is in touch with a possible tenant, and to communicate with him."

"Try to keep in with the real estate men, and to secure tenants through them whenever possible. They are worth cultivating, for they can turn many a job your way."

"Any sketches or plans showing how well the store can be remodeled to suit the prospect's needs will prove a big help in interesting him. It shows him what you actually have to offer now, not what you will have to offer when ideas are whipped into shape. The property owner should appreciate the help you can give him in this manner."

"And, by the way, have photographs taken of these jobs before and after you do the work. These photographs will probably come in handy later when talking to store owners who can make their property more valuable by remodeling."

# How Labor Is Helping to Lower Costs

*Architect's Investigation Shows Low Costs Possible In Spite of Higher Material Prices*

That a reduced wage scale is not an indispensable preliminary to resumption of activity in the building trades is the opinion of Morton Chase Tuttle, who has just returned to Boston after more than a year of service as production manager for the United States Emergency Fleet Corporation. Mr. Tuttle bases his judgment on some very recent investigations of large construction enterprises located at various points from New England to Florida, supplemented by careful studies carried out under his direction by the Aberthaw Construction Company of Boston, of which he is general manager. These unmistakably indicate that increased efficiency of labor is bringing down costs even while wages remain at existing altitudes.

"In the course of viewing numerous undertakings more or less closely associated with interests of the Government," says Mr. Tuttle, "I have lately been impressed to find the statement commonly made that costs of operation are beginning to show a noticeable decline. And this, almost without exception, was attributed to increased efficiency of the labor force, due in part to the opportunity for weeding out the less dependable workers, in part to the growing desire of all members of the force to retain their jobs.

"Owing to inadequate or otherwise unsatisfactory cost systems maintained in connection with most of these undertakings, I found it impossible fully to check the statement by actual figures. Accordingly, I asked my own company to make out the cost of any one process in an operation continued over a period of several weeks. That which was selected was a piece of concrete work; the costs studied were those for the common labor employed on this work from January 7 to February 4 of the present year inclusive. During this period the wage scale remained unaltered, but the personnel of the labor force underwent frequent changes.

"A graph of the labor cost of the work during the period noted shows a sharp and almost undeviating decline from day to day. On February 4 these costs were exactly 50 per cent less per unit than were those of January 7. It is my belief that the experience of my company is by no means isolated, and that in almost any labor force there lies the opportunity of realizing economies ranging from 20 to 50 per cent without interfering with the wage scale.

"This implies, of course, that there is now increased opportunity for selecting men according to their suitability for a given task, and an increased eagerness on the part of the men to make good. But this is as it should be, and the whole country ought soon to feel the effect of it in general improvement at all points. It is a case of supplanting so-called *liquidation of labor* by proper *adaptation of labor* as a means of keeping the cost of doing things within the bounds of utility.

"And in this connection it may well be urged that state of mind is often as potent a factor in ultimate labor costs as is the rate per hour. Any one experienced in handling workmen has recognized the difference in output between a cheerful, capable man, anxious to hold his place, and one who is a little disgruntled, and quite conscious that he can get another job the moment he drops the present one. Multiply either case by thousands of individual instances and I believe that there will be found, in shifts of mental attitude, the explanation of much of the variation which occurs in unit cost. And this, after all, is the element of labor which directly affects the profits of the employer."

# Placing the Refrigerator Conveniently

*Hints That Increase Household Efficiency*

Nearly every house owner or renter upon moving into a new residence is called upon to decide almost immediately,

A refrigerator iced from the outside is a convenience in any home

"Where shall we put the refrigerator?" In practically every house places have been provided for the stove, the dishes and other important adjuncts to a complete home, but very few provide a place for the refrigerator. If a place is provided it is probably left to chance without regard to its convenience or the size of the refrigerator that will be required.

This has resulted in a large business in built-to-order refrigerators, and this is essentially inefficient because it costs more and is generally unsatisfactory. Even the refrigerator manufacturer prefers to build standard sizes and would confine himself to a standard line if he could do so. Every manufacturer does build a standard line, and if the home builder or architect would take the trouble to inform himself what these sizes are he could provide a suitable place in his plans.

Very few builders give this subject any consideration, and the architects are employed to think of just such things and provide for them. They, too, are guilty of negligence in this respect. There really is no excuse for this. Not only should sufficient room be provided, but the location should also be considered because the efficiency of the refrigerator depends upon its location. Accessibility is another important consideration, both for charging and for the storage of food, because the housewife makes many trips to it each day and it should be conveniently placed.

The charging of the refrigerator brings up another important point. The old fashioned way is to charge the refrigerator from the front, but the modern way is to charge it from the rear and from the outside. The former method means, as a rule, that the ice must be carried into the kitchen and water drips from it onto the floor, while all icemen have dirty boots. You don't have to be married to know the mental anguish that this causes the lady of the house. And she is justified in her objections. Coal for the furnace is not carried to the basement through the kitchen and in normal times the coal supply is replenished only once or twice a year. Why, then, should the ice, which has to be renewed every day or so, be carried through the kitchen?

However, if an outside icing refrigerator is used an outside opening must be provided and it should be easily accessible. The door from the outside should be weather stripped to keep out the cold in winter and the heat and dirt in summer.

These are problems with which every architect and builder should acquaint himself. Don't leave this to chance; your forethought on this subject will please your client and add to your own reputation as a thoughtful and reliable adviser.

Any refrigerator company will gladly give you a list of its standard sizes and any further information in regard to its line that you desire. Nearly all of them now make the outside icing type and have drawings showing the sizes of outside openings required for the various sizes.


## When Can Laborers and Material Men Sue Contractor's Surety Company?

Where the provision of a contractor's bond is to the effect that "This bond is to be liable for payment of labor and material," laborers and material men may recover the amounts due them by suit against the surety company, indemnifying the contractor whenever it appears that their rights and interests were thus contemplated and provided for.

In February, 1916, the Greensborough Warehouse and Storage Co., as owner, contracted with C. G. Johnston, as contractor, to supply the material and construct six houses for the company in or near the city of Greensborough on a designated site and according to certain plans and specifications, for the price of $19,000, the same to be completed by the 15th day of June, 1916. The contract further provided that in case of failure to deliver the completed building at that time the contractor was to pay the owner a rental of $1.50 per day for each uncompleted house until delivery of the entire work included in the contract was made. It was also provided that the contractor should give a bond in the sum of $10,000, executed by a surety company, guaranteeing among other things the faithful performance of the work, and that the bond should be liable for payment of labor and materials provided for in the contract.

In September, 1916, the contractor having failed to complete the work, and being unable to do so, the owner gave written notice and took over the work and, under a condition of the contract allowing him to do so, completed the buildings.

Various claimants for labor and materials which had been furnished to the contractor thereupon instituted suit on their claims and proceeded against the contractor's bond.

The court decided that the surety company which had given the bond was liable for the labor and material claims.

## When Do Letters Constitute a Contract?

The Supreme Court of Alabama recently decided that letters do not constitute a valid contract, where an offer to seal is made by letter, unless the acceptance is unqualified and contains no new terms or conditions.

In this case a dealer had offered an indefinite quantity of boards at certain prices which varied according to grade. The buyer wrote a letter offering to accept a minimum quantity on conditions not contanied in the original letter.

When delivery was refused the prospective buyer brought suit for damages for breach of contract. The court in denying his claim said:

"The law of contracts did not require the defendant to sell except upon the acceptance of his offer in the terms of his proposal. Defendant neither did nor said anything to indicate his acceptance of plaintiff's offer upon the terms on which it was made. Letters will not constitute an acceptance unless the answer is a simple acceptance without the introduction of any new terms."

## When Does Temporary Structures Remain Really Owner's Property?

An Arkansas case, interesting to contractors and other persons who are accustomed to erect buildings of a temporary character on land owned by others, was recently decided in the Supreme Court in that state.

The lease in this particular case leased to the tenant only certain surface ground, but provided that if all the rent were paid and all the covenants were complied with the lessee should have the right within 60 days after the expiration of the lease to remove all buildings and improvements put upon the leased lands by him.

The tenant erected several frame shacks upon the leased ground and just before the expiration of his lease removed one of them and declared it to be his intention to remove the others.

A temporary restraining order was issued prohibiting him from removing the others pending a decision as to his right to do so.

The Supreme Court said on this point:

"The buildings were erected under a contract by the express terms of which a right of removal was reserved. They did not therefore become a part of the realty but remained the lessee's property.

It appears from the facts, as well as from the lease itself that the buildings were erected on the leased ground solely for the purpose of enabling the lessee to carry on his business or trade, and were intended for his own use and convenience, and not for the purpose of making a profit by increasing the value of the lots.

"Trade fixtures are articles erected or annexed to the realty for the purpose of carrying on a trade, and are removable by him during his term provided the removal does not affect the essential characteristics of the article removed or reduce it to a mass of crude materials.

"No attempt was made to show that the buildings whose removal was sought to be enjoined could not have been placed on rollers or in some other manner without taking them apart, have been removed from the land, nor does it appear that the buildings which were removed were reduced to a state of crude materials. . . . The buildings were therefore trade fixtures and a right of removal existed."

## Can Written Contract Be Abrogated by Verbal Agreement?

In a recent case it was decided, where a suit was brought to recover a balance claimed to be due for materials furnished and labor performed in erecting certain dwelling houses, that even though the contract contained the provision that "no charges for extra work will be allowed unless same be ordered in writing by the owner, and accepted by the contractor and signed by the owner in duplicate," that the parties could make a subsequent independent oral agreement and it would be considered a modification of the original contract when executed. The contractor's claim for the balance was therefore allowed.

## Right of Dealer to Refuse Payment for Lumber

In a recent Virginia case, where a seller of lumber sued for the purchase price of a shipment made, he was denied a recovery, the court holding that a purchaser of lumber by the carload lot has the right to rely upon the obligation which rests upon the seller under his contract to ship a commodity of the character and quality specified.

The court further decided that the buyer is entitled to a reasonable time in which to unload the car and make an inspection or examination before he is required to accept the shipment.



## Independent Contractor Defined

Judge Kelly, of the Supreme Court of Appeals of Virginia, in the recently decided case of Clinchfield Coal Corporation vs. Redd, defined the words "independent contractor" to mean "one who exercises independent employment or contracts to do a piece of work by his own method and without the control of any employer, except as to results."—96 S. E., 836.

## Are Lighting Fixtures a Permanent Improvement?

The New York Court of Appeals recently decided that electric lighting fixtures furnished and used for the purpose of equipping an office building and labor performed in installing them is included in the term "permanent improvement of real property," as used in the New York lien law.

Judgment was therefore ordered establishing the lien in the action which was brought to foreclose a mechanic's lien.

## When Door Not in Contract Is Placed, Is Lien Valid?

In Minnesota it was recently decided that if the owners of a building have a door installed in an opening where plans do not provide a door shall be placed, after the completion of the contract, and the material for this work is the only item furnished within 90 days of the filing of the materialman's lien, the lien is nevertheless valid, not only as to the door which was furnished but also as to all other prior items.

Suit was brought to foreclose a mechanic's lien. The owners opposed the suit on the ground that the only item of material which had been furnished within 90 days of the filing of the lien was not included in the original contract. tract.

It appeared that after the owners had contracted for the erection of a house they finally moved in on October 6, 1915. After it had been occupied from three to four weeks the owners contracted to have a door put in. On January 31, 1916, the company which had furnished the lumber filed a lien for the balance due from the owners. Although the door was the only item which had been furnished within 90 days of the filing of the lien, the Court held that the evidence in the case sustained the proposition that the material was furnished to accomplish the general purpose of the original contract, and that the lien was therefore valid as to all the items which had been furnished.

## Where Architect's Certificate Is Unjustly Withheld Can Contractor Force Payment?

In a recent Virginia case where a contractor succeeded in recovering a judgment for a balance which he claimed was due on certain construction work, the contractor charged that "he repeatedly called upon the architect to issue to him a certificate for said work which they had approved, but the said architect, without any just cause or right or excuse for so doing, wrongfully refused and failed to issue a certificate for said work in accordance with the contract."

The Virginia Supreme Court of Appeals, in affirming the judgment in the contractor's favor, held that, actual fraud is not the only excuse which may be shown by a contractor for failure to produce an architect's certificate, and such a certificate, though called for by the contract as a condition precedent to payment, is not necessary if it is capriciously or arbitrarily withheld.—Richmond vs. Scott & Nichols, 98 S. E., 1.

## Are Architect's Fees Deductible in Income Tax?

**From C. P. B., Cincinnati, Ohio.**—Can you please tell me if in filing our income tax return this month we were correct when we charged up an architect's fees for preparing plans for a building which is to be used for business purposes only, as a deduction? This seemed to us to be a business expense, but we have been told that such an item was not properly deductible.

**Answer.**—If you entered up fees paid to an architect under the heading "deduction," the item was improperly included. The "Collector's Office" has held that a charge like this, even if made for preparing plans for a business building, is improper, as it should be included as a part of the cost of the building and therefore not as a business expense.

## Does Bankruptcy Wipe Out Mechanic's Lien?

**From A. N., Syracuse, New York.**—What happens when a person on whose property we have filed a mechanic's lien goes into bankruptcy? Does the bankruptcy wipe out the lien? Or does it still remain effective?

**Answer.**—The trustee in bankruptcy takes title to the property subject to the rights of material men and laborers who have properly filed their liens within the time allowed by statute, and the liens are not affected by the fact that the owner of the property has voluntarily or involuntarily gone into bankruptcy.

# Country House Details

## *Economical Methods of Wall Framing—How to Prevent Plaster Cracks by Equalizing Shrinkage*

By A. BENTON GREENBERG, Architect

Machinery has played as potent a factor in revolutionizing building construction as it has in every other line of human endeavor. When cut nails of steel and iron could be turned out by machinery more cheaply, more quickly and in infinitely greater quantities than the old-fashioned, hand-made, wrought-iron nails, it set a milestone in the progress of house framing. The time-honored system of constructing the walls of a house with massive timbers, connecting them with laborious mortise and tenon joints and reinforcing them with heavy diagonal braces, had to give way to a lighter and more economical system, which depended entirely upon nailing to bind the different planks together.

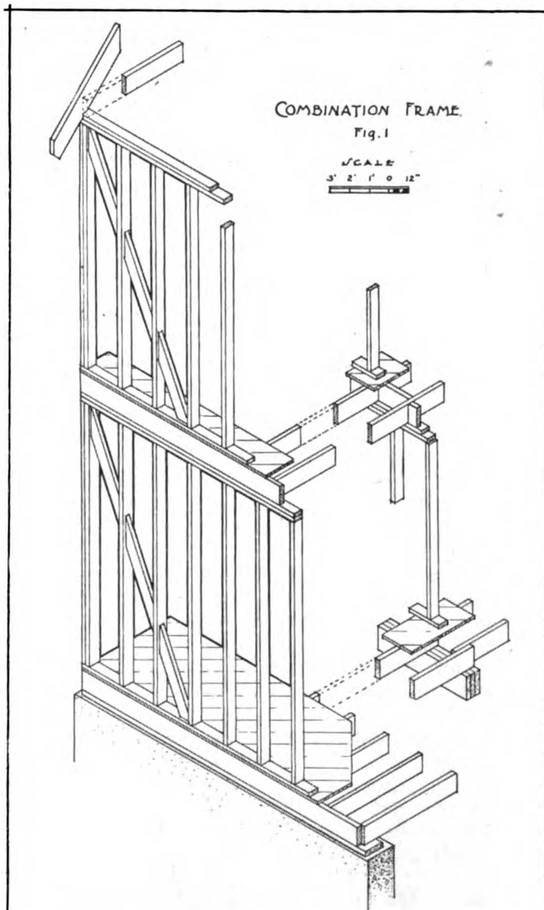
One of the distinguishing characteristics of the older method of constructing wooden buildings, known as braced framing, is the girt, shown to an enlarged scale in the upper right-hand corner of the accompanying plate. There are two kinds of girts in each house—sunk and flush. They occur at all intermediate floors and are mortised and tenoned into the corner posts and pinned with hardwood pins. The sunken girt, which is 4 in. or 6 in. thick and 6 in. or 8 in. deep, supports the outer bearings of the floorbeams. The flush girt, which is usually 4 in. by 6 in., runs parallel with the joists and is set flush with their outer edge. The flush girt should be set flatwise and should project inward so as to give a nailing to the ends of the floor boards.

The use of girts necessitates the cutting off of the studs at all floors. The studs of the first story are set in between sill and girt; those of the second story, between girt and plate. All studs are mortised and tenoned at top and bottom, spaced 12 or 16 in. on centers, set edgewise and flush with the frame. All the principal vertical and horizontal members are secured at their intersection with diagonal braces. These are tenoned into the posts, girts, etc., and are pinned together with hardwood pins. Braces to be effective must be set at an angle of at least 45 degrees and must be long enough to reach from one-third to one-half the height of the story.

Although the braced frame construction is still used for buildings requiring great strength, such as warehouses, coal pockets, and the like, it is scarcely ever employed for dwelling houses. It has been superseded by the balloon frame.

The order of procedure in the erection of the balloon frame is practically the same as in the braced frame. On the top of the foundation wall, one inch from its outside edge, the sill is set; the girder is then erected; the first floor beams framed, and the covering of rough floor boards laid. The corner posts are next placed in position, being connected at the top by the wall plate. After which, the studs are filled in and the ribbon is notched into the posts and studs on their inner face to support the intermediate floor joists.

The distinguishing feature of the balloon frame is the ribbon or ledger board, shown enlarged in the upper left-hand corner of this plate. It is usually 1 in. by 6 in., and is gained into the studding, as explained in the preceding paragraph. The joists are sized and notched out about one inch to set over the ribbon. They are then spiked to the studding. As the ribbon occurs on the inside face of the studding, the studs are run vertically, in one piece, from sill to plate.




The skeleton of a braced frame is perfectly rigid, with its stalwart corner posts, sill, girts and diagonal braces, but the balloon frame depends for its rigidity upon sheathing boards. These should be put on diagonally, at an angle of 45 degrees, to unite more firmly the different units of the wood frame. The sheathing is made to cover the entire exterior of the building, the openings for doors and windows being sawed out after the sheathing is nailed in place.

The plate that goes with this text shows, in juxtaposition, the balloon and the braced frame. It portrays vividly and clearly the relation of the different members of both types of construction. It also gives the names, the most common dimensions and the spacing of the principal parts.

There is one serious objection that may be made against the use of both the balloon and the braced frame, and that is the ravages that result from settlement due to shrinkage of the timbers composing the frames.

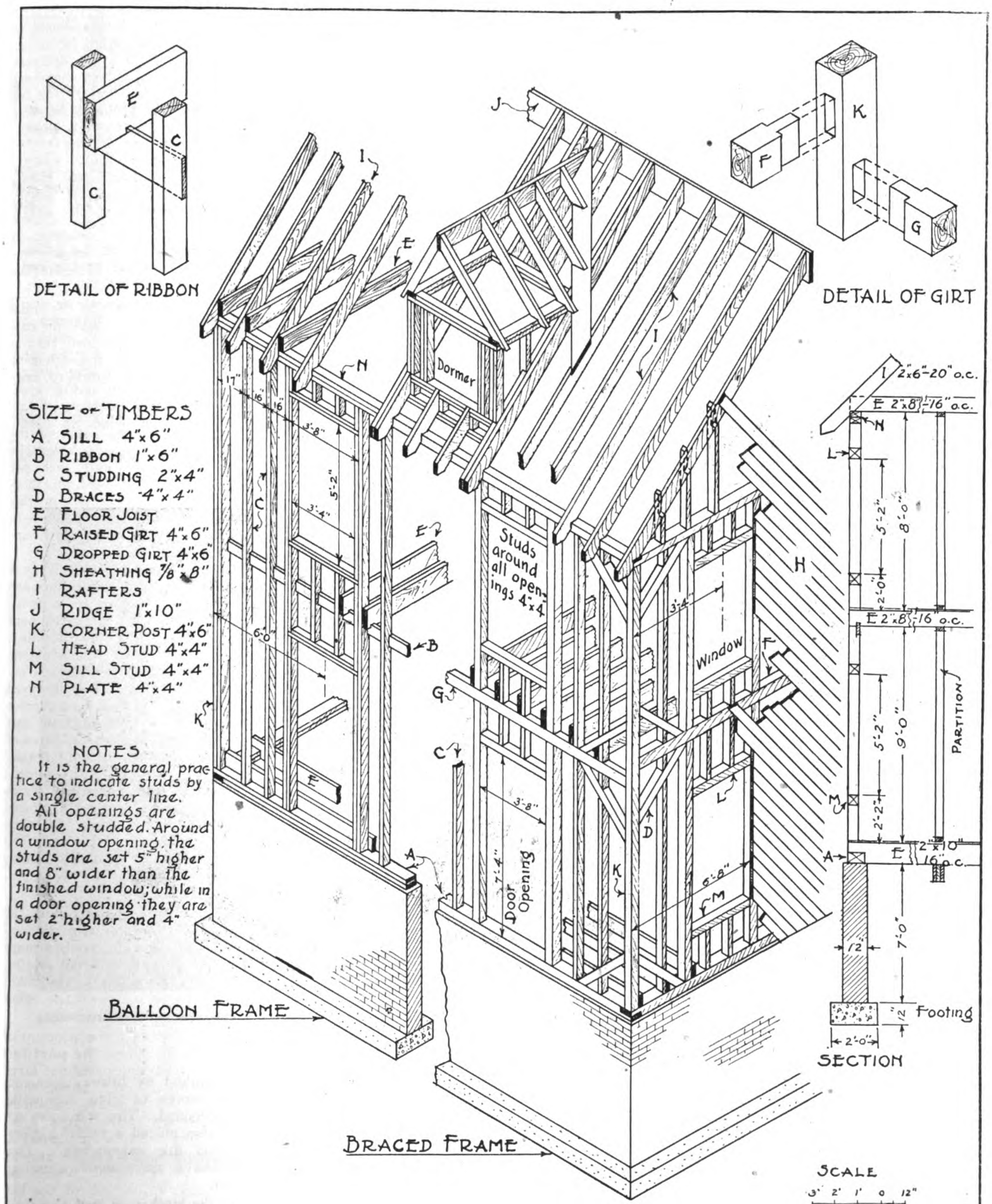
Timber shrinks imperceptibly lengthwise of the grain; but crosswise of the grain the shrinkage is considerable, amounting to almost one-half inch per foot, before the timbers become thoroughly seasoned. It is primarily this shrinkage which causes the plaster to crack, floors to sag and trim to unloosen.

All timber must shrink. That is inevitable. But if we can reduce the quantity of shrinkage to a minimum and then make the settlement uniform throughout the building, we will have solved the problem. Fig. 1 shows how this may be accomplished. It will be observed that the system of framing therein illustrated is a combination and modification of the best features of the balloon and the braced frame. The box sill and the light dimension timbers are borrowed from the balloon frame, while the braces and the separate studs at each floor are appropriated from the braced frame. For that reason Fig. 1 is known as the "Combination Frame."

The distinguishing feature of the combination frame is the disposition of its members in such a manner as to insure uniform settlement. This constitutes its main point of superiority over the other two systems of wall framing.

If we but compare the amount of shrinkable material in the partition shown on the accompanying large plate (girder, 8 in.; three floor joists, 26 in.; two layers sub-flooring, 2 in.; two partition caps, 4 in.; two partition soles, 4 in.; total 44 in.) and compare it with the amount of shrinkable material which occurs in the exterior wall of the balloon frame (sill, 4 in.; plate, 4 in.; total, 8 in., since the studding extends in one length from sill to plate) we see at a glance the reason for unequal settlement. In like manner, the discrepancy in shrinkable bearing timbers may be calculated for the braced frame. Whereas in the combination frame, by matching each timber in the exterior wall with a corresponding timber in the interior partition, we obtain a frame that insures absolute uniformity in settlement in all parts of the structure, and that, of course, is tantamount to no settlement at all.

(*To be continued*)

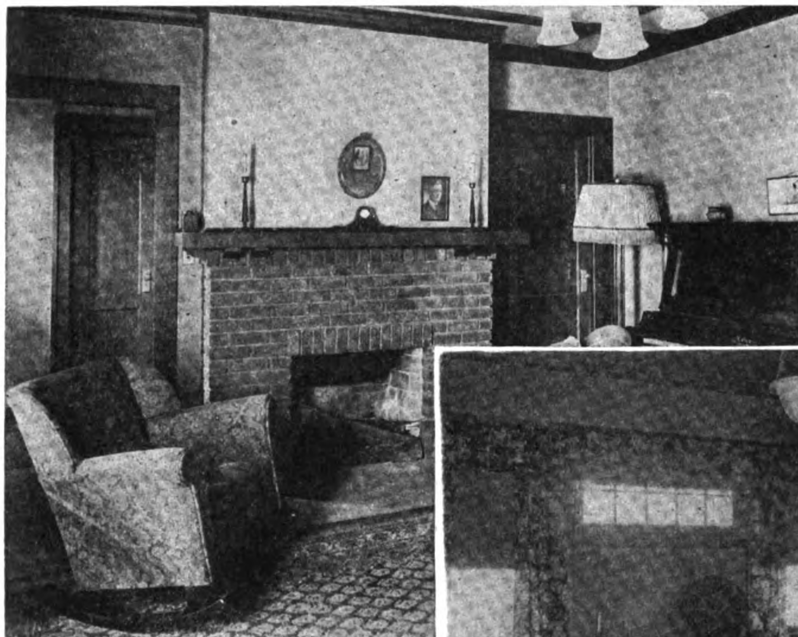



CONSTRUCTION OF FRAME

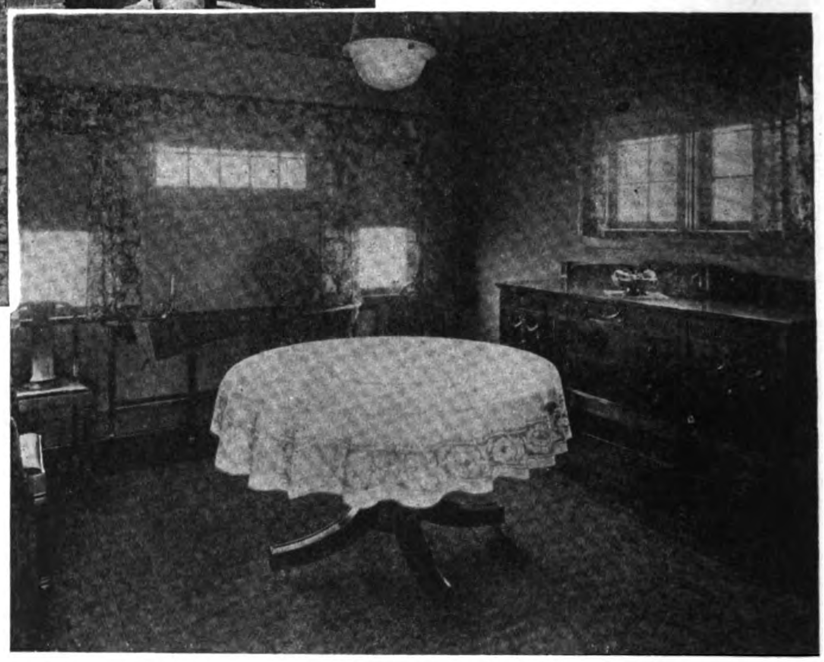
# Novelties in Plan Characterize This Bungalow

## *Kitchen Arrangement Is Interesting—Hall Is Well Placed With Waste Space at a Minimum*

The small bungalow suited to all-year-round use is becoming increasingly popular. A home with all the rooms on the one floor carries an appeal to those who desire convenience and the elimination of stair climbing. Of course, more ground space is required, yet those who can afford to build can also generally afford the small amount extra for a larger lot or for an additional lot; compared with the total cost the purchase price is small indeed, and the result is never regretted.



Simple yet effective is the living room of this attractive bungalow



The dining room has high windows, which permit sideboard and serving table to be placed beneath them

Houses with narrow fronts are in many sections not so popular as they used to be. A narrow frontage does not permit the easy, well balanced handling that makes the wider house so much more attractive. In addition, the long, low roof lines of to-day can be much more effectively gained in the wide house, with its adequate space for attractive planting.

The bungalow illustrated, with its total width of 44 ft. 6 in., requires at least a fifty-foot lot, yet the homey effect gained by its width is one of the main attractions of the design. The handling is simple, yet the proportions are well fixed; indeed proportion is the main secret of the successful small house. Large houses with their wealth of detail and large appropriations can gain much of their effect from elaborateness; the small house, with cost to be kept as low as possible, must be designed simply, depending on proportion only for the effect.

In this bungalow the siding is well proportioned; wide siding like this has a tendency to make the house appear lower, thus carrying out the typical characteristic of the bungalow type; narrow siding, sometimes mistakingly used, gives the effect of height, and clashes with what one instinctively feels is the proper balance.

A row of brick set on end, soldier fashion, to form that part of the foundation wall above grade, is an attractive detail, as are the lattice under the triple window and under the doorway hood.

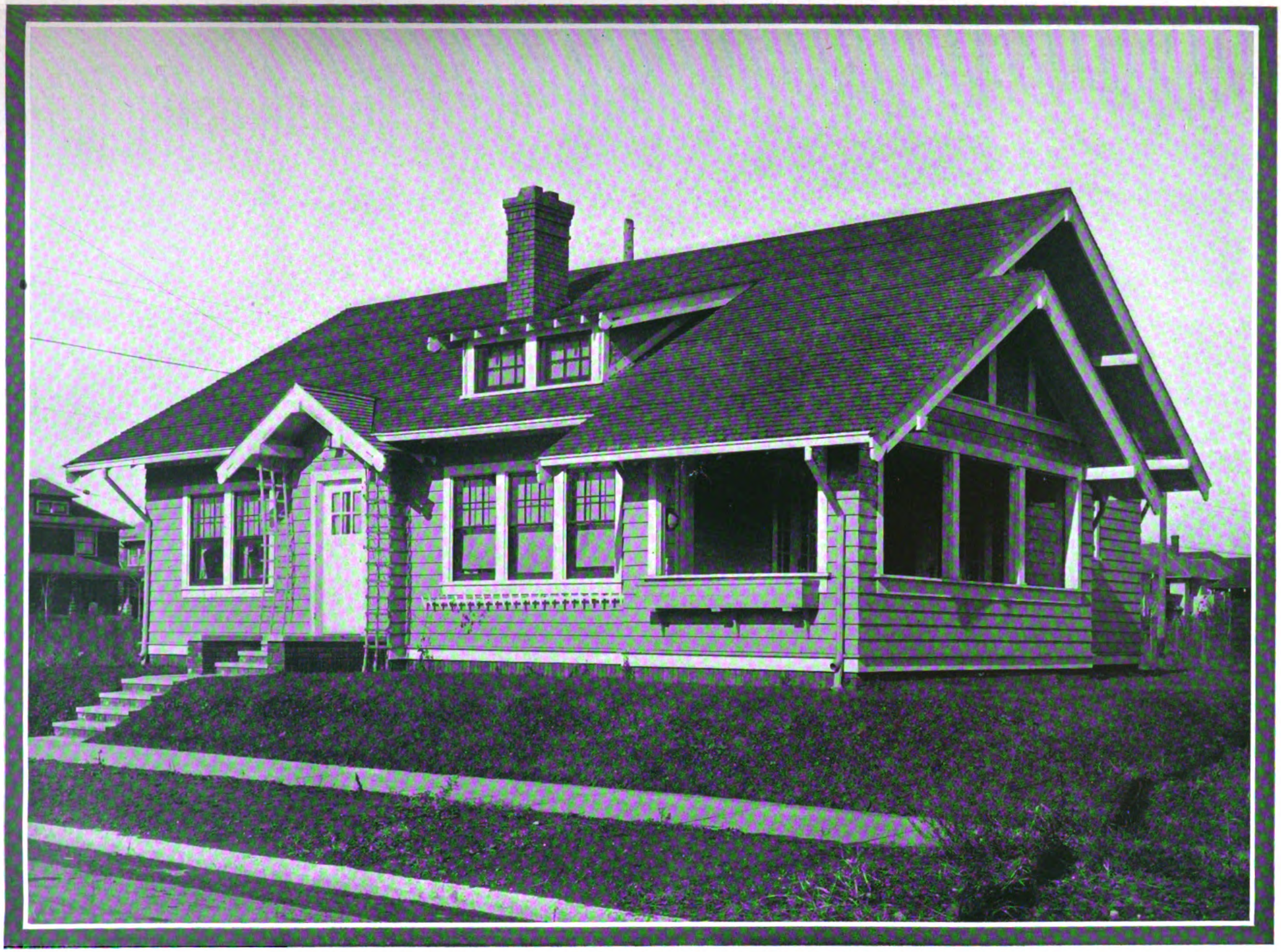
The porch, which will probably be enclosed, is well handled, forming a pleasant break to the even line of the front. The shingles on the roof, where doubled, emphasize the horizontal lines which characterize this bungalow, helping effectively to carry out the cozy appearance.

The half timbered effect on the gables is interesting as a contrast to the rest of the house.

The interior of the bungalow is well suited to a cold climate. Entrance is had to a small hall or entry, in which is a closet for guests' wraps. At the left is a bedroom; at the right the living room, which with its beamed ceiling and brick fireplace presents a pleasing vista as one enters. French windows open onto the porch.

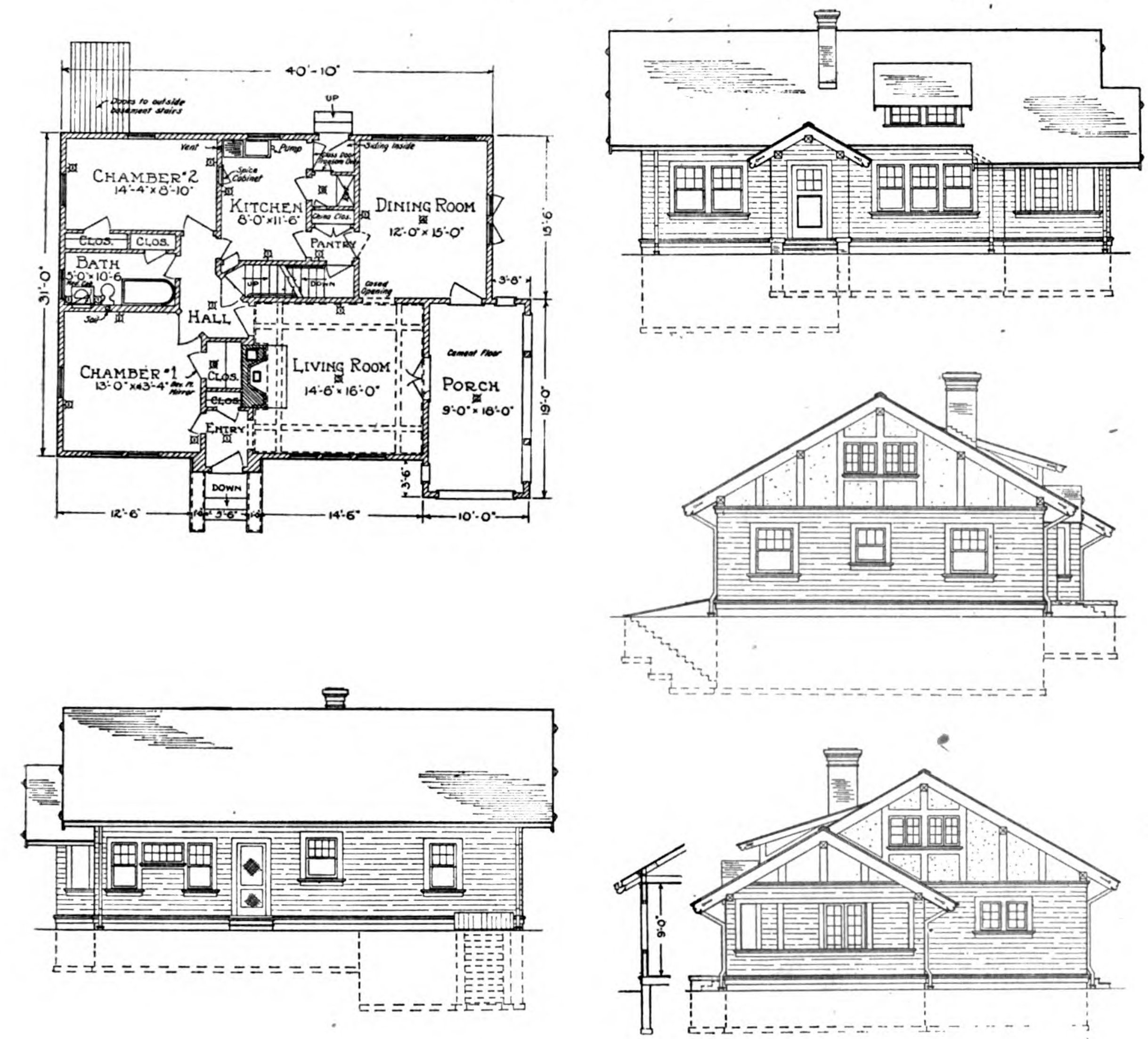
The dining room is planned with a high window flanked by lower ones, at the rear; this serves to give adequate space for a sideboard. The windows at the right are also placed a trifle higher than usual, and are casements. The dining room has a glass door opening onto the porch.

Entrance to the kitchen is had through a small pantry, containing a china closet. The kitchen contains interesting provision for an icebox, this being



Supplement to Building Age, April, 1919

**Bungalow at Indianapolis, Indiana, Herbert L. Bass & Co., Architects.**




Plan and elevations, scale 1/4" = 1 ft.

placed in an entry which can be entered either from the kitchen or from the rear passage. The sink is placed under a window, where it receives plenty of light. A built-in spice cabinet is a feature that will please the average housewife.

The right side of the cellar is unexcavated. This bungalow was designed for Mr. F. E. Gaines, Indianapolis, Ind., by Herbert L. Bass & Co., architects, 801 Hume Mansus Bldg., Indianapolis.

# Why the Farmer Should Build Now

An editorial which strikes at the heart of the whole building situation and in particular the lumber trade was printed recently in a Western paper. More of this kind of publicity will tend to clear up the doubt as to future building and lumber buying by the farmer.

The editorial is as follows:

To the man who needs a new home, a barn or other buildings for farm or elsewhere, the question that confronts him is whether building materials are high. The answer lies in figuring the cost as it relates to the value of what he has to sell—in the case of the farmer, his crops. Money is simply a medium of exchange. The real cost of what you buy is not so many dollars, but the quantity you must give of such commodities as you have to sell to equal that amount.

The Department of Agriculture has issued figures showing that the products of the farm will purchase more of all other commodities now than ever before. Relatively, the farmer's dollar has increased in buying power, because his dollar costs him less.

The figures show that the things the farmer sells bring him 190 per cent of the pre-war price, while the average price of the things he buys is only about 160 per cent of what it was. But in the case of lumber the figures show the price has increased to only 156 per cent of its value before the war. So really lumber is now cheap.

Why should a farmer—why should anyone—wait to build? Building material will be no cheaper relatively. Lumber cannot go down in price until labor, farm products, etc., go down. It is going to be a long, slow process, and anyone who needs a home or a building of any sort will lose money by waiting—and will be without the use of his building while he waits. To build now is to exercise good judgment.


## How Can This Pipeless Furnace Be Made to Heat the House?

**From J. C., Mass.**—We would appreciate very much any suggestion as to changes necessary to secure an equal distribution of the heated air in a house arranged as shown by the plans. They are the first and second floors of the east half of a double house in which there was recently installed a one-pipe furnace. It has a 24-in. firepot and is designed to heat about double the cubic feet of space contained in this house, but the parlor and the bedrooms, especially the front bedroom, are not adequately heated. The single register of the pipeless furnace is located, as may be seen in the plan, so that the register is placed in the floor partly in each room. To facilitate heating the upper floors, registers are placed in the ceilings of the parlor, living room and dining room of A, B and C.

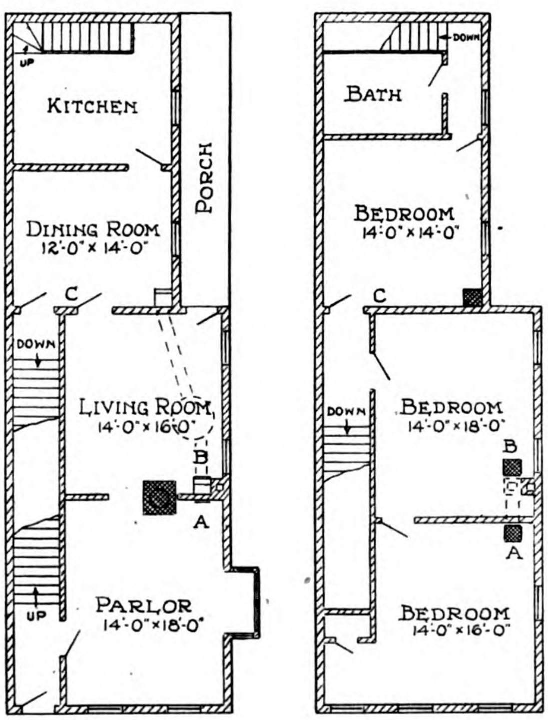
The movement of the cold air down the front stairs across the parlor to the furnace register chills that room. The door at the foot of the stairs is 3 x 7 ft. The parlor and the bedrooms, especially the front bedroom, are not adequately heated. The heated air, instead of circulating evenly in both directions, seems to be pulled toward the rear or north end of the house, and the cold air is drawn down the front stairs into the parlor.

The plan of the house was submitted to the furnace manufacturers before the furnace was installed, and they wrote that they would not guarantee satisfactory results, but that, in their opinion, the furnace would heat the house.

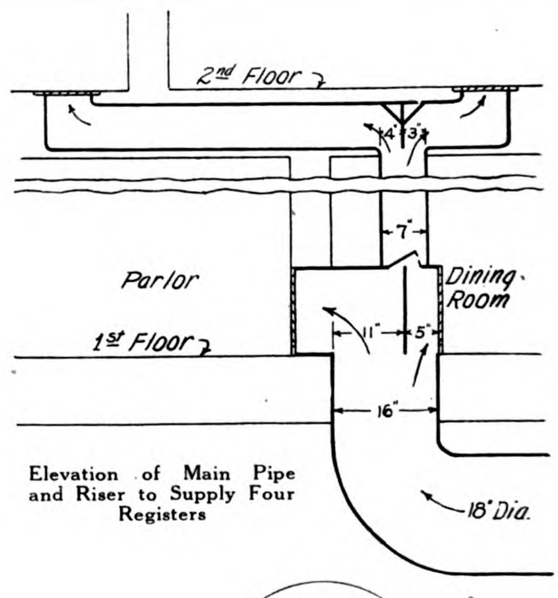
We would be glad to receive any suggestions possible, as we are anxious to remedy the condition as soon as possible and satisfy our customer.

**Answer.**—There is no difficulty in solving the problem submitted. The arrangement of the house makes it clear to any student of the heating of buildings by air that exactly what this customer has learned by experience was sure to take place.

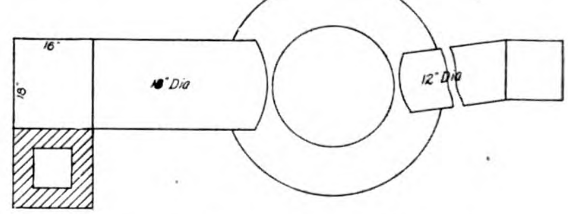
The house is so arranged that it is not adapted to be heated by means of the pipeless furnace which, like all other things, has its limitations regardless of the somewhat extravagant claims of incompetent salesmen and their employers make for it. With the ceiling registers placed at A, B and C, it is clear that the hottest air from the furnace would rise to the ceiling and find its way to the other rooms, and the size of the register would determine entirely the amount of




Plan of Building Showing Location of Pipeless Register, Suggested Ceiling Registers and Suggested Pipe Registers and Risers




Elevation of Main Pipe and Riser to Supply Four Registers




Plan of Furnace Showing Suggested New Location and Pipes hot air that passed up and whether it was sufficient to maintain the temperature desired.

With most of the registers so located as to naturally draw the hot air out of the parlor, it is not surprising that even though it has a southern exposure and an extended window to the east, it was not warm, particularly when it is noted that all of the air which was cooled and had to go back to the furnace to be heated had to pass through the parlor. The action is that now the hottest air rises to the ceiling, passes through the registers A, B and C to the other rooms before the air has a chance to spread over the ceiling and fall and warm these rooms.

The second floor shows that the air from the front bedroom had to pass through the middle chamber to find an outlet into the hall, and the air from the back bedroom also must pass down the hall stairs and all this air must rush across the parlor to the return air openings in the single register over the furnace. This is a perfectly natural movement of the air and induces the flow of the heated air on the first floor into the living room and the dining room which has much less exposure, hence are more easily heated.

This home lends itself admirably to being heated by means of a pipe system and very short and few pipes at that.

Without disfiguring the house, it will be a simple matter to run up alongside of the chimney that is shown in the dining room a 16 x 18-in. square galvanized iron warm-air duct, and after taking off the registers for the parlor and the living room it could be reduced to 7 x 16 in. in size and carried up to heat the front and middle chambers as shown. Then in the corner of the dining room a 12 x 10-in. riser could be run up and, after taking off the register in the dining room it could be reduced to 5 x 10 in. and carried to a floor register in the chamber above.

The furnace should be shifted to one side of the partition between parlor and living room and the sheet-iron riser should extend down into the basement and receive an 18-in. warm-air pipe from the furnace. A 12-in. pipe should run from the furnace over to the 12 x 10 riser.

The detail of this construction is shown in the two additional sketches, one a plan and the other an elevation.

The elevation shows on the first floor a division so as to give a section 5 x 18 in. size for the dining room and 11 x 18 in. in size for the parlor. This would insure heating both rooms. Above the division plate is the damper heated on one side and with the hinge rod extending through so that the handle could attached where it would be convenient in the dining room to turn this damper wide open when upstairs is to be thoroughly heated or to regulate the amount of heat going to the second floor, in accordance with the needs of the first floor.

On the second floor there should be a special register with a division plate, giving the larger amount of the flue space for heating the front or parlor bedroom and a less space for the living room chamber.

A 12 x 10-in. riser would be large enough for the dining room and the room above, and after the register from the dining room is taken off the pipes could be reduced to 5 x 10 in. in size and carried to a floor register in the chamber. A damper could be placed in this riser so as to keep all of the heat in the dining room when desired. This would insure the positive heating of each room, whether the doors were opened or closed.

There is no question but what there is a very decided economy in the amount of fuel required when the air supply for a furnace is taken from within the building. In this instance, if the present floor register continues in the same place and a connection is taken from it to the base of the furnace, it will keep the air in the first floor rooms in circulation through the furnace and insure heating.

Inasmuch as there is no possibility of bringing the air from the upper rooms down to the furnace in any other way than down the stairway, it is a simple matter to cut openings in the front of the risers of a couple of steps and put in narrow face plate registers at this point so that they will discharge into the space beneath the stairs. Then, if a pipe is taken from this space to the furnace, it will insure a circulation of the air in the upper rooms through the furnace.

This return air pipe should be not less than 12 in. in size, preferably larger, as cold air moves slowly, and the area of the free air space in the return air register faces that would be put in front of the stair risers should also be equal to the area of a 12-in. or larger pipe.

If this heating plant is rearranged in this way, there will be no complaint about the failure to heat any room or of the draft of the air currents across the floor in any of the rooms. I have made no attempt to suggest how changes may be made in the present heating system to help it do its work better, as I do not believe the house is adapted to the pipeless furnace outfit. However, the upper rooms could be better heated by the use of larger floor registers.

In closing my recommendation I would suggest, or rather urge, all builders to select the heating system adapted to the type of building they are going to erect, and then have all things made adequate to accomplish the results sought. F. C.

## How to Read Board Measure

**From G. F. B., California.**—I have been a reader of your magazine for several months past, and during that time have noticed several discussions on the best method of finding board measure. There have been many, but almost all the same, at least similar, in that they all use the cancellation in some way. As yet I have never seen the method I use, and successfully and easily, for over two years, the entire time I have been in the game. If it would interest you I will endeavor to explain it, though I'm afraid my explanation will make it seem hard.

When I first started to work in the office my employer headed me away from the cancellation method to that of finding the number of feet per board, timber, etc., and multiplying by the pieces. This was too hard and required great accuracy with the fractions, so I devised this way.

Take Mr. Sartain's example in the February issue. I judge he has 100 2 x 4 16 ft. I would take 8 x 100 plus one-third. Should the length have been 14 ft. add one-sixth, for 18 ft., one-half, etc. Again take 100 2 x 10 20, you find 100 x 200, one-sixth to be taken, or 6333 ft. There is always going to be a figure which will be an easy fraction of twelve in all common use. The rule don't work on all pieces the same. As in the 2 x 4 you add the fraction, in the 2 x 10 the fraction was itself the answer. When once you get this method agoing it beats an actuary seven ways from Sunday. I never use one except to check some big bills. It's quick, as you seldom need to put anything down on paper; it all works out in your head except some extra hard figures, but even these you will overcome and get their combinations. It's easy and it's sure.

I trust I have made this half way plain to you, for it's really good.—G. F. B. California.

**From A. C. B., Nebraska**—I note with interest your handy rules for figuring board measure in your November issue.

Can you give me as good a method of figuring it the other way; that is, how many pieces it would require for a given amount of feet?

**Answer**—A good method of figuring "How many pieces of lumber required for a given number of feet" is the use of board measure tables, copies of which are noted under the headings of Tables Nos. 1, 2, 3 and 4 respectively used. To cover the subject as thoroughly as possible, two different kinds of board measure tables are given; one kind being designated as Table 1, 2 and 3 and the other as Table No. 4.

Both are good, the only difference being the method of application, but as there may be a preference, both are given.

The tables should cover most requirements, but if it were desirous of making them more extensive they could be added to by additional board measure, calculation rules for which were published in the Correspondence Column of the November issue.

To use Tables 1, 2 and 3 for finding the amount of board measure, the first step necessary will be to find the product of the lateral dimensions of the cross sections of the timber. Then in the column of table having heading equal to this product, and in the horizontal line opposite the given length will be found the number of feet in board measure

Thus—for 3 x 4 in., 2 x 6 in. or 1 x 12 in. timber, look in the column headed 12.

For 4 x 6 in., 3 x 8 in. or 2 x 12 in. timber, look in the column headed 24.

Now, suppose we want to know how many pieces of 1 x 12 timber, 30 ft. long, would be required to make up 3000 ft. of board measure. The cross section of the

1 x 12 timber being 12, we refer to Table 1 and find that a timber having a product of 12 and length of 30 ft. amounts to 30 ft. board measure; therefore, all that is necessary to find the number of pieces is to divide 3000 by 30, which gives us an answer of 100, which is the number of pieces required.

Table 4 is used in a similar manner as Tables 1, 2 and 3. In finding the number of pieces to a given amount of feet, no example is given as to the method of finding the amount of board measure as this in a table, as it is self-explanatory.—W. G.

TABLE OF BOARD-MEASURES NO. 1

| Length in Feet | Sectional Area in Square Inches | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | | 6 | 8 | | 10 | | 12 | 14 | | 16 | | 18 | 20 | |
| | Ft. | In. | Ft.* | Ft. | In. | Ft. | In. | Ft.* | Ft. | In. | Ft. | In. | Ft.* | Ft. | In. |
| 6 | 2 | 0 | 3 | 4 | 0 | 5 | 0 | 6 | 7 | 0 | 8 | 0 | 9 | 10 | 0 |
| 8 | 2 | 8 | 4 | 5 | 4 | 6 | 8 | 8 | 9 | 4 | 10 | 8 | 12 | 13 | 4 |
| 10 | 3 | 4 | 5 | 6 | 8 | 8 | 4 | 10 | 11 | 8 | 13 | 4 | 15 | 16 | 8 |
| 12 | 4 | 0 | 6 | 8 | 0 | 10 | 0 | 12 | 14 | 0 | 16 | 0 | 18 | 20 | 0 |
| 14 | 4 | 8 | 7 | 9 | 4 | 11 | 8 | 14 | 16 | 4 | 18 | 8 | 21 | 23 | 4 |
| 16 | 5 | 4 | 8 | 10 | 8 | 13 | 4 | 16 | 18 | 8 | 21 | 4 | 24 | 26 | 8 |
| 18 | 6 | 0 | 9 | 12 | 0 | 15 | 0 | 18 | 21 | 0 | 24 | 0 | 27 | 30 | 0 |
| 20 | 6 | 8 | 10 | 13 | 4 | 16 | 8 | 20 | 23 | 4 | 26 | 8 | 30 | 33 | 4 |
| 22 | 7 | 4 | 11 | 14 | 8 | 18 | 4 | 22 | 25 | 8 | 29 | 4 | 33 | 36 | 8 |
| 24 | 8 | 0 | 12 | 16 | 0 | 20 | 0 | 24 | 28 | 0 | 32 | 0 | 36 | 40 | 0 |
| 26 | 8 | 8 | 13 | 17 | 4 | 21 | 8 | 26 | 30 | 4 | 34 | 8 | 39 | 43 | 4 |
| 28 | 9 | 4 | 14 | 18 | 8 | 23 | 4 | 28 | 32 | 8 | 37 | 4 | 42 | 46 | 8 |
| 30 | 10 | 0 | 15 | 20 | 0 | 25 | 0 | 30 | 35 | 0 | 40 | 0 | 45 | 50 | 0 |
| 32 | 10 | 8 | 16 | 21 | 4 | 26 | 8 | 32 | 37 | 4 | 42 | 8 | 48 | 53 | 4 |
| 34 | 11 | 4 | 17 | 22 | 8 | 28 | 4 | 34 | 39 | 8 | 45 | 4 | 51 | 56 | 8 |
| 36 | 12 | 0 | 18 | 24 | 0 | 30 | 0 | 36 | 42 | 0 | 48 | 0 | 54 | 60 | 0 |
| 38 | 12 | 8 | 19 | 25 | 4 | 31 | 8 | 38 | 44 | 4 | 50 | 8 | 57 | 63 | 4 |
| 40 | 13 | 4 | 20 | 26 | 8 | 33 | 4 | 40 | 46 | 8 | 53 | 4 | 60 | 66 | 8 |
| 42 | 14 | 0 | 21 | 28 | 0 | 35 | 0 | 42 | 49 | 0 | 56 | 0 | 63 | 70 | 0 |

*The measurements in these columns work out in even feet.

TABLE OF BOARD-MEASURE NO. 2

| Length in Feet | Sectional Area in Square Inches | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 | 28 | | 30 | 32 | | 35 | | 36 | 40 | | 42 | 48 |
| | Ft.* | Ft. | In. | Ft.* | Ft. | In. | Ft. | In. | Ft.* | Ft. | In. | Ft.* | Ft.* |
| 6 | 12 | 14 | 0 | 15 | 16 | 0 | 17 | 6 | 18 | 20 | 0 | 21 | 24 |
| 8 | 16 | 18 | 8 | 20 | 21 | 4 | 23 | 4 | 24 | 26 | 8 | 28 | 32 |
| 10 | 20 | 23 | 4 | 25 | 26 | 8 | 29 | 2 | 30 | 33 | 4 | 35 | 40 |
| 12 | 24 | 28 | 0 | 30 | 32 | 0 | 35 | 0 | 36 | 40 | 0 | 42 | 48 |
| 14 | 28 | 32 | 8 | 35 | 37 | 4 | 40 | 10 | 42 | 46 | 8 | 49 | 56 |
| 16 | 32 | 37 | 4 | 40 | 42 | 8 | 46 | 8 | 48 | 53 | 4 | 56 | 64 |
| 18 | 36 | 42 | 0 | 45 | 48 | 0 | 52 | 6 | 54 | 60 | 0 | 63 | 72 |
| 20 | 40 | 46 | 8 | 50 | 53 | 4 | 58 | 4 | 60 | 66 | 8 | 70 | 80 |
| 22 | 44 | 51 | 4 | 55 | 58 | 8 | 64 | 2 | 66 | 73 | 4 | 77 | 88 |
| 24 | 48 | 56 | 0 | 60 | 64 | 0 | 70 | 0 | 72 | 80 | 0 | 84 | 96 |
| 26 | 52 | 60 | 8 | 65 | 69 | 4 | 75 | 10 | 78 | 86 | 8 | 91 | 104 |
| 28 | 56 | 65 | 4 | 70 | 74 | 8 | 81 | 8 | 84 | 93 | 4 | 98 | 112 |
| 30 | 60 | 70 | 0 | 75 | 80 | 0 | 87 | 6 | 90 | 100 | 0 | 105 | 120 |
| 32 | 64 | 74 | 8 | 80 | 85 | 4 | 93 | 4 | 96 | 106 | 8 | 112 | 128 |
| 34 | 68 | 79 | 4 | 85 | 90 | 8 | 99 | 2 | 102 | 113 | 4 | 119 | 136 |
| 36 | 72 | 84 | 0 | 90 | 96 | 0 | 105 | 0 | 108 | 120 | 0 | 126 | 144 |
| 38 | 76 | 88 | 8 | 95 | 101 | 4 | 110 | 10 | 114 | 126 | 8 | 133 | 152 |
| 40 | 80 | 93 | 4 | 100 | 106 | 8 | 116 | 8 | 120 | 133 | 4 | 140 | 160 |
| 42 | 84 | 98 | 0 | 105 | 112 | 0 | 122 | 6 | 126 | 140 | 0 | 147 | 168 |

*The measurements in these columns work out in even feet.

TABLE OF BOARD-MEASURE NO. 3

| Length in Feet | Sectional Area in Square Inches | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 56 | | 60 | 64 | | 72 | 80 | | 84 | 96 | 100 | | 112 | |
| | Ft. | In. | Ft.* | Ft. | In. | Ft.* | Ft. | In. | Ft.* | Ft.* | Ft. | In. | Ft. | In. |
| 4 | 18 | 8 | 20 | 21 | 4 | 24 | 26 | 8 | 28 | 32 | 33 | 4 | 37 | 4 |
| 6 | 28 | 0 | 30 | 32 | 0 | 36 | 40 | 0 | 42 | 48 | 50 | 0 | 56 | 0 |
| 8 | 37 | 4 | 40 | 42 | 8 | 48 | 53 | 4 | 56 | 64 | 66 | 8 | 74 | 8 |
| 10 | 46 | 8 | 50 | 53 | 4 | 60 | 66 | 8 | 70 | 80 | 83 | 4 | 93 | 4 |
| 12 | 56 | 0 | 60 | 64 | 0 | 72 | 80 | 0 | 84 | 96 | 100 | 0 | 112 | 0 |
| 14 | 65 | 4 | 70 | 74 | 8 | 84 | 93 | 4 | 98 | 112 | 116 | 8 | 130 | 8 |
| 16 | 74 | 8 | 80 | 85 | 4 | 96 | 106 | 8 | 112 | 128 | 133 | 4 | 149 | 4 |
| 18 | 84 | 0 | 90 | 96 | 0 | 108 | 120 | 0 | 126 | 144 | 150 | 0 | 168 | 0 |
| 20 | 93 | 4 | 100 | 106 | 8 | 120 | 133 | 4 | 140 | 160 | 166 | 8 | 186 | 8 |
| 22 | 102 | 8 | 110 | 117 | 4 | 132 | 146 | 8 | 154 | 176 | 183 | 4 | 205 | 4 |
| 24 | 112 | 0 | 120 | 128 | 0 | 144 | 160 | 0 | 168 | 192 | 200 | 0 | 224 | 0 |
| 26 | 121 | 4 | 130 | 138 | 8 | 156 | 173 | 4 | 182 | 208 | 216 | 8 | 242 | 8 |
| 28 | 130 | 8 | 140 | 149 | 4 | 168 | 186 | 8 | 196 | 224 | 233 | 4 | 261 | 4 |
| 30 | 140 | 0 | 150 | 160 | 0 | 180 | 200 | 0 | 210 | 240 | 250 | 0 | 280 | 0 |
| 32 | 149 | 4 | 160 | 170 | 8 | 192 | 213 | 4 | 224 | 256 | 266 | 8 | 298 | 8 |
| 34 | 158 | 8 | 170 | 181 | 4 | 204 | 226 | 8 | 238 | 272 | 283 | 4 | 317 | 4 |
| 36 | 168 | 0 | 180 | 192 | 0 | 216 | 240 | 0 | 252 | 288 | 300 | 0 | 336 | 0 |
| 38 | 177 | 4 | 190 | 202 | 8 | 228 | 253 | 4 | 266 | 304 | 316 | 8 | 354 | 8 |
| 40 | 186 | 8 | 200 | 213 | 4 | 240 | 266 | 8 | 280 | 320 | 333 | 4 | 373 | 4 |
| 42 | 196 | 0 | 210 | 224 | 0 | 252 | 280 | 0 | 294 | 336 | 350 | 0 | 392 | 0 |
| 44 | 205 | 4 | 220 | 234 | 8 | 264 | 293 | 4 | 308 | 352 | 366 | 8 | 410 | 8 |
| 46 | 214 | 8 | 230 | 245 | 4 | 276 | 306 | 8 | 322 | 368 | 383 | 4 | 429 | 4 |
| 48 | 224 | 0 | 240 | 256 | 0 | 288 | 320 | 0 | 336 | 384 | 400 | 0 | 448 | 0 |
| 50 | 233 | 4 | 250 | 266 | 8 | 300 | 333 | 4 | 350 | 400 | 416 | 8 | 466 | 8 |
| 52 | 242 | 8 | 260 | 277 | 4 | 312 | 346 | 8 | 364 | 416 | 433 | 4 | 485 | 4 |
| 54 | 252 | 0 | 270 | 288 | 0 | 324 | 360 | 0 | 378 | 432 | 450 | 0 | 504 | 0 |
| 56 | 261 | 4 | 280 | 298 | 8 | 336 | 373 | 4 | 392 | 448 | 466 | 8 | 522 | 8 |
| 58 | 270 | 8 | 290 | 309 | 4 | 348 | 386 | 8 | 406 | 464 | 483 | 4 | 541 | 4 |
| 60 | 280 | 0 | 300 | 320 | 0 | 360 | 400 | 0 | 420 | 480 | 500 | 0 | 560 | 0 |
| 62 | 289 | 4 | 310 | 330 | 8 | 372 | 413 | 4 | 434 | 496 | 516 | 8 | 578 | 8 |
| 64 | 298 | 8 | 320 | 341 | 4 | 384 | 426 | 8 | 448 | 512 | 533 | 4 | 597 | 4 |
| 66 | 308 | 0 | 330 | 352 | 0 | 396 | 440 | 0 | 462 | 528 | 550 | 0 | 616 | 0 |
| 68 | 317 | 4 | 340 | 362 | 8 | 408 | 453 | 4 | 476 | 544 | 566 | 8 | 634 | 8 |
| 70 | 326 | 8 | 350 | 373 | 4 | 420 | 466 | 8 | 490 | 560 | 583 | 4 | 653 | 4 |
| 72 | 336 | 0 | 360 | 384 | 0 | 432 | 480 | 0 | 504 | 576 | 600 | 0 | 672 | 0 |
| 74 | 345 | 4 | 370 | 394 | 8 | 444 | 493 | 4 | 518 | 592 | 616 | 8 | 690 | 8 |
| 76 | 354 | 8 | 380 | 405 | 4 | 456 | 506 | 8 | 532 | 608 | 633 | 4 | 709 | 4 |
| 78 | 364 | 0 | 390 | 416 | 0 | 468 | 520 | 0 | 546 | 624 | 650 | 0 | 728 | 0 |
| 80 | 373 | 4 | 400 | 426 | 8 | 480 | 533 | 4 | 560 | 640 | 666 | 8 | 746 | 8 |
| 82 | 382 | 8 | 410 | 437 | 4 | 492 | 546 | 8 | 574 | 656 | 683 | 4 | 765 | 4 |
| 84 | 392 | 0 | 420 | 448 | 0 | 504 | 560 | 0 | 588 | 672 | 700 | 0 | 784 | 0 |

*The measurements in these columns work out in even feet.

TABLE OF BOARD-MEASURE NO. 4

| Size of Timber in Inches | Length of Piece in Feet | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 1x2 | 1⅔ | 2 | 2⅓ | 2⅔ | 3 | 3⅓ | 3⅔ | 4 |
| 1x3 | 2½ | 3 | 3½ | 4 | 4½ | 5 | 5½ | 6 |
| 1x4 | 3⅓ | 4 | 4⅔ | 5⅓ | 6 | 6⅔ | 7⅓ | 8 |
| 1x5 | 4⅙ | 5 | 5⅚ | 6⅔ | 7½ | 8⅓ | 9⅙ | 10 |
| 1x6 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1x8 | 6⅔ | 8 | 9⅓ | 10⅔ | 12 | 13⅓ | 14⅔ | 16 |
| 1x10 | 8⅓ | 10 | 11⅔ | 13⅓ | 15 | 16⅔ | 18⅓ | 20 |
| 1x12 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 1x14 | 11⅔ | 14 | 16⅓ | 18⅔ | 21 | 23⅓ | 25⅔ | 28 |
| 1x16 | 13⅓ | 16 | 18⅔ | 21⅓ | 24 | 26⅔ | 29⅓ | 32 |
| 1x20 | 16⅔ | 20 | 23⅓ | 26⅔ | 30 | 33⅓ | 36⅔ | 40 |
| 1½x4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1½x6 | 7½ | 9 | 10½ | 12 | 13½ | 15 | 16½ | 18 |
| 1½x8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 1½x10 | 12½ | 15 | 17½ | 20 | 22½ | 25 | 27½ | 30 |
| 1½x12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| 2x4 | 6⅔ | 8 | 9⅓ | 10⅔ | 12 | 13⅓ | 14⅔ | 16 |
| 2x6 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 2x8 | 13⅓ | 16 | 18⅔ | 21⅓ | 24 | 26⅔ | 29⅓ | 32 |
| 2x10 | 16⅔ | 20 | 23⅓ | 26⅔ | 30 | 33⅓ | 36⅔ | 40 |
| 2x12 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 2x14 | 23⅓ | 28 | 32⅔ | 37⅓ | 42 | 46⅔ | 51⅓ | 56 |
| 2x16 | 26⅔ | 32 | 37½ | 42⅔ | 48 | 53⅓ | 58⅔ | 64 |
| 2½x12 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 2½x14 | 29⅙ | 35 | 40⅚ | 46⅔ | 52½ | 58⅓ | 64⅙ | 70 |
| 2½x16 | 33⅓ | 40 | 46⅔ | 53⅓ | 60 | 66⅔ | 73⅓ | 80 |
| 3x6 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| 3x8 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 3x10 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 3x12 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| 3x14 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 |
| 3x16 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 4x4 | 13⅓ | 16 | 18⅔ | 21⅓ | 24 | 26⅔ | 29⅓ | 32 |
| 4x6 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 4x8 | 26⅔ | 32 | 37⅓ | 42⅔ | 48 | 53⅓ | 58⅔ | 64 |
| 4x10 | 33⅓ | 40 | 46⅔ | 53⅓ | 60 | 66⅔ | 73⅓ | 80 |
| 4x12 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 4x14 | 46⅔ | 56 | 65⅓ | 74⅔ | 84 | 93⅓ | 102⅔ | 112 |
| 6x6 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| 6x8 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 6x10 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| 6x12 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 |
| 6x14 | 70 | 84 | 98 | 112 | 126 | 140 | 154 | 168 |
| 6x16 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 |
| 8x8 | 53⅓ | 64 | 74⅔ | 85⅓ | 96 | 106⅔ | 117⅓ | 128 |
| 8x10 | 66⅔ | 80 | 93⅓ | 106⅔ | 120 | 133⅓ | 146⅔ | 160 |
| 8x12 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 |
| 8x14 | 93⅓ | 112 | 130⅔ | 149⅓ | 168 | 186⅔ | 205⅓ | 224 |
| 10x10 | 83⅓ | 100 | 116⅔ | 133⅓ | 150 | 166⅔ | 183⅓ | 200 |
| 10x12 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 |
| 10x14 | 116⅔ | 140 | 163⅓ | 186⅔ | 210 | 233⅓ | 256⅔ | 280 |
| 10x16 | 133⅓ | 160 | 186⅔ | 213⅓ | 240 | 266⅔ | 293⅓ | 320 |
| 12x12 | 120 | 144 | 168 | 192 | 216 | 240 | 264 | 288 |
| 12x14 | 140 | 168 | 196 | 224 | 252 | 280 | 308 | 336 |
| 12x16 | 160 | 192 | 224 | 256 | 288 | 320 | 352 | 384 |
| 14x14 | 163⅓ | 196 | 228⅔ | 261⅓ | 294 | 326⅔ | 359⅓ | 392 |
| 14x16 | 186⅔ | 224 | 261⅓ | 298⅔ | 336 | 373⅓ | 410⅔ | 448 |

# "Broken Promises Mean Trouble," Says Uncle Ezra

## *And Tells a Little Story in Which He Proves Conclusively That Living Up to Your Promise Is Good Business*

For the farmer thinks the builder a bandit, and the builder thinks the farmer a Chinaman. So they go to it with a right good will.

By DUDLEY POLLARD

I never was no hand to preach. My long suit is on the other end of the wire, and that's why folks always say that old Ezra Brown is a mighty good listener. But when a man gets old—when the lights are dim at the windows—when the grinders are replaced by crockery teeth, and rheumatics make your old bones creak like a farm wagon on a country road of a frosty morning—why folks just naturally think the old man must know something, for he's lived a mighty long time. Still that don't mean nothin', either, as there ain't no fool on earth that represents so completely the perfection of the species like an old fool.

And an old fool to my mind must of course have been a young fool who never in all his life has allowed work to interfere with his cracker box oration. So you see believing these things just as firmly as I do that Jonah swallowed the whale (or was it the other way round?) I can't consistently begin to preach now, but I can make a few observations on the mutability of things touchin' on and appertainin' to my work as a carpenter and builder.

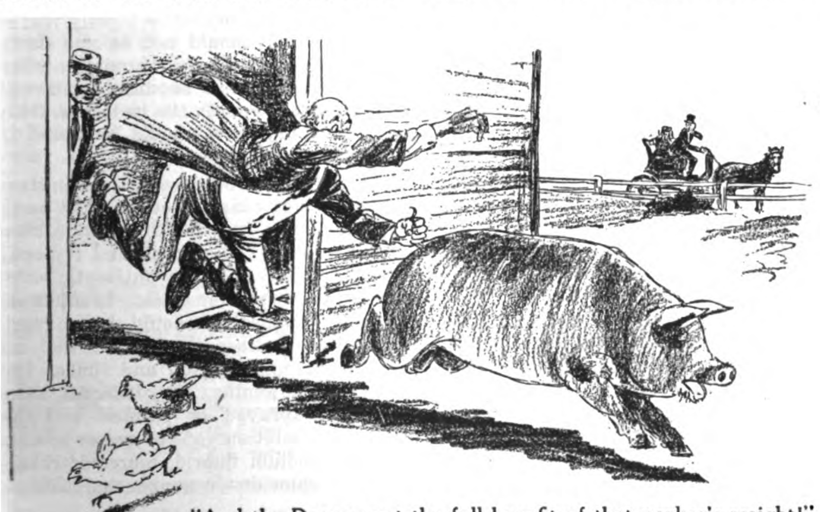
It's a one-reel fillum this evening, entitled "Keep Your Word," scenario by Ezra Brown, as they say in the movies.

Now I'm not going to place the blame on either side, but I'm going to call attention to the feud that exists the country over between the small builder and the farmer. It don't seem natural, of course, when you consider the amount of work the average successful farmer has for a builder to do, but the farmer just naturally hates a builder, and the builder reciprocates this unbrotherly feeling. One is a highway robber and the other is a Chinaman. That's the way they look at each other. That's all wrong, of course, and I'd like to say something that would bring about a better understanding between the two. The farmer has got a full-grown man's job with his own work, and it's not up to him to try and be a builder at the same time. On the other hand, the builder must not look on the farmer as legitimate prey, soak him for little jobs and neglect the bigger ones if something else comes along. It would be better for both parties if they would meet on a basis of common sense, give and take, and gradually bring about a condition of affairs that would be mutually advantageous.

I want to hold to my text right here and then I'm going to tell you a little story. If there is any one asset, other than honest work, that will carry a builder further than another, it is a reputation for keepin' his word. Once establish that reputation and the game is won. There are, of course, times when one cannot live strictly to what has been promised, but there is nothing that will brush aside so completely these unforeseen events like a fair, honest, manly explanation. The fault was not yours; then say so and explain how it happened—but don't let it happen too often. Be careful how you promise, but when your promise is given live up to it or bust something.

In my part of the country there never was a more cantankerous old skinflint than Eph Olson. He was a farmer and more than well to do, a deacon in the church, a bank director, but you know the type—the woods are full of them. And he just naturally hated a builder. He would round up his hired men and as boss of the job he did all his repairing, and even built his farm buildings. But old Eph needed a new cow barn. He came to me one day with a building magazine which had a picture of a new-fangled and at that time up-to-date sanitary cow barn. It was some barn, and the likes of it had never been thought of in our bailiwick. Well, the deacon hemmed and hawed, we chewed the rag, he discussed and I cussed, and we were about four and a half miles from nowhere when we got through the first session. But the deacon wanted that barn, and what the deacon wanted he usually got.

The deacon was what we call nowadays a progressive farmer. The year before he had made an experiment of crossing his breed of pigs with a razorback variety which he got from the South, from Texas, I believe. This porker was white and a long, lean, rangy brute that stood easily three feet high and could run like a rabbit. I'm not going into the deacon's theory of mixing the breed of swine—they were his pigs and he could do what he liked with them. But keep your eye on that pig.



"And the Deacon got the full benefit of that porker's weight!"

Well, this year the deacon was still progressing, but this time he had an uplift idea about the cows. So nothin' would do but that the old barn must come down and be replaced by the new-fangled construction as a domicile for the kine, and I was to do the job—that is, if we could come to terms.

Now the old barn was a terror, rat infested and sadly affected with senile decrepitude. I haven't any idea how old it was, as the deacon's father had built it, but it was one of those old affairs with a gable roof and a window on the side. The deacon wanted that I should tear the old thing down and take the lumber for my trouble, but the lumber was so rotten I didn't want it. Then again, he insisted that I allow him $2 a day as a helper on the new barn work. Now the deacon was all right in his way. He could make a powerful prayer in church, and when he came to announce the first verse of the hymn

*"I know that God is wroth with me,*
*For I was born in sin;*
*My heart is so exceeding vile*
*Damnation dwells within.*
*Awake I sin, asleep I sin,*
*I sin in every breath;*
*When Adam fell he went to hell,*
*And I am doomed to death."*

I can feel the cold shivers run down my back yet, but he couldn't drive a nail with a shovel.

That was the condition of affairs when I went out to the deacon's place one Thanksgiving day to look the old barn over and try to come to an understanding. The dominie and his wife were to take dinner with the deacon that day. The parson hadn't arrived, and just before dinner the deacon and I went out to the old barn, still talking business. The deacon was arrayed in his Sunday go-to-meeting clothes. He was only about 5 feet high, and on Sunday and gala days he garbed himself in a frock coat that went below his knees. We were still arguing when we reached the old shack, and the deacon was all het up. To convince me how right he was about something he got a long extension ladder and climbed up to the gable. There he stood perched up on the top of the ladder, yelling down at me at the top of his voice and me shouting back.

Just how it happened I'll never be able to explain, for it came so sudden like, but that razor-back pig got rambunctious about something and hit the bottom of the ladder. The deacon gave one yell and down he came. Fortunately he broke the fall on the hay loft, but he rebounded and all sprawled out, his arms and legs waving, his coat split up the back, his collar shoved over his ears, he landed on all fours right in front of the barn door. I ran to see if he was much hurted. The deacon was facing me and he was just straightening up when that pig made a break for the door. He darted between the deacon's legs, and off he carried him lickety split, the deacon's little short legs dangling in the air and missing the ground by six inches. He had a death clutch on the pig's tail with one hand while he frantically waved the other in the air, just like a flagman trying to stop an express train, and shouted hysterically at the top of his voice, "Ezra, Ezra, stop this damn pig."

Just over the post and rail fence, now twenty feet away, was the parson and his missus, both standing up in their buggy, their eyes bulging out of their heads and an expression of grieved amazement on their faces. I see the old parson pucker up his mouth to say something, but I guess the same thought came to him as was already in my head—what in thunder was there to say? He and his missus flopped down in the buggy and sorrowfully wagged their heads while the deacon and his steed were beating it to the other side of the lot at a 2:30 clip.

But I must get back to my text. A day or two later I saw the deacon. He was bruised up right smart, for that pig was some sprinter and had mussed the deacon up some.

"Ezra," he said, "go ahead with the barn and count me out in any carpentering around this place hereafter—and —Ezra—if you don't mind, don't tell anybody as long as I live about that—yes—that damn pig."

The deacon has been dead now these ten years and more and this is the first time I ever told the story. Yes, sir, it pays to keep your word.

# Lumber Decay Means Wasted Money—How To Prevent It

*Hints on the Proper Storing of Lumber Which Will Keep Decay at a Minimum*

Much trouble and loss with stored lumber may be averted if the following hints, given by the Forest Products Laboratory, Madison, Wis., are heeded. Many serious losses from decay in wooden structures are possibly due to the fact that the timbers used were infected with wood-destroying fungi while in storage. These losses can be grealy reduced by keeping lumber storage yards in a sanitary condition. The Government has had its sad experience in the proper and improper storing of lumber. It is a fact that of the one hundred odd million feet in the Government's hands, every stick must be disposed of as soon as possible or all of it will stain and finally decay. Some hints as to how to do this are:

Strong efforts should be made to store the product on well-drained ground, removed from the possible dangers of floods, high tides and standing water.

All rotting debris scattered about yards should be collected and burned, no matter whether it be decayed foundation and tramway timbers or stored lumber which has become infected. In the case of yards already filled in to considerable depths with sawdust and other woody debris the situation can be improved by a heavy surfacing with soil, slag, or similar material. Weeds should be cut away from the piles to allow good ventilation.

More attention should be given to the foundations of lumber piles in order to insure freedom from decay and better ventilation beneath the stacks. Solid foundations should never be used. In humid regions the stock should not be piled less than 18 to 24 in. from the ground. Wood blocking used in direct contact with wet ground should be protected by the application of creosote or other antiseptic oils or else replaced by concrete, brick or other durable materials. Treated skid timbers would also be highly advantageous.

Foundations should be built so that the piles will slope approximately 1 in. to every foot of length.

In most regions lumber should not be close-piled in the open, but should be "stuck" with crossers at least one inch thick. Lateral spacing is also very desirable. Roofing or cover boards on the piles should not be neglected, and should extend over for several inches in front and back.

Instead of throwing the "stickers" about on the ground to become infected with decay, they should be handled carefully and when not in use piled on sound foundations and kept as dry as possible. If pine, saturated with resin, or the heartwood of such durable species as white oak or red gum be employed, the danger of possible infection will be greatly decreased.

In storage sheds the necessity for piling higher from the ground is very apparent in many cases. The same remedies apply here as for pile foundation in the open. The sheds should be tightly roofed and the siding should not be run down below the bottom of the foundation sills. Free air circulation should be allowed from all sides beneath the inclosure. Only thoroughly dry stock should be stored in close piles under cover.

Should fungous outbreaks occur in storage sheds not constructed to meet sanitary needs the infected foundation timbers should all be torn out and replaced with wood soaked in an antiseptic solution or by concrete or brick. In all cases the new foundation should be so constructed as to keep the lumber well off the ground, and the soil and timber immediately adjoining the infected area should be sprayed or painted with an antiseptic solution of a water-soluble salt, like sodium fluorid, mercuric chloride, zinc chloride or copper sulphate.—A. C. S.

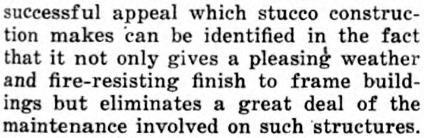

# How To Do Stucco Work

## *Practical Pointers Which Help Make a Better Job On Metal Lath, Brick, and Wood Lath*

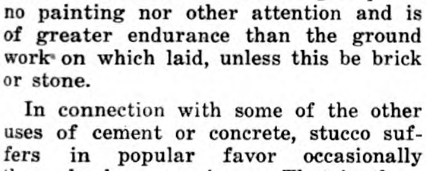
By H. COLIN CAMPBELL

One of the popular and rapidly increasing uses of cement is in the form of Portland cement stucco. Not only is this being applied extensively in connection with new frame construction, but there is a large and growing field of use in the renovation of old structures, both frame and brick. The reason for the successful appeal which stucco construction makes can be identified in the fact that it not only gives a pleasing weather and fire-resisting finish to frame buildings but eliminates a great deal of the maintenance involved on such structures. Stucco well laid on a building requires no painting nor other attention and is of greater endurance than the ground work on which laid, unless this be brick or stone.

In connection with some of the other uses of cement or concrete, stucco suffers in popular favor occasionally through abuse or misuse. That is, there are right and wrong ways of doing stucco work as well as doing other things, and unless a good practice or specification is followed it is only natural that the work may in some respects prove unsatisfactory. The first requirement is of course Portland cement. Fortunately the standardization of this produce has reached such a point that the contractor need concern himself little about its quality, knowing that any of the well-known brands meet specification requirements, which are very exacting and therefore may be relied upon. Great attention, however, must be given to the selection of aggregates. Frequently these are used without any particular examination regarding their cleanliness or other suitability, and it is not surprising that the finished work fails to come up to expectations. Fine aggregate may consist of sand or screenings from crushed stone or crushed gravel. It should be well graded from fine to coarse particles and should pass, when dry, a screen having eight meshes to the linear inch. Organic matter, if present, should not exceed 7 per cent by volume. If there is more than this the aggregate must be prepared by washing, or if this cannot be done the material should be discarded.

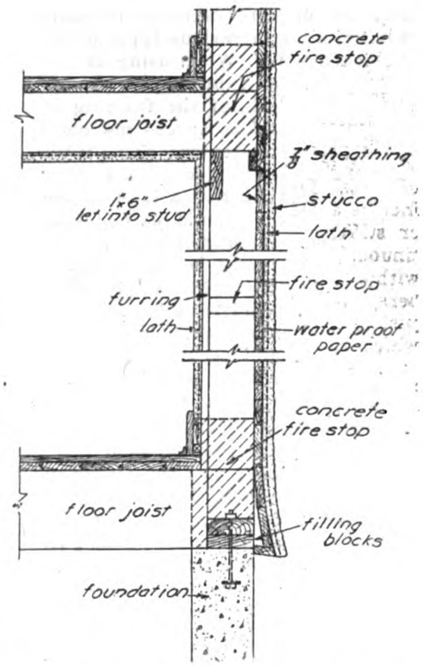



Stucco on Metal Lath with Wood Sheathing




Stucco on Wood Lath with Wood Sheathing

The methods of measuring the various materials, including water, should insure uniform proportions of each at all times. This is not only necessary because of the desirability of uniform consistency in applying the stucco but also because the finished surface will not have uniform color when the stucco has thoroughly hardened unless materials are at all times accurately proportioned. Variations in proportioning will be even more noticeable where coloring matter is used to vary the tint of the finished surface. It is necessary that the ingredients first be mixed in the dry state by sufficient turning, to give them a uniform color, then the required quantity of water should be added and the mixing continued until the desired consistency is secured and also uniform color. Only enough water should be used to produce a mortar which, after thorough mixing, will have the right plasticity to permit spreading readily under the trowel yet stiff enough to prevent it from losing its key on the wall or bond to the under coat without slipping or flowing. It is also necessary that no greater quantity of mortar be prepared at one time than can be used within an hour after water has been added to the dry materials. If longer time than this is allowed to elapse, chemical changes leading to hardening will have progressed to such a stage as to change the original plasticity of the mix and invite retempering by adding more water and again mixing. This should not be done. It is preferable, where it can be so arranged, that stucco mortar be machine mixed. If hand mixing, however, must be resorted to, the mixing should be done on a watertight platform or in a tight mortar box, thoroughness of mixing being the rule in both cases.

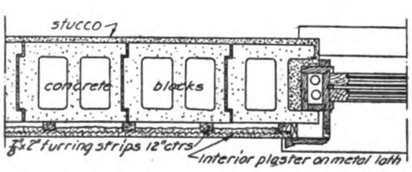



Section showing fire stopping and general features of stucco construction.

Principally to increase the plasticity or ease of working under the trowel hydrated lime is frequently added to stucco mortar. Only a thoroughly hydrated standard brand of this material should be used. Unless the lime is thoroughly hydrated, the unslaked particles present will eventually air slake in the wall, causing pitting or disruption of the surface. The use of hair or fiber of any kind is now considered unnecessary. Various methods are used to prepare the ground for receiving stucco. Wood lath ground is more common than metal lath but preference should be given to metal lath. Most of the cracking in stucco surfaces can be traced to improperly wood-lathed surfaces. If, however, wood laths are used, they should be of the same standard quality called for in interior plastering. Frequently there is substituted for wood lath one of several types of prepared stucco board now on the market—some composed of wood lath fastened to waterproof felt or fiber board, others consisting of sort of a wire mesh woven through waterproof building paper.

The metal lath or grounds are of various forms. Some of these are made by taking sheets of thin steel, cutting or slotting them in a regular manner and then deforming or expanding these sheets so that, drawn out, the slots are changed into meshes that permit entrance of the stucco mortar and hence enable it to bond or key to the surface. Other types of metal grounds are essentially woven wire netting or fabric somewhat similar to various types of so-called chicken wire. When using any of these metal lath or fabrics as a ground for stucco, the studs of the framing in the structure should be spaced not more than 16 in., center to center. Some types of metal fabric are made so that they include a deformation that acts as a stud or stiffener. Studs should extend continuously from foundation to rafters without any intervening horizontal members, and studs should be tied together just below the floor joists by 6-in. boards, which are held into the studs on their inner side flush and securely nailed to them. These boards act as sills for the floor joists which, in addition, are securely spiked to the side of the studs.

All necessary measures should be taken to thoroughly brace the frame of the building so that settlement or sagging will be prevented, otherwise the stucco will eventually crack. All gutters and down spout hangers and all other fixed supports should be set or put up before any stucco is applied, so there need be no break in the plastering where they are to be permanently fixed. Wall copings, balustrade rails, chimney caps, cornices, etc., should be built with ample overhang and watertight joints to keep water from behind the plaster. Sills should project well from the face of the plaster for ample grip groove or lip. All trim should be placed the proper distance from the studding or furring to show its right projection after the plaster




**Stucco on concrete blocks or other masonry.**

is on. At corners, strips of lath 6 in. wide should be bent around and stapled over, otherwise the sheets themselves should turn corners at least 3 in. so as to prevent cracks in the finished work.

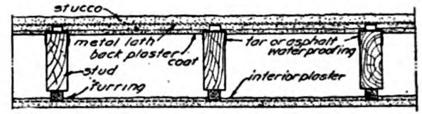
Various sketches accompanying show sections of walls prepared in different ways and with different materials preparatory to receiving stucco coat. Another sketch shows section through stucco wall, suggesting method by which fire stops are arranged.

In the case of back plastered walls, air space in the wall may be divided after the lath on the outside have been back plastered by applying heavy building paper, felt or other suitable insulating material between the studs and fastening it to the studs by nailing wood strips over folded ends of the material. Such insulation should be so fastened that it will clear bridging, thus leaving greater air space next to the plaster. The insulating material should be kept clear of the plaster and joints against wood framing must be made tight at top and bottom of the spaces and against the bridging where the face intercepts.

When using wood lath as a ground, the lath should be placed horizontal on furring with ½-in. openings between lath and nailed to each furring strip with four-penny galvanized nails. Joints should be broken at least every twelfth lath. Around all openings and bent over corners there should be placed a 6-in. strip of galvanized metal lath or fabric firmly stapled over the wood lath with 1¼-in., 14-gage galvanized staples. Neglect to do this is evidenced by so many cracks at corners and angles in existing structures. Before applying the stucco to wood lath the ground should be thoroughly wet so that water necessary to proper hardening of the mortar will not be absorbed by the lath. In the preparation of old surfaces to be stuccoed, such as brick, tile or concrete block, these surfaces must be cleaned down by brushing with a stiff wire brush or broom or equally effective means. All loose particles should be removed and mortar joints picked back at least ½ in. to provide a better bond or key for the plaster.

Stucco is generally applied in two or more coats. The first or scratch coat should be mixed in the proportions of 1 sack of portland cement to nor more than 3 cu. ft. of fine aggregate. The second and third coats, if three coats are used, should be in the same proportion and hydrated lime may be added in an amount not exceeding 10 per cent by volume of cement in the mixture. In applying the plaster, the work should be carried on with as little interruption as possible. Plastering should be continued in one general direction without allowing it to dry at edges. When it is impossible to work the full width of the wall at one time, joints should be arranged for at some natural division of the surface, such as a corner window or door. Succeeding coats should be well worked on to insure good bond with the preceding coat. The first coat should be applied with sufficient force to secure good key to the ground, and when it has partly hardened the surface should be scored sible to work the full width of the wall with a saw-tooth paddle, a piece of metal lath or other tool that will roughen the mortar so that key will be provided for the subsequent coat. In applying the second or any following coats, the preceding coat should be thoroughly wet down to prevent absorption of water from the fresh mortar being applied. For back-plastered walls the first coat should be spread evenly not less than ¼ in. over the face of the lath and project through behind the lath about three-eighths of an inch. The backing coat should increase the thickness behind the lath to not less than ⅝ in. The intermediate coat should have a thickness of not less than ¼ in. The final coat should be not less than ¼ in., and the total thickness of the several applications at least 1¼ in.

One of the most important details of stucco work is more frequently neglected than observed. Protection is rarely given to the plastered surface that will keep it from rapid drying out. It should be made a rule invariably to keep the surface damp by frequent sprinkling after the mortar has hardened to protect it so that the plaster will cure evenly and thoroughly. If sprinkling cannot be done, then the surface should be protected against sun and wind by hanging wet burlap, canvass or other material to prevent wind and sun rays from striking it.




**Stucco on metal lath, back plastered wall. The bracing and insulation are not shown.**

One of the strongest appeals of stucco comes from the fact that a variety of surface effects may be secured. The common finishes are known as stippled, sand floated, sand sprayed, rough cast or spatter dash, pebble dash and exposed aggregate. To obtain a stippled surface, the finished surface should be truly smoothed with a metal trowel with as little rubbing as possible, then should be lightly tapped with a brush of broom straw to give an even stippled surface.

To secure the sand floated finish, the final coat after having been brought to a smooth, even surface, should be rubbed with a circular motion, using a wood float, and a little sand applied to the mortar surface to roughen it. Sand floating is done when the mortar has partly hardened.

To get the sand sprayed effect, the finishing coat is brought to an even surface, then sprayed by means of a wide, long-fiber brush, with a mixture consisting of equal parts of cement and sand mixed with water to the consistency of thick paint. This mixture should be kept well stirred while being used. If this mixture is thrown forcibly against the surface to be finished, the effect will be very pleasing.

Rough cast or spatter dash finish is secured by throwing a mixture composed of 1 sack of cement to 3 cu. ft. of fine aggregate mixed with water forcibly against the wall to produce a rough surface of uniform texture. Special care should be taken to prevent the rapid drying out of this finish by keeping the surface moist for several days following the application.

Pebble dash finish is secured by throwing clean, round pebbles or other selected, graded material not smaller than ¼ in. nor larger than ¾ in. forcibly against the mortar of the last coat on the wall while it is soft enough to permit such pebbles to partly embed themselves in and cling to the surface.

Exposed aggregate effects, as the name implies, are secured by treating the finished surface, the finishing coat of which contains selected coarse aggregate particles that are brought to view by scrubbing off the film of cement concealing them before the mortar in the last coat has thoroughly hardened.

Much disappointment will result from attempting to vary the tint of stucco surfaces by using mortar colors unless permanent colors are chosen. Only mineral colors should be used. It should also be remembered that the required color can be secured only after some experimentation as the mortar has a quite different color when wet than when dry. Perhaps the most pleasing surface finish in stucco work comes from using white portland cement and various spar or quartz aggregate in the final coat, exposing these particles by washing. The "life" of such a surface is very pleasing.

# Improving Looks of Old Brick Buildings By Tuck Pointing

*Good Profits in Improving Looks of Old Structures—How to Do the Work*

By E. V. LAUGHLIN

It is simply marvelous what tuck pointing will do for an old, forlorn looking brick building. If the work is correctly and artistically done the made-over structure will look as if it were made of new high quality brick. For those who may be interested I will describe tuck pointing as it is performed by the mason in my employ; and in order that the reader may best follow me I will tell how he worked over an old college building that had stood a great many years, and which was showing the effects of time and wear very much. Many ice and heat cracks had appeared in the walls and the door and window arches were loose and insecure. None of these cracks are now visible, and the wall surfaces present an unbroken alignment of carefully spaced bricks. In addition the arches are so true and symmetrical that they probably look better even than when they were new. Tuck pointing brought about this change.

In the case of the arches my mason reset a great many of them. He also did the same wherever there were loose bricks. His first aim was to provide a perfectly solid brick surface for receiving the colored mortar. He explained that it would be foolhardy to plaster upon any other kind of surface, inasmuch as the loose bricks would in all probability cause the plaster coat to scale off.

Perhaps a word of explanation as to what tuck pointing is may here be opportune. Briefly, tuck pointing consists in applying a plaster made of sand, lime, and mortar color to the brick surface, after which mortar joints are run on, thus giving the effect of bricks. In making the mortar, bank or river sand is preferable. This, of course, must be screened through a fine sieve to remove any chance pebbles. The proportions of sand and lime can only be determined by testing. However, the effort must be to provide a very hard mortar, for a soft mortar is soon dissolved by rains. The amount of mortar color also must be found by testing. My mason determines these things at the time he begins the job and then maintains them throughout the entire undertaking.

Tuck pointing should begin next to the eaves and move downward. This prevents spattering work already done. The mortar is applied over an area eight or ten feet long and four or five feet wide. It is troweled until it lies over the surface to a depth of about one-eighth of an inch. After standing undisturbed for an hour or so the freshly plastered surface is washed with a dilute solution of muriatic acid. For this purpose a heavy brush is used. The brushing roughens the surface somewhat, making it more nearly resemble a brick surface; the acid cuts out the surface lime, leaving the mortar color prominent. The depth of color depends quite a little upon the strength of the acid and the amount of brushing. An inexperienced mason learns quickly how to produce the desired results. Without the use of the acid the surface cannot be made to resemble a brick surface.

For running on the mortar joints two instruments are needed. These are a straight-edge with level attached, and a joiner. Ordinary sand-lime mortar is used except that a little plaster of paris is added. With the joiner the mason runs a series of horizontal lines, later crossing with vertical lines so as to produce the brick effect. These lines must be run while the plaster surface is still soft, as this effects a permanent union between the plaster surface and the mortar lines. The ragged edges of the joints are best cut away with a putty knife while still soft. This is better than brushing the walls, as they are apt to become discolored from the scatterings of the joints.

Naturally there are quite a number of wrinkles that the mason learns which greatly aid him in this work. Here are a few of them: The straight-edge that is used should have two levels—one for horizontal lines and the other for vertical lines. Moreover, it should be just as wide as half the length of a brick. This permits the mason to space his bricks without measuring. In working between adjoining doors or windows he should space from the windows toward the center. This avoids an inartistic spacing next to either window—the very place where it would be most conspicuous. It is necessary also that the same horizontal line carries from corner to corner, and that it aligns perfectly where it crosses windows and doors. The same is true of the vertical lines. The ones that are placed on a new area should hitch on perfectly to those previously placed on the area above.

Any mason or plasterer can easily learn to tuck point. It is best learned, however, by watching some experienced tuck pointer at work. And there is always remunerative employment for the man who can do a good job of tuck pointing.

# How to Build and Fireproof With Hollow Tile—XII

*Constructing Short and Long Span Segmental Arches*

By J. J. COSGROVE

Almost any type of hollow-tile arch is strong enough for general purposes, but when real strength is wanted in floor construction, the segmental arch cannot be beaten. It is the pioneer arch from which all others have been evolved, and while many different kinds have been designed displacing the segmental arch for most purposes, still when extremely heavy floor loads must be carried, as, for instance, in factories, loft buildings, sidewalk construction and bridges, the engineer goes back to the segmental type of arch.

The segmental arch is not only the strongest but it is likewise the cheapest known form of arch construction for any given bearing load. In view of the fact that it is not only the strongest but the cheapest arch, it might not be without interest to inquire why it should have been displaced by the flat arch.

If strength and cheapness were all that were required, the segmental arch would not have been displaced as it has been to a great extent by the flat arch. The truth of the matter is, finish or appearance is the determining factor, as it always will be in building construction, all other properties of a material or method having to give way to the quest for the pleasing, the beautiful.

In office buildings, apartment houses, hotels, clubs, public buildings of all kinds and residences, something more than an arch is needed. What is wanted is a floor construction, and the segmental arch falls short of filling the specification for that requirement. A flat arch presents a flat ceiling surface.

When segmental arches are sprung, a ceiling of metal lath and plaster must be provided to give the same smooth, continuous under surface, and the cost of that ceiling must be added to the cost

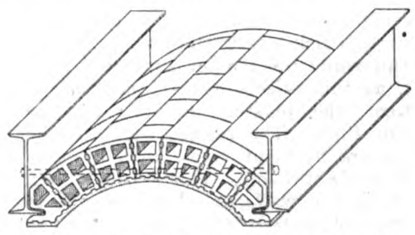


Fig. 88. Typical segmental arch. Note the lips of the skewbacks

of the arches to find the cost of the floor construction.

The combined cost of arch and ceiling would probably equal if it did not exceed that of a flat arch, so strength is the only remaining factor in a segmental arch where flat ceilings are desired. In warehouses and other buildings where strength and cheapness are the ruling factors the segmental arch stands alone.

A typical segmental arch of hollow tile is shown in Fig. 88. It will be observed that the skewbacks butting against the I-beams have lips which project half way across the under flange of the beams. When an arch is sprung on the other side of either one of these I-beams, the two projecting lips of the skewbacks meet in the center, thereby providing cover and protection for the lower flange.

Six and 8-in. hollow-tile blocks are generally used for segmental arches. Six-inch blocks are used for general purposes, and an arch of 6-in. blocks is as strong as one of 8-in. blocks of equal rise and thickness of web comparative to the depth of the tile. End construction segmental arches are unsatisfactory unless the arches are of uniform span and rise throughout. On the other hand, a slight variation in the rise or span does not matter in the case of side construction, for the rise can be increased or diminished by varying the thickness of the mortar of the upper or lower part of the mortar joint, and the span can be varied by varying the general thickness of the mortar joints. This cannot be done with end construction blocks.

A simple arch of hollow tile with a flat ceiling of wire lath or expanded metal and plaster can be seen in Fig. 89. It will be noticed with this form of construction that there is no lip to the skewbacks, so the only protection to the I-beams is that afforded by the metal lath and plaster ceiling.

In places where very valuable materials are stored and greater protection is required for the I-beams, it is provided by constructing a ceiling across the under side of the beams, and at the same time using lipped skewbacks similar to those shown in Fig. 88, which will continue to protect the steel beams even should the ceiling be torn away. This form of construction is shown in Fig. 90.

The rise of a segmental arch is a very important matter in practice, for within reasonable limits the greater the rise of an arch the greater the strength. It is impossible to give any great depth to an arch, however, without increasing the depth of the beams in like proportion, thereby increasing the cost. As it works out in practice, the rise of the soffit of a short-span segmental arch above the springing line is from one-tenth to one-eight the span of the arch. Assuming the proportions to be one-tenth, a 6-ft. arch would require a rise of 7.2 in.; while if the rise is to be one-eighth of span, for a 6-ft. arch it would be 9 in. The range in height found suitable in practice, therefore, for a 6-ft. arch is 1.8 in.

The greater the rise of an arch the less will be the thrust, a fact well worth knowing and considering when the load the floor must support will be heavy.

In Fig. 91 is shown a single rowlock arch made of hollow brick instead of hollow tile. There is no great difference between hollow tile and hollow

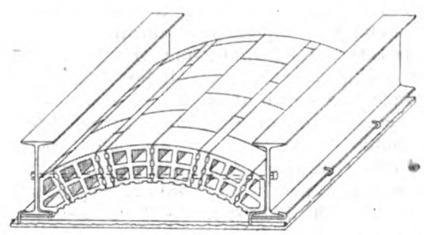


Fig. 89. Form of construction where ceiling is required

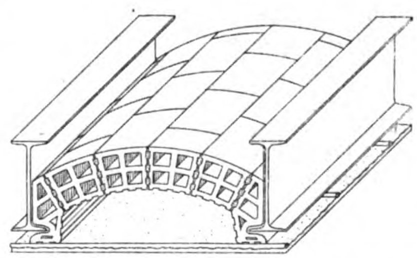


Fig. 90. Tile are lipped so entire ceiling can be torn away and yet the I-beams will be adequately fireproofed

brick, the size alone being the main distinguishing feature. A double rowlock segmental arch is shown in Fig. 92. This makes a particularly good construction for driveways, bridges or wherever heavily loaded trucks will be driven over them, or they will be subjected to unusually heavy usage.

Arches of double rowlock hollow brick will be of interest to the practical builder only where the loads will be heavy. Where the loads will not be excessive, the ordinary segmental arch of hollow tile will prove the better, as it is sufficiently strong, and being much lighter, a lighter I-beam can be used. At *a* in the illustration can be seen a single rowlock arch sprung from a higher line than that in Fig. 91. That is a raised arch, and raising it has both its advantages and its disadvantages. By raising the arches at the skewbacks the arches are flattened and the strength of the arch is reduced. On the other hand, the advantages gained are that it reduces the dead weight of the cinder concrete at the haunches used for beam filling, and gives a more pleasing beamed ceiling effect to the rooms.

In all arches, flat or segmental, short-span or long-span, in which a thrust is exerted against the beams, tie-rods must be provided to prevent the beams from spreading. The thrust of segmental arches is considerable, the total thrust, of course, depending on the load; and the line of thrust is about the center of the skewbacks.

On account of the thrust of an arch being about the center of the skews, that would be the most effective place to locate the tie-rods to counteract the thrust near the bottom of the beams. They may be placed there and protected. That is sometimes done; or, they may be placed there and painted, but that exposes them to the heat of a fire, and if the fire is a severe one, may cause the failure of the arch. It is the practice in general, therefore, to locate tie-rods at a higher level than the center of the skews, where, while they might not be so effective in resisting the thrust of the arch, they will be protected by the arch from the heat of a fire. In flat arch construction the thrust is at the top of the keys and bottom of the skewbacks. In shallow arches the tie-rods are sometimes above hollow tile, while in deeper arches they are bedded in the arches.

The rods are usually ¾ or ⅞ in. in diameter for short-span arches. Interior flat tile arches with spans 6 ft. or less generally have ¾-in. tie-rods, which are spaced about 5 ft. apart. For spans of 7 ft., ⅞-in. tie-rods are used spaced 5 ft. apart. When the span is greater, instead of increasing the size of the tie-rods, their number is increased and they are spaced closer together. For in-

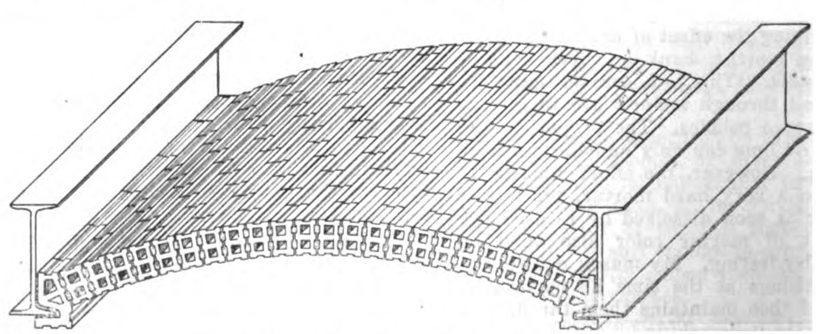


Fig. 91. A single rowlock arch made of hollow brick, which is very similar to one laid up of hollow tile

stance, for a 9-ft. span 7/8-in. rods would be used, but they would be spaced about 4 ft. apart.

Tie-rods are seldom spaced closer than 4 ft. or more than 8 ft. apart. Usually they are spaced a distance equal to eight times the depth of the beam. For instance, with a 6-in. beam the tie-rods would be spaced 6 x 8 equals 48 in., or 4 ft. apart.

The safe loads in pounds per square foot for 6-in. and 8-in. segmental arches of hollow tile built of semi-porous tile 5/8-in. webs and shells, the arches being of the side arch construction and with a rise of one-eighth, the span can be found in the following table:

SAFE LOADS FOR SEGMENTAL ARCHES OF HOLLOW TILE

| Span in Feet | Safe Load for 6-In. Arch, Pounds per Square Foot | Safe Load for 8-In. Arch, Pounds per Square Foot |
|---|---|---|
| 4 | 1.103 | 1.318 |
| 5 | .878 | 1.049 |
| 6 | .735 | .883 |
| 7 | .630 | .735 |
| 8 | .554 | .662 |
| 9 | .490 | .585 |
| 10 | .443 | .529 |

Within recent years there has been developed in practice what is known as the long span arch. These arches are used for floor constrution, and will span spaces 20 or 24 ft. across. The long-span floor arch construction is the logical result of the effort to cut down the amount of structural steel required in a building, without reducing the strength of the structure. It will be readily understood by the practical builder that the less the dead weight of the floor, the less will be the size, weight and expense of columns, girders and the general building structure.

In Fig. 93 is shown detail of a long-span segmental arch. It will be noticed that extra deep I-beams must be used with this form of construction, not only to allow for the rise of the arch, but likewise to provide the necessary strength to carry the load. Segmental arches of this type have been successfully used for all lengths of span up to and including 25 ft. These arches are exceptionally strong, so strong in fact that the most concern in using them is caused by the great thrust upon the supporting beams between which the arches are sprung.

Fig. 94 is shown the way floors built of long-span arches are constructed at the outer bays sometimes, to withstand the thrust that would otherwise be exerted near the outer walls. The outer row of bays all around the building is built of reinforced flat arches and no tie rods are used. In other installations the thrust is taken care of by steel tie rods from beam to beam built in the outer bays.

*(To be continued)*

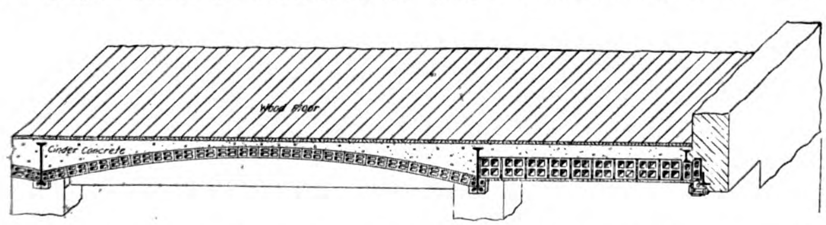



Fig. 94. Occasional construction of long span arch at outer bays, to avoid thrust on outer walls

# What Makes Chimneys Leak?

## *Why Should One Chimney Prove Troublesome When That in the House Next Door Is O.K.?*

By A. R. FAIR

There has been much discussion in the past in BUILDING AGE and other papers in regard to "Leaking Chimneys" and how to stop them from leaking.

Personally, I don't think that the ordinary chimney leaks; there may be some chimneys that are so old and dilapidated that they could not help but leak, but I do not think the ordinary chimney will leak.

For instance, Jones says the chimney on his house leaks. Smith, next door, says his does not. Now, if it rains at Jones' house it must be raining at Smith's house. If there is snow around the chimney on Jones' house, there is apt to be snow around the chimney on Smith's house. What causes one chimney to leak while the other chimney does not?

I spent several years in the natural gas region, where every one burned gas for heating their houses. A great many people did not use stovepipes, so were not troubled with leaky chimneys. But about three years ago I went into an office building, a one-story frame building, lathed and plastered and divided

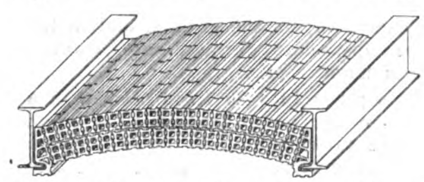


Fig. 92. Double rowlock arch with lipped skewbacks

into two rooms—one outer office and the superintendent's private office. There was a good size gas stove in the outer office connected to a good brick chimney with about ten feet of 6 in. stovepipe. The chimney did not extend to the floor of the building, but sat on top of a post, the bottom of the chimney being about six feet up from the floor.

It was a very cold day and when I went into the office I noticed water dropping from the chimney to the floor, and the plaster was all wet and discolored around the chimney. I said to my friend, "What is the matter with your chimney, or where does the water come from?" He said "I don't know. I have had carpenters here and had new flashing put around the chimney, and had a tile cap

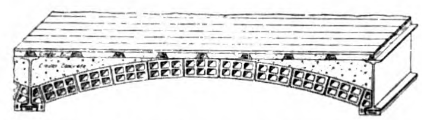


Fig. 93. Long span segmental arch. Extra deep I-beams are required with this arch

put over the top to keep the snow out, but it doesn't do any good."

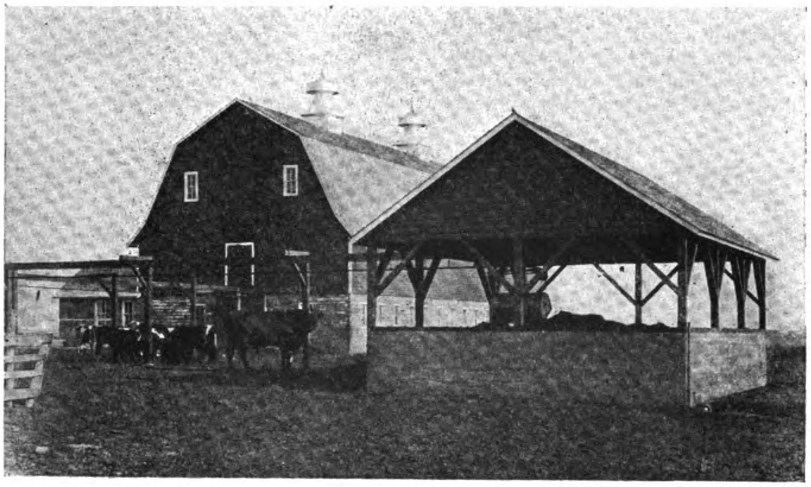
I looked at the stove and the pipe; then I discovered something, and I told him I could stop his chimney from leaking, and I turned the damper in the pipe so that it was just a little open; he had it shut tight.

The damper being shut tight just let enough of the heat from the stove to go up the chimney to cause the frost to draw through the chimney brick, and then it would melt and run down the chimney. I asked him to leave the damper as I opened it for three days and see what the effect would be. I left the damper open just enough to let a little heat up the chimney. I went back to his office in three days and found the chimney perfectly dry, and it has remained dry ever since.

There must be enough heat go up every chimney to dry up any moisture that may accumulate there, otherwise it will find its way into the building. And the ordinary well-built chimney will not leak except in some instance, as I have outlined.

## Effect of Cement on Removing Rust from Steel

The disappearance of rust from steel and iron bars after being embedded in cement or concrete has been traced by various authorities to the presence of acid carbonates and sulphates in the cement. These salts dissolve the iron oxide and leave the metal bright. The de-rusting process takes place while the cement is setting and through the period of hardening—this, because, during that period the cement absorbs carbonic acid from the air, thus producing the necessary acid carbonates. W. G.



# Dairy Barn and Manure Pit on Modern Farm

## *Good Looks and Economical Plan Make This Barn Attractive Farm Asset*

Farmers are beginning to realize that architectural beauty of their farm buildings is as much an asset as are well-kept fields and finely groomed stock. Indeed, where the buildings are attractive in appearance, one is almost certain to find them well kept and neat inside and out. There seems to be a certain tidy influence exerted on the farm help, an influence which is just as noticeable as it is on the resident in a good neighborhood. Pride in one's surroundings is always reflected in one's personal efficiency.

Indeed, a big factor in keeping the children at home on the farm lies in the beauty and comfort of the home surroundings. A child with an upward inclination is not long going to be content with the squalor that is so often apparent on the farm where the owner does not take sufficient pride in its upkeep. With attractive surroundings and a comfortable home life, replete with city conveniences, farm life presents a charm that is more than likely to keep the youngsters at home. Without such surroundings, there is neither pleasure nor joy in the life.

A barn that arouses much of this feeling of pride is illustrated on this page. The well-kept cattle, cleanliness of yard and surroundings, do much to increase the farm earnings in a very practical way.

The barn itself is 82 ft. long by 34 ft. wide, exclusive of a 16-ft. wing. At each side of one end of the barn is a feed chute, so that feed can be easily shot down from the feed loft above. At the opposite end to the feed chutes are a bull pen and calf pens.

The barn is of hollow tile for the first story, with floors of concrete. The pens have floors of cork brick, which is very easy on the feet of the cattle. Milk cows and young cattle only are handled in the barn, the others being handled in another barn.

Water is drawn directly from a well. The barn is lighted by electricity.

A manure pit is an efficient adjacent to this barn. Farmers realize that it is wasteful to allow this valuable fertilizer to leach away in the ground, and so the more up-to-date farmers are making use of manure pits.

This pit is 20 x 30 ft. in plan, with a drain in the center leading to a liquid manure tank holding 75 bbl. A drain from the gutters in the cattle barn also empties into this tank. The pit has a concrete floor pitched to the center, and 8-in. concrete walls carried to a height of 4 ft. 6 in. above grade. The liquid manure is pumped out onto the solid manure when the latter is hauled out to the fields.

The barn is located on Moorland Farm, George M. Moore, proprietor, Spirit Lake, Iowa. The contracting builder was Bert Palmer, Jackson, Minn.

# What Is the Matter With the Contracting Business?

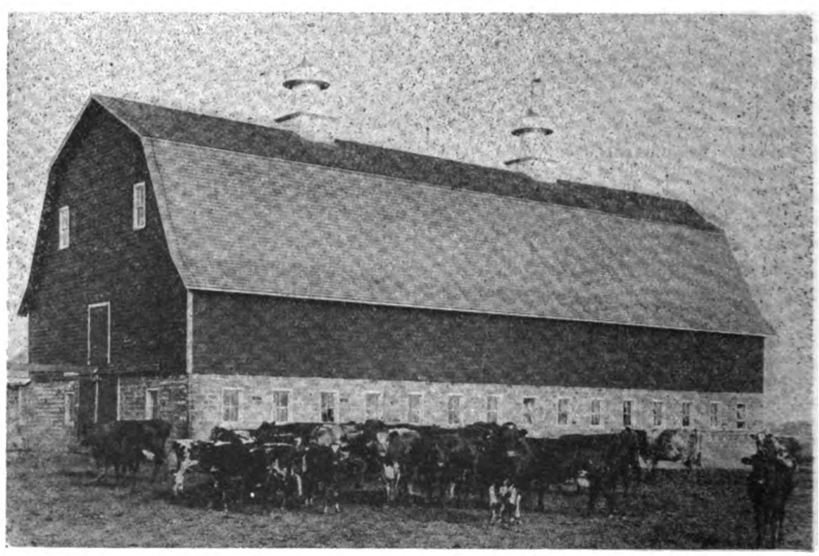
By F. E. DAVIDSON, A. I. A.

The business mortality of contractors is said to be the highest of any business, and approaches the mortality of the battlefields of Europe.

I am going to assume that a twenty-five years' active experience in the construction field, first as draftsman, then building superintendent, afterward estimator, then contractor, and for the past fifteen years as architect and engineer, has offered me an opportunity of observing some of the shortcomings of my friends, the contractors and if perchance I may offer a single suggestion that will react on their brains as a thought, which if acted on should result in conserving any part of their time or resources and at the same time conserve any part of our labor resources for the general good of society, then I shall feel that my trip to this wonderful city of Green Bay will have been of some avail.

Based upon observation, it is my firm belief that the average contractor is ill-equipped successfully or efficiently to perform his functions in our business world. His training has not been sufficient. We have no colleges or schools of contracting. The average contractor

*Address before the Master Builders of Wisconsin.



This well ventilated dairy barn keeps cows healthy and productive enters business, not only with insufficient training and preparation, but with inadequate capital, and often the only asset he has when entering business life is an acquaintance with some architect's superintendent, which permits him to secure a set of plans and specifications and submit a bid as a full-fledged, financially responsible and experienced contractor; and he has been able to get away with it. Why? Because the average owner will usually consider only the lowest bid, because forsooth the bonding companies are ever ready to write a bond on anything and for any purpose.

Everyone knows that contractors and material dealers are children in arms when considered as business men. Else why should our state legislatures provide lien laws to protect their credits, a protection not given to any other business on earth?

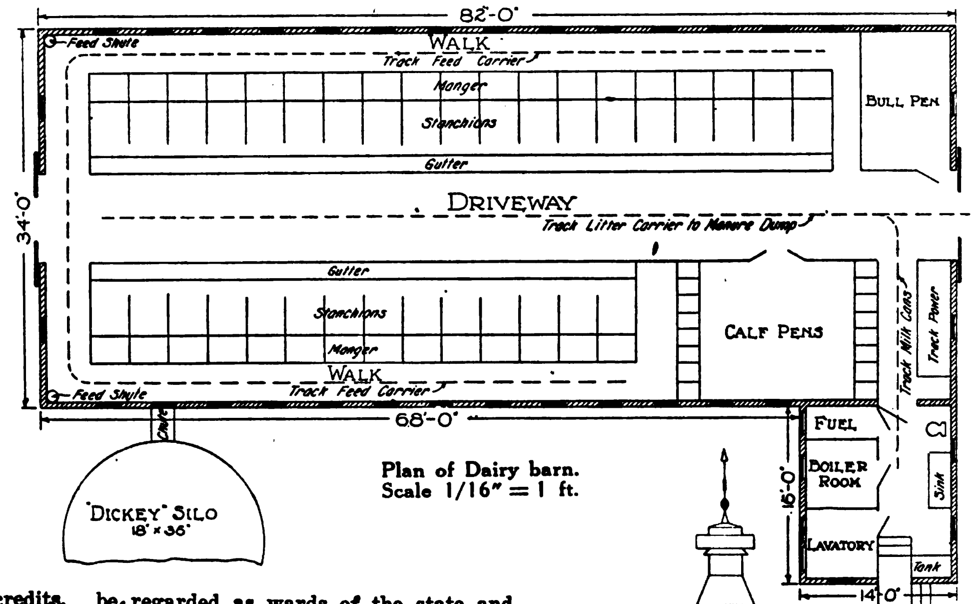
I will make the positive statement that our lien laws and our custom of exacting surety bonds has done more injury to the building business as a business than all other things combined. I have often condemned the system of surety bonds as a species of organized legal graft. The price of a bond is fixed by the mortuary business tables of the insurance companies and anyone with the price to pay can secure a bond for any purpose and for any amount.

As to our lien laws, every mechanic's and material man's lien law should be wiped off our statute books and the building business put on the same footing of common honesty and fair dealing that is the rule of conduct in any other successful business.

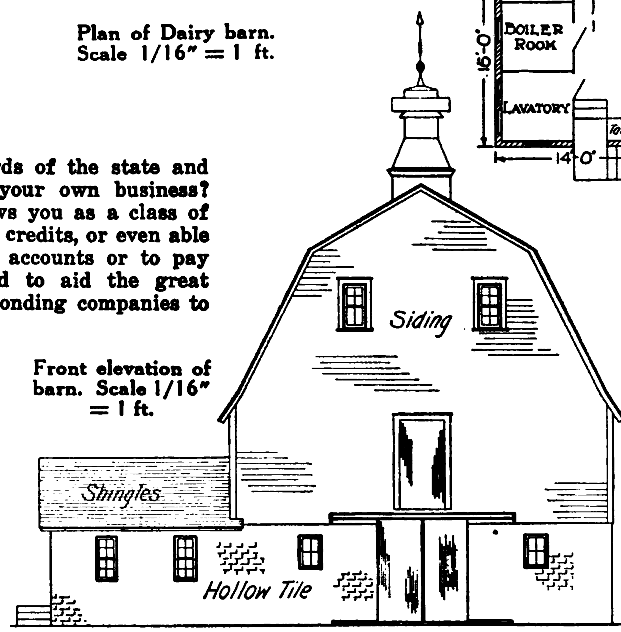
Is it not time that you as contractors ceased to be, regarded as wards of the state and unable to conduct your own business? To-day the law views you as a class of men unable to judge credits, or even able to collect your own accounts or to pay your own bills, and to aid the great gamble allows the bonding companies to speculate on your ability to conduct even a simple financial transaction.

One of the vital questions which our nation must answer and which you individually and as an organization may do your part in answering, a question that is now and in the next few years will be one of the most important that any people have ever been called upon to face, is the great problem of conserving the man power of the nation.

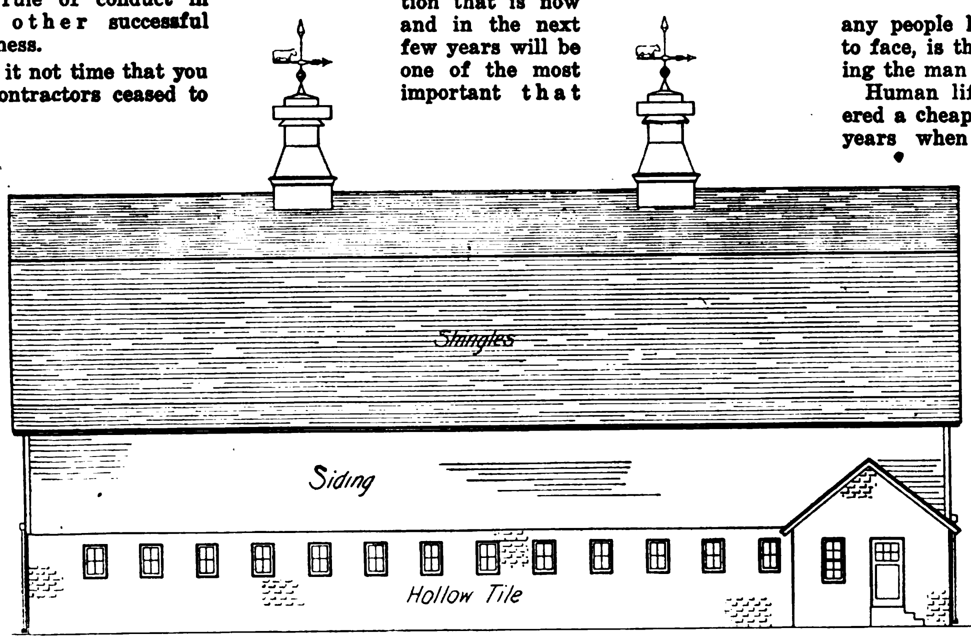
Human life has always been considered a cheap commodity, and during the years when the tide of immigration set to our shores but little regard was paid by industry to safeguarding human life and limb. Society overlooked the fact that the maiming or killing of an industrial worker was a crime and that it must thereby carry an additional burden for every worker that was killed or injured. It also overlooked the fact that every worker injured or killed reduced the available man power of the nation and directly decreased our capacity for production and added as well a further burden on society for caring for the injured and for the sup-




Plan of Dairy barn. Scale 1/16" = 1 ft.




Front elevation of barn. Scale 1/16" = 1 ft.




Side elevation of barn. Scale 1/16" = 1 ft.

port of the family of the one injured. But again the state has recognized that what is particularly true in the building industry is true to an extent in all industry, that industry and society were not adequately and directly caring for those injured and for the families of those killed. Therefore the bonding companies were permitted to gamble on the chances of your employees being killed or injured and on your inability so to manage your building operations as to prevent the loss of life and limb. And what is the result? In many states we find compulsory liability insurance laws, and the rates charged by the liability insurance companies for insurance in the field of building is higher than for any other industry, proving conclusively that contractors as a class are less able to protect their own interests, as well as the interests of the community, than any other class of men. Every preventable accident is a direct loss not only to society, but to the employer. The expense of the labor turn-over is increased, the loss or damage of materials, the cost of reorganizing the working force, the expense of replacing and training of men to replace those injured, on the occasion of a serious accident, all represent a financial loss to the contractor that is not covered by his insurance policy and that is a factor of cost not usually considered in preparing estimates on work.

Why is the percentage of accidents, and the corresponding cost of insurance, higher in the building industry than in any other? In Wisconsin the ratio is about four to one and varies but little in the other states. It cannot be that our building mechanics are less intelligent or less skillful than the workers in the railroad yards or the mechanics in a rolling mill. The human element will be found the same whatever the line of work considered. Therefore why the four to one ratio of accidents on your work as compared with all others? I will venture the suggestion that the average contractor was improperly trained for his calling. He is perhaps an ex-carpenter boss, or a bricklayer, or a plumbing foreman whose wife has inherited a little money and he concludes to become over night a full-fledged contractor; and if he is lucky, he gets away with it. He is starting his business life no better equipped than the very great majority of his competitors. By the law of averages a few at least succeed in making money, but he continues to conduct his business along the lines of the same old gamble instead of organizing to reduce costs and increase efficiency; he continues to gamble on the chance of a profit on work in which to him there are so many unknown quantities that the loss of a few lives is too small a matter to be considered; for has he not done his duty to society by buying liability insurance? He overlooks the fact that his neglect in doing all that might be done to prevent accident is not only a direct loss to himself and to the community, but affects the insurance rates placed on his class of work, which every man in a similar capacity is compelled to pay.

No man can live by and for himself alone. Our each and every act affects the lives of all our fellows. It is the duty of every contractor to do all possible to conserve man power.

The contractor who is able to maintain a high morale in his organization is able to do work cheaper and better than the contractor who takes no interest in his workmen. The really successful contractor is he who knows men, who knows their problems and can sympathize with them in their troubles, who considers even the laborer on the job as his partner in business, and recognizes that the time has arrived when it is better to consider labor as a comrade than as an enemy. A contractors' association such as yours will do well if it heeds the "handwriting on the wall" that labor has the right to participate in the management of construction and that the right of organized and collective bargaining has been established for all time as one result of the world's war. Co-operation was the great lesson taught by the war. You as contractors and we as architects must recognize that the co-operation of contractors, workmen and architects is necessary to give perfect service to those who employ us. Let me say further that the contractors of the future will be compelled to give a service not dreamed of in your philosophy. I expect to see the day when contracting, instead of being a matter of barter and exchange, will develop professional aspects, and that when you sign a contract you will be expected and compelled to furnish service to the owner in addition to delivering to him so many carloads of brick or so many feet of lumber assembled in a certain way.

The successful contractor of the future will be a better business man than he is to-day. He will not only know how to keep cost accounts progress reports, etc., but he will also learn how to reduce the labor turn-over and prevent 85 per cent of the accidents now chargeable to building operations.

In conclusion let me say that if you have no brains hire some. Brains are the poorest paid and the scarcest commodity in the world to-day. Organize your work, give your employees an interest with you or at least see to it that they are interested in your welfare. Prove to them that their best interests are also your own. Increase the morale of your working force. Don't regard your competitor as an enemy but as your brother. Talk over your problems with him. Remember that he who can devise a means of reducing costs is a benefactor of his race. Remember that every preventable loss, whether in materials or man power, is a national loss, and above all, remember that whatever you may do affects your neighbor, that in the end his interests are your interests, and that as an organization you can have no ideals not possessed by you and your associates as individuals.

# Material Prices During Civil War and World War Compared

A study of the relative rise in the wholesale price of building materials during the Civil War and the World Conflict, recently published by the Department of Labor, is interesting and shows a striking similarity in the movement of prices in the two great wars on the whole, the chief differences being (1) that the rise began earlier in the Civil War; (2) that it was more pronounced than in the present war, and (3) that the fall began earlier. Taking the index number 100 as a base price during the both wars, building materials rose 81 per cent in the present war, as compared with 100 per cent during the Civil War. To trace the comparative rise and declines of prices during the two wars is interesting, and interesting comparisons are shown. These figures refute the assertion that building materials are at "unheard of levels."

However, in 1861 the price of building materials rose 2 per cent, while in the first year of the world war there was no advance in price.

A gross increase of 16 per cent in building materials is noted at the end of 1862, where as the price of building materials in 1915, the second year of the world war was still unchanged.

However, the next year, 1916, was the scene of an advance of the first advance in price of building materials since the start of the World War. This year showed a gain of 17 per cent, while at the end of 1863 in the Civil War a gross gain of 45 per cent in the cost of building material is shown, showing that the rise during the Civil War was more rapid and with greater results than during the present war.

At the end of 1864 the price of building materials reached their peak, having risen exactly 100 per cent. However, the gross rise in price at the end of 1917 was 52 per cent, or little more than half the rise during the corresponding years of the Civil War.

Between April and July, 1865 (the time when Lee surrendered), the price of building materials fell 25 per cent, but quickly rebounded to its old mark (rise of 100 per cent) at the end of that year. However, in 1918, the price of building material rose steadily until July, 1918, when it reached a total rise of 81 per cent.

The end of 1866 began the decline in building material price. Figures on building materials later than July, 1918, have not yet been computed by the Department of Labor, but it is believed that they have hovered at much the same figure. That they will not go appreciably lower is the opinion of many authorities in the building and lumber trades. That they will never reach the level of 1914 prices is also declared a certainty.

A. C. S.

# THE EDITOR'S PAGE

## Should Builders Be Licensed?

There has just been defeated in New Jersey by one vote a bill providing for the licensing of builders. In Milwaukee during February a bill giving the city power to license building contractors was introduced and is making headway. Agitation for licensing of builders is nothing new, but the close call for the measure in New Jersey shows that it can be expected to pass in some State in the near future.

Will this be a good thing for the trade in general? Will it tend to concentrate work in the hands of the big contractors, eliminating the small man?

The answer to these questions depends largely on the manner in which the bill is finally drafted before enactment.

Undoubtedly the majority of capable contractors would welcome any law tending to prevent irresponsible bids and the cut-throat competition indulged in by the contractor who is not enough of a business man to know his costs. And even more important would be the elimination of the incompetent contractor who gives a black-eye to good materials and contractors in general. How many people, for instance, have been prejudiced against stucco because they have noticed cracked, unsightly jobs done by men incapable of handling the material correctly? Those badly done jobs naturally form a criterion for the prospective home owner, and he will shun stucco as he would the plague. Again, the sad experiences of many with fireplaces have caused the open fire frequently to be regarded with suspicion. Four-inch walled chimneys, unlined, have caused many a life-time's savings to go up in smoke; floor joists framed into chimneys, construction that causes plaster cracks—all these should and can be eliminated.

The wasted material and inefficient methods of an incompetent contractor tend to keep costs at a higher level than they should be.

Why should not the public be protected from the contractor who cannot build properly who, if he makes a mistake, must either retrench by inferior work or become insolvent, and whose work affords him less than day's wages on contracts where a capable builder, wise in labor-saving methods, would make a fair profit; should not the public be protected from such inefficient contractors?

The licensing of architects is doing much to raise the standard of that profession in a very practical way. No longer in licensed States can the owner of a Tee square and a book of the Orders set himself up as fit to take the public's money. Such laws have proved their worth. Where the intent has been merely to restrict the title "architect" to those qualified to bear it, and not to hamper builders in their activities in preparing plans, the trade has been pleased.

Laws licensing builders should be along the same lines as those laws which license architects, and yet which do not hamper the builder's activity. The title "Builder" should be restricted to those worthy of it, to those who can make the name a synonym for honesty and capability. Yet respect should be shown for the small man with little capital who wants to and can only engage in small work. He, however, should not be entitled to call himself a licensed Builder. People who engage him would do so knowing his educational limitations.

Bills drafted to restrict the title "Builder" just as the title "Architect" has been satisfactorily restricted, will have the full support of the best element in the trade, of the element that realizes that only through honesty and efficiency can the trade ever secure and hold tight to the dignity and respect that it deserves.

## Proposal to Exempt New Buildings from Taxes

One of the plans proposed to off-set the high price bugaboo is that buildings erected now shall be tax free for several years. As present and proposed high taxes are an excuse for lack of building the proposal is a logical one which, if put through, would probably do its bit in stimulating "Build Now."

High taxes are a discouraging feature. We are all feeling the effects, effects which directly or indirectly affect our pocket-books in no small degree. High taxes are, of course, the logical result of the war, and no more to be used as an excuse to stop production of buildings than to stop production of clothing, food and the other vital necessities that we all need.

Although it is certain that "tax free for five years" would prove a strong slogan for "Build Now," yet it is to be hoped that such methods will prove unnecessary. Exempting 1919 buildings from taxation will only throw a heavier burden on the rest of the population, which must necessarily make up the loss in revenue.

## Don't Let Higher Prices Tell Against Good Work

High prices are a temptation to skimp, to use cheaper materials than are actually required for good work. Such a tendency cannot be too strongly discouraged, for the few dollars saved are not sufficient to off-set the dissatisfaction that is almost certain to be felt, sooner or later.

Architects and builders should impress on home builders the fact that the house is not to be built for to-day only. It is intended to be a house that in twenty years will be livable, comfortable, and not have trebled its original cost through excessive up-keep.

At present I am living in a farm house that is over 50 years old; $500 would put it in a condition equal to many practically new houses. I know of more than one house, sturdily and honestly built, that has stood for twenty or more years, and is now costing less for upkeep than houses only five years old.

Good materials and honest workmanship are worth paying for—and they are a mighty good investment in the house that is intended to be a real home. Impress that fact on the people with whom you do business.

In my talks with people who have wanted advice on building their home, I have been surprised at noting the number who remark that they prefer such and such a material, even though more expensive, because they understand that the up-keep will be less.

And that question of up-keep is a big one that every prospective home owner must be brought to face, sooner or later. Help him face it before it is too late. He, the trade, and you will all be benefited. Where permanence is desired, quality always pays.

## Watchful Waiting Won't Pay

Costs are not going to drop to pre-war levels. The sooner that fact is grasped, the sooner will more logical methods of cutting costs than "watchful waiting" be grappled with.

Waiting for prices to drop will not bring business; it will not cause your bank roll to swell and burst the confines of the old sock that has housed its limited diameter. Nor will it cause new houses to spring up and confound the profiteering landlord.

No! Other and more practical means must be used to cope with the situation. The chimera of lower prices must not be allowed to bolshevik its way into the hearts of homebuilders, causing them to hold off and off until their regrets are as loudly wailed as those of the man who was out when opportunity knocked.

The situation must be boldly met. Relief can and is being sought by progressive up-to-date methods, which gradually are turning the tide.

Save! Save on labor, on materials, on equipment, not by sacrificing quality, but by eliminating waste. Many a country house in the halcyon days of yore was, like Topsy, not built up logically, but just growed. Yes, grew without plan, without thought as to economy of labor, of material, of anything. And, as it grew, it evidenced an enormous appetite, an appetite that swallowed excess over estimate, regardless of cost.

The most economical material for its purpose must be chosen. And that material must be used without waste; it must go into the building as quickly as possible. And to accomplish that, the utmost ingenuity of the builder must be used. Planning before doing always conserves. Labor saving methods must be evolved, equipment must be used to the best advantage, the latest and best that the market affords must be at the builder's finger tips.

And not only that. Costs must be kept track of as never before. The exact cost of every item must not only be estimated as closely as possible, but the actual cost on the job must be checked against the estimate. At any stage of the game the builder should know exactly what is his investment in the building, and how it stands in relation to his estimate. Then waste can be discovered and checked in time, accidently discovered kinks that brought quicker time than expected can be noted and remembered for future use.

Don't follow a policy of watchful waiting, a waiting that is sure to bring vain regrets. Jump into the fray now and cut costs by eliminating waste. You can do it. Others are—why not you?

## Turn Ignorance Into Wisdom

Willingness to investigate never harmed anyone. Only the man who knows too much to seek new ideas is ashamed to acknowledge to himself that his ignorance requires enlightenment, or feels that he is harmed by admitting that he does not know it all.

Many a man will frankly admit that although he knows quite a bit about carpentry and labor-saving devices, yet he is willing, even anxious, to investigate the merits of a new saw rig. He will quiz any salesman he may meet, find out if he can cut costs by the use of hitherto unknown equipment, and become a wiser, richer man.

Another man, knowing no more, will be ashamed to admit that he doesn't know all about saw rigs and what they will do for him. Unwilling to admit his ignorance, he loses his chance to perhaps learn something really new and worth while.

The biggest men in any field are those who are open to new ideas. They will investigate anything and everything that promises to help them in the handling of their work, even remotely. They are not willing to pass up data which might possibly be of vital interest, merely because they are ashamed to learn.

It is only the wise man who realizes when he does not know—and he is wise only because he will not allow himself to remain in ignorance.

## Canada Helps

The Federal Government of Canada is showing a very practical spirit by helping its workingmen and returned soldiers to homes of their own at actual cost. The government proposes to loan twenty-five million dollars to the provinces, which will administer this fund on a pro-rata basis and, it is expected, add a contribution of their own. This original fund is sufficient to provide over 7000 $3,500 houses, which will go far to relieving the housing situation in Canada.

In Pittsburgh an effort is being made to have the city issue bonds to erect small houses on municipally owned lands. These houses, then, will be rented to workers. As Pittsburgh has some 2000 building lots, the scheme is a practical one which should both relieve housing conditions and provide employment in that city.

## Method of Indicating Materials Should Be Standardized

I often go into an architect's office and talk with him of the work he is doing. He will generally pull out drawings to illustrate some especially interesting bit of construction data.

And I am often compelled to look at the drawing and remark, "Is this brick or is it stone or is it concrete"

Occasionally he will look astonished at the query, especially if his experience is merely local. If he has practised widely, he realizes that I probably have seen concrete indicated in five or six different ways, each method also being used in various localities to indicate stone, brick and other materials.

A man should be able to walk into the office of a New York or Chicago architect and say definitely: "This drawing indicates stone here." But he can't. There is no standard method of indicating materials.

The Architectural Service Corporation of Philadelphia is doing good work in making all their drawings conform to a standard method of indication, outlined on a separate sheet. The American Institute of Architects recommended standard indications, but has never made any active effort to secure its adoption.

Either one of these or some other system should be followed. The present looseness should not be tolerated. With the increased necessity for efficiency, a standard method of indicating materials should be adopted as furthering the best interests of the trade. The growing practice of "keying" the materials on a separate section of a blueprint is only a confession of the confusion which exists, a confusion that no longer should be allowed to hamper workers in the trade.

# Building Activity in the United States

Live cities all over the country are booming "Build Now." Contractors, lumber dealers and real estate men are bending every effort to stimulate construction. And their efforts are succeeding, for at last reports of building inspectors are beginning to show the results of the "Build Now" movement.

There is but little pessimism in the trade, in spite of the continued high prices. The feeling is growing that prices will hold steady; it is to be hoped that government efforts looking to this end will prove effective in removing any remaining uncertainty.

In country house construction. a suburban firm of architects and builders who have kept careful track of their costs during the war, report to us that their records show a high mark of 35 per cent over pre-war costs last fall, with present prices between 20 and 30 per cent over before-the-war costs. Our own investigations in non-fireproof construction show this to be about right. Fireproof construction has shown a greater increase.

The fact that costs in non-fireproof construction, which is largely residence work, have not risen to so great a degree as have fire-proof construction costs, will logically see the stimulation of residence work, which will probably be well under way before city building.

Architects are beginning to feel business flow their way, and although much of this work has of course not as yet reached the contractors, it can be expected to be in their hands in the near future. When the Fifth Liberty Loan is out of the way, loans will undoubtedly be made more freely. All in all, the outlook is bright indeed.

Out of 171 cities reporting, 114 show a gain, as against 57 showing a loss. The volume of construction for February, 1919, is $33,825,961, as against $29,316,-167 for the corresponding month of 1918, the increase being 15 per cent.

Eastern cities show the gratifying gain of 15 per cent, 45 out of 62 cities reporting gains.

Cities in the middle states report a loss of 10 per cent, this being the only section of the country to show a loss. Of 49 cities reporting, 28 show gains.

Southern cities show a gain of 12 per cent, 28 out of 38 cities reporting gains.

Western cities report the gratifying gain of 30 per cent, 13 out of 22 cities showing increases.

Naturally this increase is decidedly encouraging, even though increased costs would take away part of the favorable showing. From now on construction can be expected to pick up steadily.

CITIES IN EASTERN STATES

| | February, 1919 | | | | February, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Albany, N. Y. | 6 | $10,900 | 106 | $84,785 | 4 | $65,500 | 91 | $74,350 |
| Allentown, Pa. | 18 | 14,575 | ... | ... | 10 | 11,250 | ... | ... |
| Altoona, Pa. | .. | ... | 17 | 6,184 | ... | ... | 12 | 7,299 |
| Atlantic City, N. J. | 6 | 27,700 | 69 | 50,170 | 3 | 8,350 | 65 | 45,028 |
| Auburn, N. Y. | 2 | 650 | ... | ... | 1 | 2,000 | ... | ... |
| Bayonne, N. J. | 15 | 33,990 | ... | ... | 4 | 4,450 | ... | ... |
| Binghamton, N. Y. | 23 | 13,433 | 89 | 23,747 | 24 | 26,878 | 57 | 12,623 |
| Boston, Mass. | 21 | 215,190 | 79 | 113,990 | 15 | 360,650 | 142 | 134,056 |
| Brockton, Mass. | 17 | 8,120 | 21 | 23,762 | ... | ... | 5 | 4,850 |
| Buffalo, N. Y. | 153 | 269,400 | 74 | 50,600 | 157 | 493,000 | ... | ... |
| Easton, Pa. | 2 | 6,000 | 10 | 3,970 | 1 | 750 | 6 | 4,320 |
| East Orange, N. J. | 30 | 29,171 | ... | ... | 7 | 24,400 | ... | ... |
| Elizabeth, N. J. | 33 | 58,143 | ... | ... | 7 | 20,250 | ... | ... |
| Erie, Pa. | 38 | 60,312 | 22 | 11,521 | 14 | 14,375 | 11 | 15,650 |
| Harrisburg, Pa. | 25 | 44,530 | ... | ... | 4 | 181,906 | ... | ... |
| Hartford, Conn. | 36 | 222,175 | 24 | 29,125 | 7 | 1,685 | 13 | 19,910 |
| Cambridge, Mass. | 68 | 81,640 | ... | ... | 20 | 27,435 | ... | ... |
| Hoboken, N. J. | 2 | 9,000 | 13 | 26,240 | 2 | 7,250 | 9 | 12,015 |
| Holyoke, Mass. | 2 | 1,275 | 2 | 1,700 | ... | ... | 4 | 1,070 |
| Jersey City, N. J. | 40 | 55,163 | ... | ... | 50 | 382,504 | ... | ... |
| Lawrence, Mass. | 9 | 2,543 | 13 | 13,005 | | 10,000 | 6 | 2,820 |
| Manchester, N. H. | 11 | 33,652 | 26 | 26,256 | 5 | 13,333 | 10 | 10,120 |
| Mount Vernon, N. Y. | 26 | 128,400 | 11 | 7,400 | 5 | 28,800 | 7 | 4,075 |
| Newark, N. J. | 146 | 202,587 | ... | ... | 82 | 298,976 | ... | ... |
| New Bedford, Mass. | 38 | 154,850 | ... | ... | 13 | 4,100 | ... | ... |
| New Britain, Conn. | 9 | 41,100 | 8 | 3,600 | 4 | 192,675 | 5 | 11,700 |
| New Haven, Conn. | 101 | 177,419 | ... | ... | 28 | 678,195 | ... | ... |
| New York: | | | | | | | | |
| Manhattan | 16 | 3,978,200 | 223 | 954,480 | 17 | 1,896,700 | 168 | 480,655 |
| Bronx | 18 | 248,900 | 130 | 48,209 | 30 | 625,800 | 77 | 35,598 |
| Brooklyn | 184 | 1,388,060 | 371 | 464,030 | 38 | 514,200 | 322 | 306,249 |
| Queens | 555 | 856,419 | ... | ... | 189 | 379,669 | ... | ... |
| Richmond | 71 | 157,315 | 42 | 18,745 | 30 | 89,820 | 15 | 15,660 |
| Nutley, N. J. | 9 | 19,275 | 5 | 735 | 1 | 2,000 | 2 | 660 |
| Passaic, N. J. | 8 | 18,300 | 5 | 7,200 | 3 | 825 | 3 | 1,300 |
| Paterson, N. J. | 61 | 82,175 | ... | ... | 33 | 50,850 | ... | ... |
| Philadelphia, Pa. | 161 | 906,035 | 276 | 234,650 | 310 | 591,865 | ... | ... |
| Pittsburgh, Pa. | 78 | 144,305 | 92 | 235,646 | 42 | 345,099 | 61 | 69,589 |
| Portland, Me. | 6 | 6,875 | 16 | 12,440 | 2 | 11,200 | 7 | 8,875 |
| Reading, Pa. | 24 | 148,375 | 113 | 26,775 | 3 | 125 | 54 | 18,000 |
| Schenectady, N. Y. | 19 | 35,445 | 10 | 4,420 | 6 | 665 | 5 | 9,150 |
| Scranton, Pa. | 27 | 37,480 | ... | ... | 6 | 3,865 | ... | ... |
| Springfield, Mass. | 64 | 107,050 | ... | ... | 25 | 12,775 | ... | ... |
| Syracuse, N. Y. | 69 | 84,010 | ... | ... | 39 | 44,910 | ... | ... |
| Trenton, N. J. | 51 | 59,768 | ... | ... | 10 | 4,600 | ... | ... |
| Utica, N. Y. | 6 | 10,050 | 8 | 6,800 | 2 | 10,000 | 1 | 500 |
| Wilkes-Barre, Pa. | 38 | 14,306 | ... | ... | 37 | 87,162 | ... | ... |
| Camden, N. J. | 50 | 70,118 | ... | ... | 23 | 56,848 | ... | ... |
| Worcester, Mass. | 42 | 42,770 | 46 | 89,351 | 17 | 73,655 | 18 | 53,770 |
| York, Pa. | 4 | 4,500 | 13 | 11,500 | 2 | 3,000 | 6 | 3,810 |
| Fitchburg, Mass. | 11 | 15,675 | 4 | 1,800 | 5 | 4,320 | 3 | 8,100 |
| Lowell, Mass. | 14 | 195,175 | 26 | 10,295 | 4 | 341,200 | 8 | 11,100 |
| Lancaster, Pa. | 4 | 10,400 | 12 | 6,250 | 2 | 29,000 | 8 | 15,400 |
| Newport, R. I. | 10 | 32,600 | 12 | 4,600 | 2 | 4,100 | 17 | 16,958 |
| Rochester, N. Y. | 55 | 72,005 | 61 | 101,883 | 19 | 23,150 | 32 | 80,650 |
| Stamford, Conn. | 46 | 45,535 | ... | ... | 9 | 16,685 | ... | ... |
| Fall River, Mass. | 23 | 19,710 | ... | ... | 9 | 3,200 | ... | ... |
| Hamilton, Ohio | 23 | 79,055 | ... | ... | ... | ... | ... | ... |
| Malden, Mass. | 21 | 26,855 | ... | ... | 16 | 5,280 | ... | ... |
| McKeesport, Pa. | 4 | 19,950 | ... | ... | ... | ... | ... | ... |
| Salem, Mass. | 17 | 6,765 | ... | ... | 6 | 3,690 | ... | ... |
| W. Hoboken, N. J. | 8 | 4,783 | ... | ... | 2 | 200 | ... | ... |
| Yonkers, N. Y. | 12 | 66,100 | ... | ... | 5 | 1,300 | ... | ... |
| | 2686 | $10,916,257 | 2049 | $2,715,864 | 1413 | $8,096,464 | 1248 | $1,495,910 |

CITIES IN EXTREME WESTERN STATES

| | February, 1919 | | | | February, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Berkeley, Cal. | 4 | $8,300 | 49 | $12,300 | 9 | $19,000 | 36 | $17,500 |
| Boise, Idaho | 2 | 935 | 20 | 19,530 | 3 | 2,600 | 12 | 3,264 |
| Denver, Col. | 66 | 171,900 | 75 | 47,600 | 80 | 68,080 | 52 | 105,550 |
| Colorado Spgs., Col. | 6 | 1,300 | 10 | 3,270 | 1 | 190 | 3 | 440 |
| Eureka, Cal. | 2 | 700 | 2 | 900 | 4 | 1,400 | 2 | 1,500 |
| Long Beach, Cal. | 243 | 324,972 | ... | ... | 161 | 148,865 | ... | ... |
| Los Angeles, Cal. | 410 | 873,747 | 283 | 134,448 | 289 | 641,274 | 229 | 124,356 |
| Oakland, Cal. | 173 | 450,207 | 79 | 42,392 | 115 | 381,250 | 57 | 26,391 |
| Pasadena, Cal. | 27 | 23,523 | 57 | 15,660 | 22 | 32,470 | 38 | 12,293 |
| Portland, Ore. | 242 | 214,870 | 225 | 65,850 | 151 | 159,565 | 171 | 62,265 |
| Pueblo, Col. | 33 | 23,196 | ... | ... | 36 | 14,470 | ... | ... |
| Sacramento, Cal. | 75 | 70,360 | ... | ... | 46 | 60,803 | ... | ... |
| Salt Lake City, Utah | 42 | 56,435 | ... | ... | 26 | 35,510 | ... | ... |
| San Diego, Cal. | 38 | 11,135 | 41 | 82,430 | 67 | 23,435 | 35 | 41,840 |
| San Francisco, Cal. | 281 | 355,377 | ... | ... | 340 | 537,230 | ... | ... |
| Cheyenne, Wyo. | 2 | 6,500 | 0 | 1,000 | ... | ... | ... | ... |
| San Jose, Cal. | 20 | 19,393 | ... | ... | 25 | 62,274 | ... | ... |
| Seattle, Wash. | 820 | 1,750,085 | ... | ... | 789 | 896,030 | ... | ... |
| Spokane, Wash. | 46 | 5,245 | 37 | 14,350 | 34 | 25,210 | 20 | 7,033 |
| Stockton, Cal. | 37 | 41,661 | ... | ... | 49 | 57,105 | ... | ... |
| Tacoma, Wash. | 126 | 83,570 | 114 | 38,235 | 65 | 144,839 | 78 | 51,870 |
| Tucson, Ariz. | 11 | 32,670 | 16 | 800 | 11 | 52,000 | 15 | 1,250 |
| | 2706 | $4,586,081 | 1009 | $478,765 | 2323 | $3,363,600 | 748 | $455,552 |

CITIES IN SOUTHERN STATES

| | February, 1919 | | | | February, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Galveston, Tex. | 597 | $43,495 | ... | ... | 199 | $15,689 | ... | ... |
| Atlanta, Ga. | 115 | 356,822 | 77 | $44,411 | 64 | 242,694 | 85 | $39,104 |
| Baltimore, Md. | 270 | 605,474 | 563 | 180,945 | 18 | 394,885 | 295 | 93,325 |
| Knoxville, Tenn. | 49 | 42,190 | ... | ... | 55 | 34,765 | ... | ... |
| Birmingham, Ala. | 66 | 114,870 | 204 | 80,946 | 39 | 25,077 | 235 | 31,036 |
| Charleston, S. C. | 17 | 17,220 | ... | ... | 7 | 5,383 | ... | ... |
| Charlotte, N. C. | 9 | 13,725 | 9 | 3,200 | 12 | 12,825 | ... | ... |
| Chattanooga, Tenn. | .. | ... | 140 | 57,368 | ... | ... | 106 | 47,301 |
| Columbia, S. C. | 3 | 3,550 | 69 | 12,900 | 3 | 4,450 | 69 | 6,954 |
| Corpus Christi, Tex. | 9 | 3,885 | ... | ... | 7 | 930 | ... | ... |
| Dallas, Tex. | 72 | 91,964 | ... | ... | 64 | 148,058 | ... | ... |
| El Paso, Tex. | 95 | 66,203 | ... | ... | 72 | 56,340 | ... | ... |
| Jacksonville, Fla. | 31 | 74,775 | 21 | 21,215 | 14 | 21,300 | 34 | 24,895 |
| Houston, Tex. | 90 | 180,766 | 161 | 32,739 | 70 | 163,267 | 86 | 11,617 |
| Huntington, W. Va. | 46 | 6,900. | .. | ... | 30 | 59,995 | ... | ... |
| Louisville, Ky. | 89 | 86,015 | 29 | 18,835 | 56 | 76,541 | 15 | 7,070 |
| Memphis, Tenn. | 112 | 138,240 | ... | ... | 62 | 95,505 | ... | ... |
| Miami, Fla. | 64 | 107,800 | ... | ... | 38 | 95,900 | ... | ... |
| Jacksonville, Fla. | 52 | 95,990 | ... | ... | 48 | 46,195 | ... | ... |
| Macon, Ga. | 22 | 7,674 | 30 | 16,400 | 21 | 14,175 | 28 | 11,071 |
| Montgomery, Ala. | 6 | 7,000 | 83 | 19,349 | 4 | 200 | 87 | 11,954 |
| Nashville, Tenn. | 10 | 28,200 | 122 | 34,091 | 6 | 6,065 | 90 | 28,187 |
| New Orleans, La. | 5 | 10,800 | 14 | 27,640 | 27 | 89,135 | 6 | 1,750 |
| Norfolk, Va. | 58 | 153,387 | 8 | 5,215 | 44 | 026,950 | 10 | 10,399 |
| Oklahoma City, Okla. | 75 | 175,310 | ... | ... | 98 | 258,315 | ... | ... |
| Richmond, Va. | 28 | 253,690 | 57 | 55,457 | 17 | 114,688 | 89 | 29,358 |
| San Antonio, Tex. | 207 | 148,616 | ... | ... | 201 | 569,965 | ... | ... |
| Savannah, Ga. | 19 | 48,175 | 15 | 9,100 | 11 | 14,340 | 9 | 2,815 |
| Shreveport, La. | 39 | 87,125 | 29 | 11,943 | 13 | 29,922 | 29 | 7,568 |
| Tampa, Fla. | 12 | 8,390 | 44 | 11,960 | 18 | 16,090 | ... | 18,022 |
| Washington, D. C. | 90 | 373,192 | 199 | 132,142 | 52 | 627,640 | 164 | 103,810 |
| Wilmington, Del. | 67 | 174,957 | ... | ... | 41 | 70,440 | ... | ... |
| Covington, Ky. | 15 | 18,125 | ... | ... | 7 | 13,500 | ... | ... |
| Ft. Worth, Tex. | 42 | 166,365 | 35 | 79,642 | 24 | 108,650 | 23 | 59,065 |
| Lexington, Ky. | .. | ... | 21 | 12,275 | 17 | 12,713 | ... | ... |
| Roanoke, Va. | 55 | 39,545 | ... | ... | 15 | 4,440 | ... | ... |
| Wheeling, W. Va. | .. | ... | 34 | 9,435 | ... | ... | 16 | 18,825 |
| Augusta, Ga. | 7 | 12,155 | 96 | 10,473 | 5 | 12,500 | 84 | 8,617 |
| | 2543 | $3,762,590 | 2059 | $887,681 | 1479 | $3,589,527 | 1510 | $572,743 |

CITIES IN MIDDLE STATES

| | February, 1919 | | | | February, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| Akron, Ohio | 257 | $662,330 | 40 | $23,640 | 80 | $153,945 | 22 | $23,640 |
| Canton, Ohio | 86 | 351,450 | ... | ... | 24 | 48,030 | ... | ... |
| Cedar Rapids, Iowa. | 10 | 23,000 | 5 | 9,000 | 4 | 57,000 | 3 | 9,000 |
| Chicago, Ill. | 197 | 1,758,150 | ... | ... | 93 | 2,376,000 | ... | ... |
| Cincinnati, Ohio | 52 | 40,770 | 266 | 149,330 | 30 | 167,405 | 222 | 30,385 |
| Cleveland, Ohio | 122 | 900,500 | 404 | 235,105 | 97 | 1,106,200 | 367 | 155,870 |
| Columbus, Ohio | 95 | 538,415 | 72 | 33,055 | 46 | 90,255 | 45 | 68,255 |
| Davenport, Iowa | 47 | 56,315 | ... | ... | 25 | 25,645 | ... | ... |
| Dayton, Ohio | 111 | 146,210 | 29 | 21,825 | 49 | 665,114 | ... | ... |
| Decatur, Ill. | 16 | 27,525 | 7 | 6,450 | 6 | 63,050 | 4 | 4,600 |
| Des Moines, Iowa | 23 | 51,650 | ... | ... | 30 | 54,850 | ... | ... |
| Detroit, Mich. | 500 | 1,279,065 | ... | ... | 180 | 857,580 | ... | ... |
| Dubuque, Iowa | 19 | 45,800 | ... | ... | 3 | 35,030 | ... | ... |
| Duluth, Minn. | 48 | 75,316 | ... | ... | 34 | 88,095 | ... | ... |
| East St. Louis, Ill. | 2 | 52,000 | 18 | 7,260 | 3 | 15,000 | 15 | 950 |
| Evansville, Ind. | 45 | 44,485 | ... | ... | 29 | 64,280 | ... | ... |
| Ft. Wayne, Ind. | 12 | 21,300 | 11 | 11,510 | 3 | 5,250 | 7 | 5,830 |
| Grand Rapids, Mich. | 20 | 42,380 | 37 | 40,993 | 12 | 76,330 | 20 | 22,098 |
| Indianapolis, Ind. | 186 | 337,644 | 204 | 99,001 | 78 | 266,605 | 108 | 51,021 |
| Joplin, Mo. | 3 | 3,150 | 12 | 18,215 | 12 | 32,000 | 19 | 12,585 |
| Kansas City, Kan. | 25 | 63,335 | ... | ... | 10 | 25,100 | ... | ... |
| Kansas City, Mo. | 238 | 360,860 | ... | ... | 110 | 1,682,700 | ... | ... |
| Lincoln, Neb. | 36 | 68,190 | ... | ... | 12 | 31,605 | ... | ... |
| Milwaukee, Wis. | 178 | 465,137 | ... | ... | 69 | 335,619 | ... | ... |
| Minneapolis, Minn. | 179 | 369,765 | ... | ... | 187 | 253,095 | ... | ... |
| Omaha, Neb. | 129 | 274,715 | ... | ... | 44 | 163,600 | ... | ... |
| Peoria, Ill. | 10 | 37,600 | 16 | 10,525 | 13 | 78,000 | 14 | 4,100 |
| Richmond, Ind. | .. | ... | 13 | 10,960 | 2 | 12,800 | 2 | 1,000 |
| Saginaw, Mich. | 24 | 26,348 | ... | ... | 5 | 9,142 | ... | ... |
| St. Louis, Mo. | 180 | 134,920 | 262 | 175,701 | 121 | 214,156 | 248 | 147,148 |
| St. Paul, Minn. | 94 | 153,619 | ... | ... | 72 | 238,473 | ... | ... |
| Hamilton, Ohio | 11 | 71,456 | 12 | 7,619 | ... | ... | ... | ... |
| Sioux City, Iowa | 16 | 61,000 | 14 | 19,700 | 9 | 423,700 | 12 | 9,175 |
| South Bend, Ind. | 42 | 39,913 | ... | ... | 19 | 12,265 | ... | ... |
| Springfield, Ill. | 8 | 18,775 | 32 | 18,710 | 11 | 10,000 | 20 | 24,325 |
| Superior, Wis. | 36 | 121,150 | ... | ... | 28 | 141,270 | ... | ... |
| Terre Haute, Ind. | 21 | 12,021 | 20 | 9,415 | 9 | 3,335 | 13 | 5,025 |
| Toledo, Ohio | 152 | 366,957 | ... | ... | 52 | 30,782 | ... | ... |
| Topeka, Kan. | 13 | 26,100 | 5 | 4,100 | 7 | 1,465 | 2 | 325 |
| Wichita, Kan. | 65 | 158,250 | ... | ... | 74 | 262,650 | ... | ... |
| Youngstown, Ohio | 63 | 91,598 | 20 | 35,125 | 19 | 673,740 | 12 | 10,000 |
| Bay City, Mich. | 6 | 3,450 | 6 | 5,050 | ... | ... | ... | ... |
| Jackson, Mich. | 35 | 40,930 | ... | ... | 17 | 36,848 | ... | ... |
| Kalamazoo, Mich. | 10 | 42,150 | 4 | 4,300 | 1 | 1,800 | 1 | 350 |
| Lansing, Mich. | 15 | 27,505 | 1 | 425 | 1 | 4,400 | ... | ... |
| Springfield, Mo. | 5 | 2,450 | 11 | 4,710 | 3 | 3,025 | 11 | 3,925 |
| Joliet, Ill. | 4 | 16,500 | ... | ... | 2 | 7,000 | ... | ... |
| Quincy, Ill. | ... | ... | ... | ... | 2 | 14,200 | ... | ... |
| Springfield, Ohio | 7 | 4,850 | ... | ... | 4 | 3,930 | ... | ... |
| | 3453 | $9,516,999 | 1511 | $961,724 | 1691 | $11,102,264 | 1167 | $640,107 |

Owing to a typographical error, the headings last month were printed December instead of January. The figures as stated in the text, were for January, 1918, and January, 1919, respectively.

# New Catalogs of Interest to the Trade

1. **Mill Construction.** Published by National Lumber Mfrs. Association, Chicago, Ill., and distributed by the Southern Pine Association, New Orleans, La.—Describes heavy timber or mill construction, giving minimum sizes of materials, framing details for floors, roofs, etc.; flashing of valleys, formulas for design in mill construction, valuable tables giving weights of timber and roofing material, snow loads in different localities, weights of merchandise and other valuable data, which will prove worth while to the architect or builder interested in this type of construction.

2. **The Interior of Your Home.** Southern Pine Association, New Orleans, La.—Beautifully illustrated booklet, giving interiors and exteriors of beautiful homes. Contains color plates showing popular finishes in Southern pine interior trim.

3. **Coburn Sliding Door Hardware.** Coburn Trolley Track Mfg. Co., Holyoke, Mass.—Catalog and price list No. 53. Illustrates various types of sliding door hardware manufactured by this concern. Illustrates various types of doors and gives hardware required for various types of doors.

4. **Facts Worth Knowing About Turpentine.** National Turpentine and Rosin Bureau, Audubon Building, New Orleans, La.—Describes the growth of this industry and gives some valuable information concerning its manufacture.

5. **Implement Sheds.** Southern Pine Association, New Orleans, La.—Describes and illustrates various types of implement sheds. Dimension drawings are used to illustrate the various types. A valuable table shows the amount of space taken up by various kinds of farm implements, thus enabling the proper amount of floor space to be readily calculated.

6. **Beauty Plus Service in Floors.** Southern Pine Association, New Orleans, La.—Contains pictures of attractive interiors and exteriors in which edge grain Southern pine floors have been used. Contains a page showing Southern pine edge-grain flooring in a variety of stains.

7. **School Architecture.** Southern Pine Association, New Orleans, La.—Contains the results of a contest conducted by the association for the purpose of securing attractive and useful school buildings. Reproductions of the architects' drawings are contained.

8. **Concrete Building Block and Brick.** Portland Cement Association, 111 West Washington Street, Chicago, Ill.—Gives fundamental principles underlying the manufacture of concrete building block and bricks. Contains progress pictures, examples of kinds of block that can be produced, pictures of attractive structures in which concrete blocks are used, etc.

9. **Home Building with Metal Lath and Stucco for Permanence and Safety.** Associated Metal Lath Manufacturers, 813 Woodward Building, Washington, D. C.—Describes the advantages of metal lath as a stucco and plaster base, and gives pictures of attractive houses and prominent business buildings in which metal lath has been used.

10. **Globe Ventilators.** The Globe Ventilator Co., Troy, N. Y.—Gives data concerning Globe ventilators, with sizes, dimensions, weights, gages of material and price list. Contains numerous pictures of buildings in which they have been used.

11. **Reliable Vacuum and Vacu-Vapor Heating Equipment. Catalog H-25.** The Bishop-Babcock-Becker Co., Cleveland, Ohio.—Describes the method of installing this system, and gives valuable data on heating. Gives suggestions for specifications of the reliable air line vacuum heating equipment and other similar systems.

12. **"H. & H." Switches and "Paiste" Wiring Material. Catalog "P."** The Hart & Hegeman Mfg. Co., Hartford, Conn.—This illustrates and gives prices and brief description of various types of switches for various purposes, together with interesting data worth while for the electrical contractor.

13. **General Fireproofing,** February issue; General Fireproofing Co., Youngstown, Ohio.—House organ describing construction with "Self-Sentering," Herringbone metal lath, and contains other features of interest to builders.

14. **Advertising Suggestions to Boom Building;** Southern Pine Association, New Orleans, La.—Advertising data collected by the association to be used by dealers and contractors to stimulate local building. Folder contains illustrations, of which line cuts can be purchased for a small sum.

15. **Builders' Hardware,** Catalog Supplement No. 1; Chantrell Hardware & Tool Company, Reading, Pa., sole agents to G. Goldberg & Sons, 19 Warren St., New York.—Catalog illustrating and describing various types of locks, casement fasteners, butts, sash hardware, flush bolts, door knobs, etc.

16. **"Pentex" Hollow Tile.** Pennsylvania Fireproofing Co., Erie, Pa.—Booklet illustrating this tile in colors, together with drawings showing the sizes in which it is furnished, the exterior faces being of rough texture and of same size as solid face brick. Accompanying folder illustrates construction.

17. **Dampproofing Walls Above and Below Grade;** Hydrex Felt & Engineering Co., 120 Liberty St., New York.—Circular describing and illustrating methods of dampproofing walls, and acidproofing and waterproofing floors. Contains illustrations showing how the work is done.

18. **Majestic Coal Chute Protects Your Building;** the Majestic Company, Huntington, Ind.—Folder illustrating and describing the Majestic Coal Chute, with prices.

19. **Auto-Kem-Clo.;** Automatic Chemical Closet Co., Minneapolis, Minn.—Folder illustrating and describing various types of chemical closets manufactured by this company.

20. **Parker Metal Punch;** Parker Supply Co., Inc., 785 E. 135th St., New York City.—Folder illustrating and describing punch designed by field and shop use for punching holes in sheet metal.

21. **Contractor's Atlas, February;** Atlas Portland Cement Co., New York City.—Contains best articles submitted in prize contest. Also contains other interesting data.

22. **Atlas Almanac,** February issue; Atlas Portland Cement Co., New York.—Contains interesting data on advertising, together with data on construction of a rectangular concrete tank with material required for different sizes.

23. **Parker Expansion Bolts.** Parker Supply Company, 785 East 135th St., New York City. Folder illustrating and describing various types of lag screws, together with page showing size bolts required for various diameter holes. Also describes toggle bolts.

24. **Hy-Rib and Metal Lath;** Truscon Steel Co., Youngstown, Ohio.—Booklet describing construction where Hy-Rib is used, illustrated by photographs and drawings. Contains valuable tables showing necessary thickness for slabs on various spans. Gives specifications for stucco on metal lath, together with drawings illustrating the proper method of application. Describes construction of partitions built of Hy-Rib, metal lath ceilings, and other data of value.

25. **Pullman Unit Sash Balances, Catalog 32.** Pullman Mfg. Co., Rochester, N. Y.—Profusely illustrated booklet illustrating and describing various types of sash balances together with blue print sheet showing details of installation.

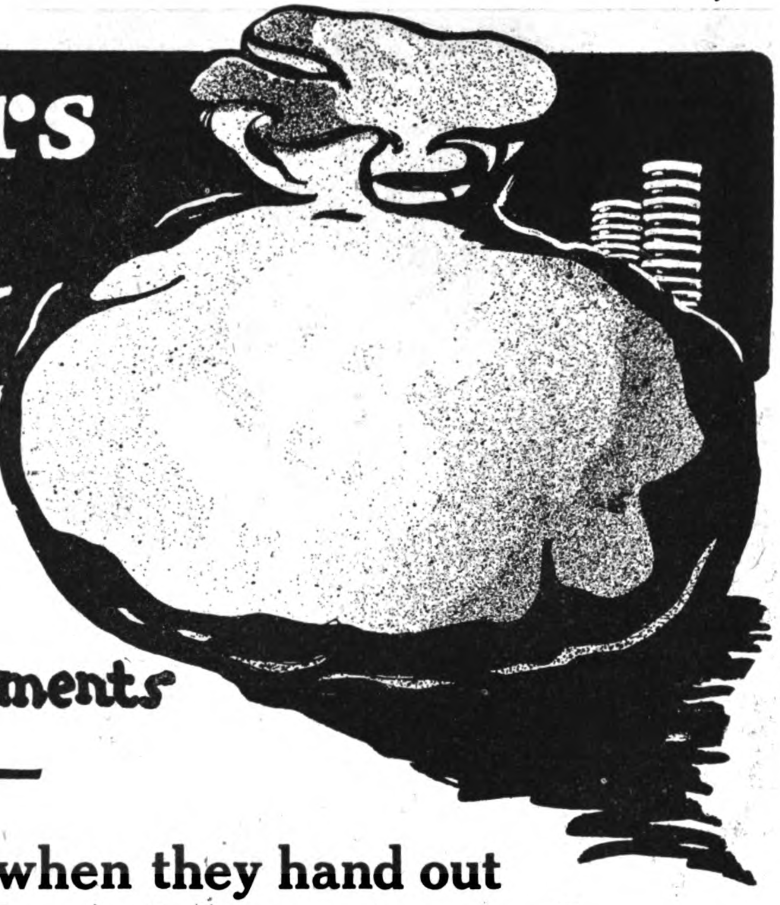
26. **Sargent Standard Steel Squares.** Sargent & Co., New Haven, Conn.—Illustrated booklet describing use of the steel square, shows how to find various cuts for cripple, jack, hip, common rafters, together with other data of value.

27. **Reynolds Shingle Bulletin.** H. M. Reynolds Shingle Co., Grand Rapids, Mich.—April issue. House organ illustrating various houses on which Reynolds shingles have been used, together with general information of interest.

28. **Clay Products for Building Construction.** The Sewer Pipe Mfg. Co., Akron, Ohio.—Illustrated booklet giving valuable data on construction of chimneys and flues, the main features being illustrated by drawings. Illustrates various types of fire clay chimney tops. Gives house drain specifications.

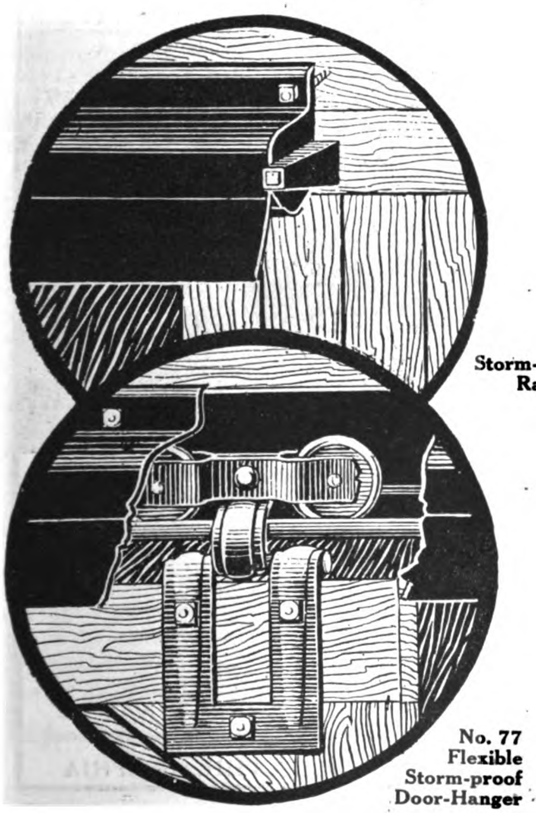
**If you desire any of these catalogs, write the date of this issue and the number of the catalog on a postal and mail it to Building Age, 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.**

# Farmers have the money



## they're going to spend some of it for improvements this spring—

## Will you be in line when they hand out the Contracts for barn door equipment?



Storm-proof Rail

No. 77 Flexible Storm-proof Door-Hanger

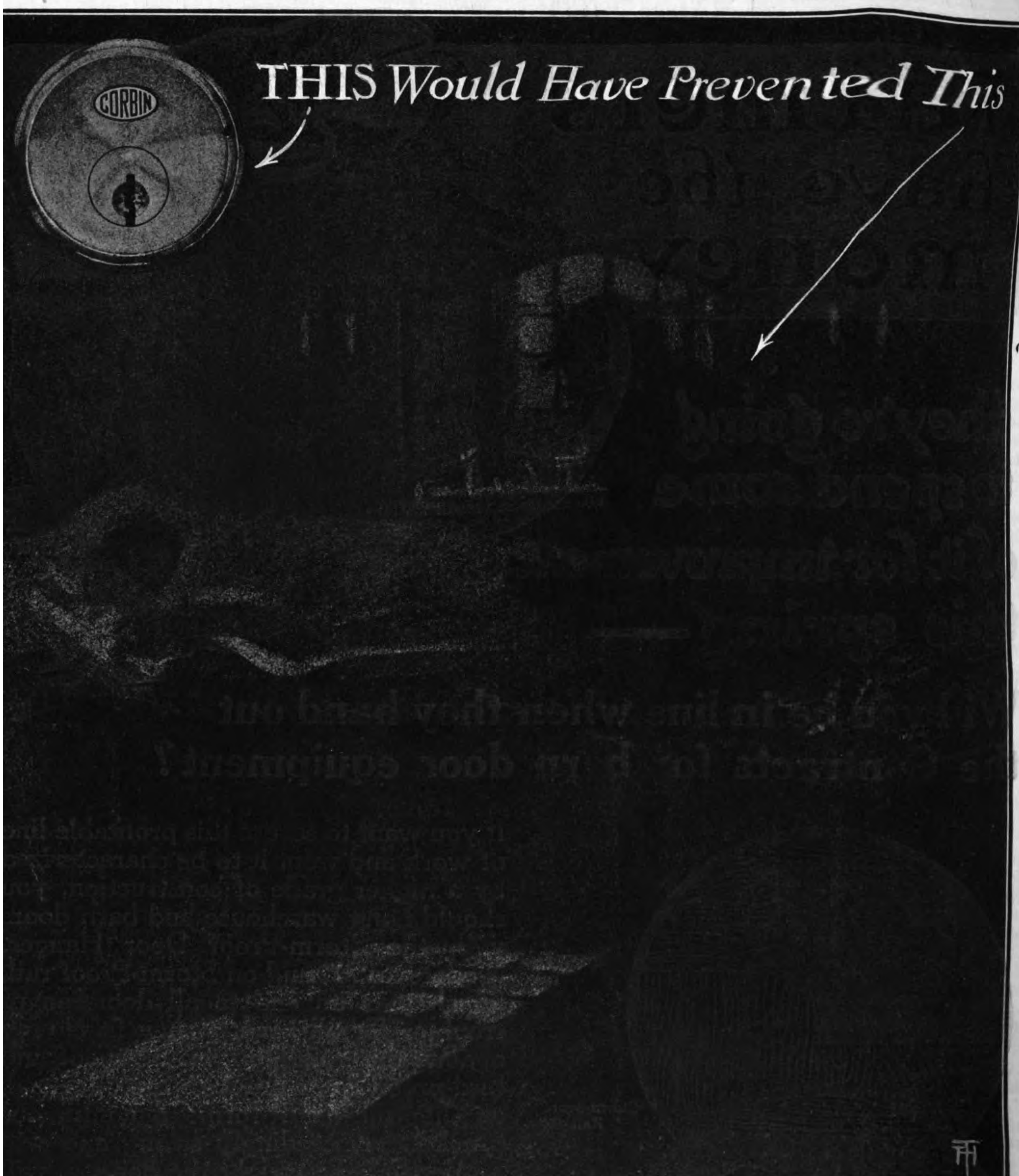
If you want to secure this profitable line of work and want it to be characterized by a higher grade of construction, you should hang warehouse and barn doors with the Storm-Proof Door Hanger, Model No. 77, and on Storm-Proof rail, which puts an end to all door-hanger troubles for all time. They fit closely against the building. Storm-proof and bird-proof. No brackets are required, as the rail itself forms a continuous bracket. Exceedingly strong and will support all the weight the hangers will carry.

The rail-joints are dovetailed, forming the sections into practically a one-piece rail.

The cover can be removed at any time for painting inside of rail.

# National Mfg. Co.

**Sterling, Ill.**




# The Corbin Ball Bearing Pin-Tumbler Cylinder Lock

## THE MOST EFFECTIVE HOME GUARD

SOLD BY THE BEST HARDWARE DEALERS IN ANY CITY

MADE BY

## P. & F. CORBIN

*The American Hardware Corporation, Successor*

NEW BRITAIN, CONN.

NEW YORK CHICAGO PHILADELPHIA

# TARGET & ARROW ROOFING TIN

# No. 5 ~ RIBBED ROOF DESIGNS

RIBBED roofing is one of the oldest forms of roof design. The history of Architecture is replete with examples of its use, attesting its appeal to the Master Designers of all times.

Both the Greeks and Romans used this design, covering their roofs with marble, stone or tile. But it remained for the builders of the wonderful Gothic structures to grasp the full significance and design value of strong parallel lines running from gutter to ridge.

Better still, they used a comparatively thin metal roof covering, laid over battens or with heavy standing seam, instead of the heavy stone and tile of the Ancients. Thus they not only lessened the weight of their roofs, but gained a certain grace and refinement.

Ribbed roofing was used with marked effect in the days of the Renaissance, and later during the Classical Revival in Europe, noticeable on the many domed buildings of those periods. History mentions lead, copper and zinc as the metals used for roof coverings, but early in the 19th Century they were quite generally superseded by tin plate.

Copper would seem to be ideal for this purpose, but those who have had experience with it know how hard it is to keep the joints of a copper roof from leaking The expansion and contraction of copper is much greater than that of tin plate and in this lies the weakness of the copper roof. Many forms of joints have been devised to overcome this tendency of copper to work loose and develop leaks, but few, if any, have proved successful. With roofing tin this trouble is wholly avoided. True, tin must be painted every few years, but the cost of this is slight and the roof is practically restored to its original condition with each painting. The life of the tin roof, if of good tin, is thus prolonged indefinitely. We have records of tin roofs in good condition after remarkable periods of service running from fifty to one hundred years.

We still furnish this long life tin plate in our "Target & Arrow" brand (until 1907 known as Taylor's Old Style).

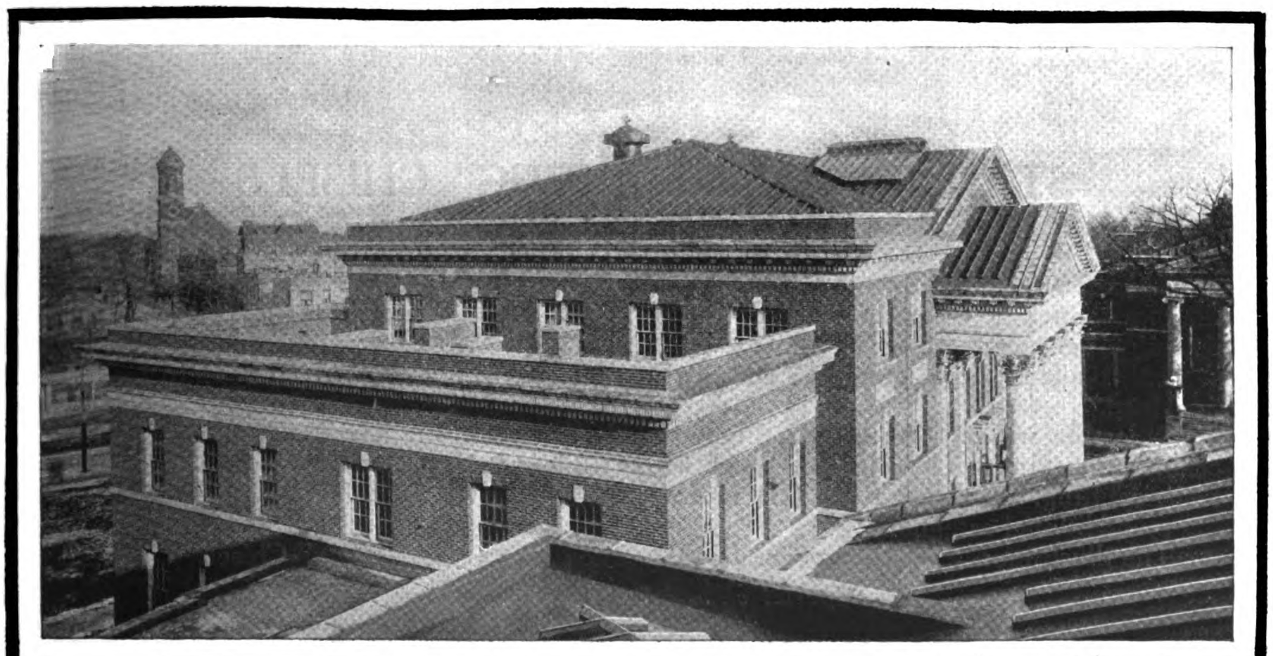
For Ribbed Roofs, this metal combines the good qualities of zinc, lead and copper, without their disadvantages.

For details of construction and application see "*Service Sheets*" 1 and 4 No. 18. If interested, send us your name and address.

# N. & G. TAYLOR COMPANY

## PHILADELPHIA, U. S. A.

HEADQUARTERS FOR GOOD ROOFING TIN SINCE 1810



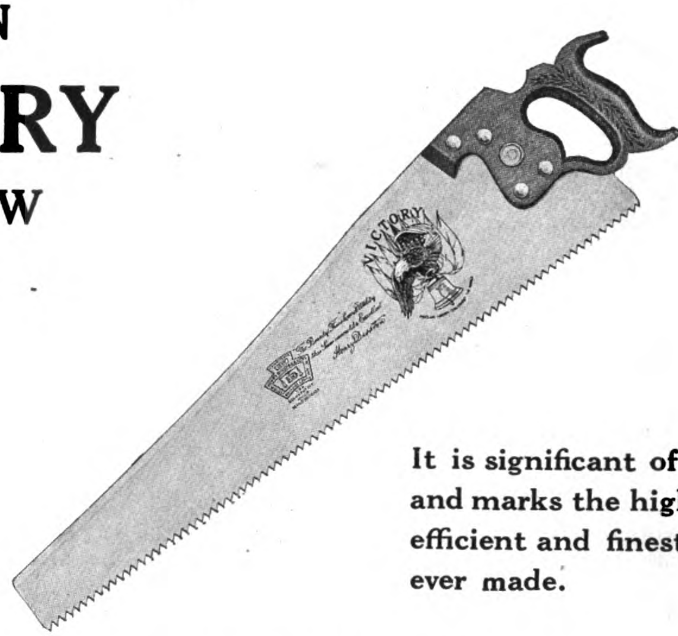
State College for Teachers, Albany, New York

Note how tin covered battens are used to form strong parallel lines running from gutter to ridge, and how they add to the strength and dignity of the entire design

DISSTON

# VICTORY

HAND SAW




It is significant of the times and marks the highest, most efficient and finest handsaw ever made.

TRADE MARK
REG. U. S. PAT. OFF.

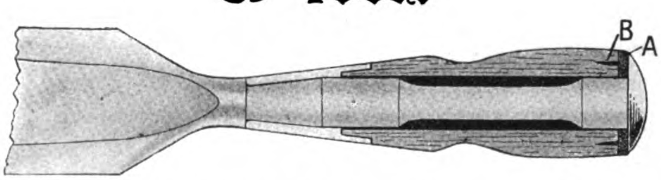
## HENRY DISSTON & SONS

INCORPORATED

KEYSTONE SAW, TOOL, STEEL AND FILE WORKS

PHILADELPHIA

Stanley Tools




# STANLEY "EVERLASTING" CHISELS

## Blade, Shank and Head One Piece of Solid Steel

This not only insures great strength and durability but enables the full power of the blow struck by a hammer or mallet to be transferred directly from the head to the cutting edge.

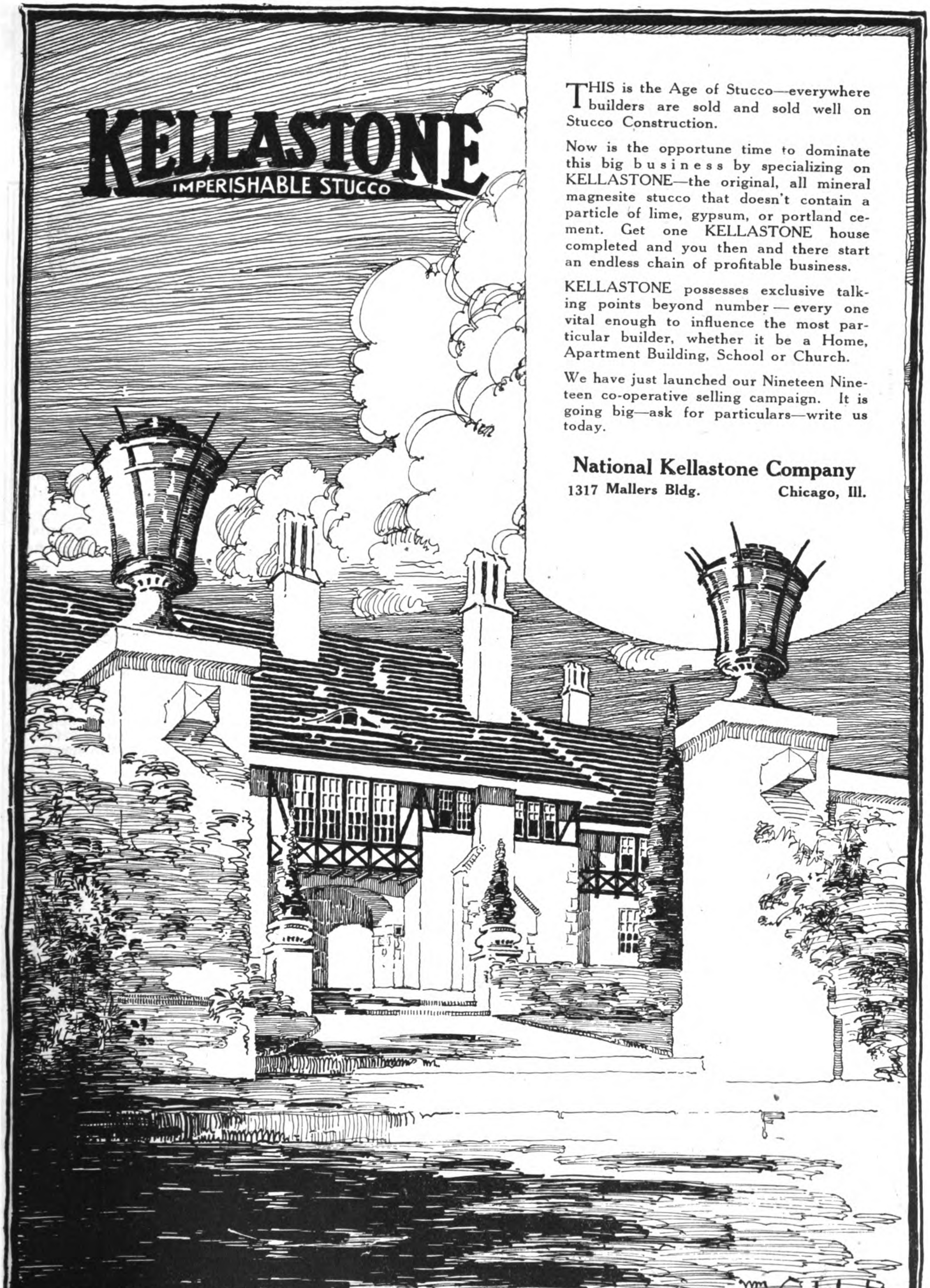
The Blade is forged from one end of the steel rod, the other end being upset to form the Head.

A leather washer (A) is placed between the head and the handle. This acts as a cushion, relieving the handle from shock when a blow is struck, thus preventing same from splitting. A Brass Ring (B) is driven into the large end of the handle, providing an additional safeguard.

The illustration shows the general construction of all "Everlasting" Chisels.

*Special circular upon request.*

**STANLEY RULE & LEVEL CO.**
**NEW BRITAIN, CONN. U.S.A.**


KELLASTONE
IMPERISHABLE STUCCO
THIS is the Age of Stucco—everywhere builders are sold and sold well on Stucco Construction.
Now is the opportune time to dominate this big business by specializing on KELLASTONE—the original, all mineral magnesite stucco that doesn't contain a particle of lime, gypsum, or portland cement. Get one KELLASTONE house completed and you then and there start an endless chain of profitable business.
KELLASTONE possesses exclusive talking points beyond number — every one vital enough to influence the most particular builder, whether it be a Home, Apartment Building, School or Church.
We have just launched our Nineteen Nineteen co-operative selling campaign. It is going big—ask for particulars—write us today.
National Kellastone Company
1317 Mallers Bldg. Chicago, Ill.

# Starrett Quick Reading Tapes

plainly marked with bright figures on black background, precise in graduations, accurate, convenient.

Write for Catalog No. 21P.


The L. S. Starrett Company

*The World's Greatest Toolmakers*

*Manufacturers of Hack Saws Unexcelled*

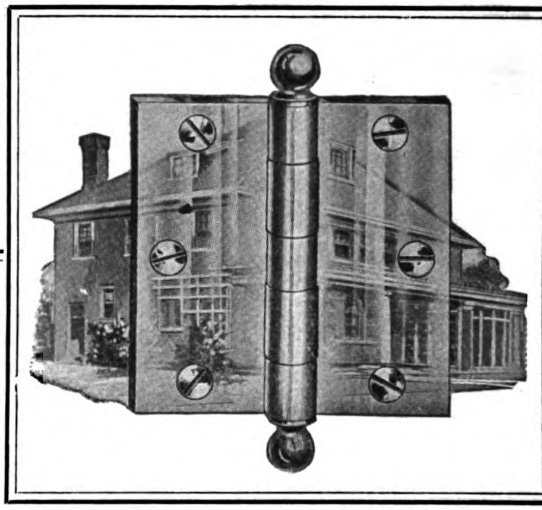
Athol, Mass.

New York

London

Chicago

42-915



Your

## ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

## GRIFFIN

**"The Door Butt of America"**

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

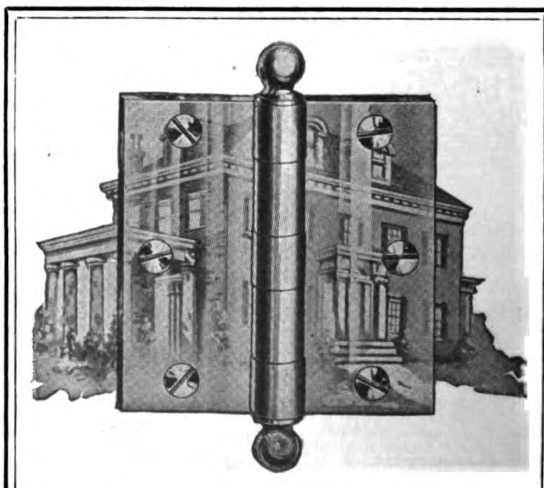
The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

Send for illustrated catalog and circulars.

**The Griffin Manufacturing Company**
**ERIE, PENNA.**

**30 Warren St. New York** — **17 E. Lake St. Chicago**



# BUILDING AGE

*NEW YORK, MAY, 1919*

# A Homelike House With Livable Plan

## *Erected for a Builder—Economical Stair Arrangement*

THE country house of to-day must more than ever fill a popular demand that is on an even higher plane. Design as well as plan must be above the average in the house that is to be considered successful. Yet the architecture, although correct, must be such as to carry a popular appeal in order that the home owner may feel that his dwelling is not a house but a home.

In gaining this effect, one of the popular devices is to employ a "chipped" roof. This helps to bring an intimate character that is often foreign to the severer lines of the more formal house. For the same reason shingles are often preferred. The subordinate vertical shingle lines contrast well with the stronger horizontal lines and lend a pleasing effect.

Occasionally, as in the house illustrated, part of the second story may extend out over the first story wall line, lending a pleasing shadow which effectively breaks up the wall. Combined with overhangs throwing a heavier shadow, the effect is one that admits of the pleasing contrast of light and shades so often sought.

Well balanced yet effectively contrasted in this house are the "chipped" front gable and dormer. The chipped sides, it will be noticed, have the same pitch as the common rafters. This gives a harmony of line that goes well with the house.

The porch columns are built up and shingled over. Shutters are placed on the front second story windows, not being used on any of the first story windows.

Part of the rear roof is slightly raised to obtain head room in the second story, this part of the roof extending slightly over the outside parts.

The garage at the rear is designed in harmony with the house, "chipped" gable and overhang being carried out in proper proportion to the main structure.

Entrance is had from the porch into a hall, at the rear of which is a coat closet, and the hall entrance to the kitchen.

At the left of the hall is the dining room, which is effectively panelled. The trim here is simple, with no projecting moldings to catch dust.

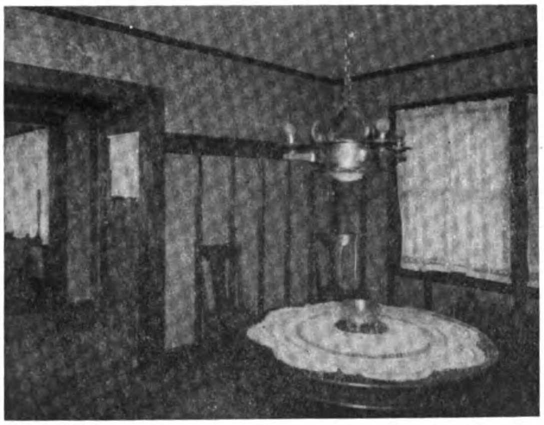
At the right of the hall is the living room, extending the full depth of the house. A brick fireplace is the feature that attracts one's attention immediately upon entering the house. At the rear of the living room is a den, which the contracting builder, who is the owner, uses as an office. This room is almost a sun parlor, as there is more than ordinary window space.

The kitchen sink is placed under the window, so that it receives plenty of light. A drain board is at each side, with cupboard over so that the dishes can be washed and placed with a minimum amount of effort. An entry provides space for a refrigerator.

The second story contains three bedrooms and bath. One of the bedrooms extends the full depth of the house, and is provided with two closets. An alcove forms a cozy nook.

The stair arrangement is interesting, the well being placed in the center of the first story. Light is had from the landing on the second story. This house, as the architect states, is a combination of the ideas of the builder and himself, being a modern adaptation of an old design built some years ago.

This house was built at 22 Harvard Terrace, West Orange, N. J., in accord-



The dining room, looking towards the hall and living room

ance with plans and specifications prepared by H. Messenger Fisher, architect, Montclair, N. J., the contractor builder and owner being Ernest McChesney.

# Saving Money with Interior Trim

*Obtaining Lower Costs without Sacrificing Appearance*

By H. VANDERVOORT WALSH, Architect

The selection and the use of interior trim in the new home will be more than ever dependent upon the cost of the material and its appearance. From the war we have learned what the word economy is, but we have also been learning during the past twenty-five years what is the value of artistic treatment. The builder and architect will have to be on the alert to study how economy and good appearance can be made to walk together. These factors will determine for interior trim the kind of wood that will be used, what location the various kinds will have in the building, how they will be treated in finishing, whether the details will be stock or special, what types of joints will be used, whether the mouldings will be simple or elaborate and whether the trim is to be put together at the mill or on the job.

In the past, hardwoods have been considered the best appearing woods for interior trim. They are strong and withstand dents from knocks by furniture, and they have an elegant appearance, due to their inherent beauty and the fact that there has been more thought and care spent upon their finish than upon the finish of softwoods. The increasing cost of hardwoods has gradually broken down this prejudice against softwoods, however, and it is a common thing to see the softer woods used extensively in the trim of the less prominent parts of the house, such as the attic, the kitchen and the servants' quarters. In the smaller houses, where economy is carried still further, it was not uncommon to see softwoods used as trim in all parts of the house, except the dining room and the living room. But conditions in this line are going to be more exacting in the future than ever, and the prejudice against the softer woods for trim will have to disappear completely as more recognition is given to the beautiful finishes which are possible to secure.

A correct distribution, however, of the hardwoods throughout the house would be a better solution of this economic problem than is this tendency to eliminate them entirely. The chief value of the hardwoods is not so much that their appearance is superior to some of the softwoods, but that they are capable of wearing much better, and maintaining a good appearance after many years of standing. Now, where real economy is desirable, it means not only reducing the initial cost, but also the cost of upkeep. After ten years a house which was finished throughout with yellow pine might have deteriorated in appearance from ordinary wear and tear so much that although its initial cost was cheaper than a house which was finished in oak, yet after the same length of time the latter would be in so much better condition that it would have more than paid for the original difference. The reasonable solution, then, is to combine soft and hardwoods, using the hardwoods in the places where the wear is the greatest. This means a very careful study of the combinations of woods. It also means a careful consideration of which are the cheapest woods to be had on the local market, that are satisfactory for use in the bulk of the interior trim.

The selection of woods for interior trim, then, depends upon what wood the nearest mill sells the cheapest, whether that wood is satisfactory for the kind of finish which is desired, and whether a good hardwood can be combined with it in the places where the wear is the most.

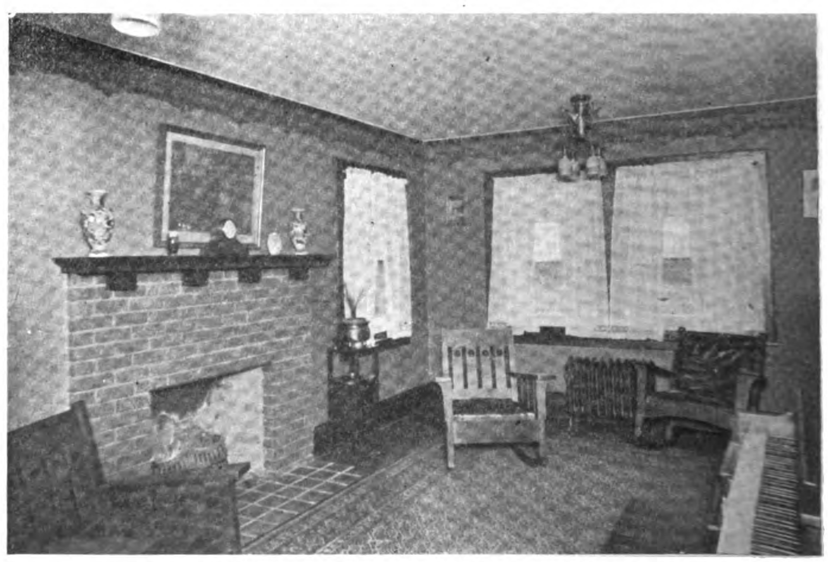
The rear of the house

Now, the successful combination of the hardwood with the softwood depends upon the correct insertion of it in the various places where the wear is the most, and also upon the use of a frank contrast of finish.

As to the places where the wear on the

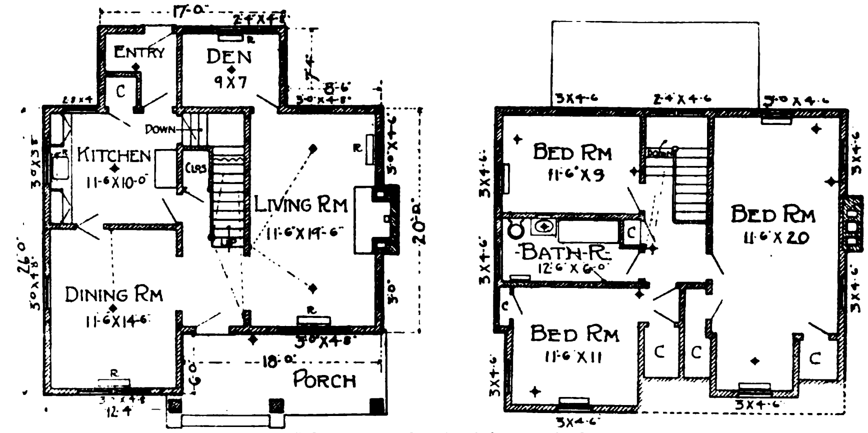
The garage is well in keeping with the character of the house

woodwork is the most, a study of the trim of any house more than ten years old will give the answer. The door stops seem to get most of the knocks by moving furniture, and if they are of softwood, they generally show a very poor

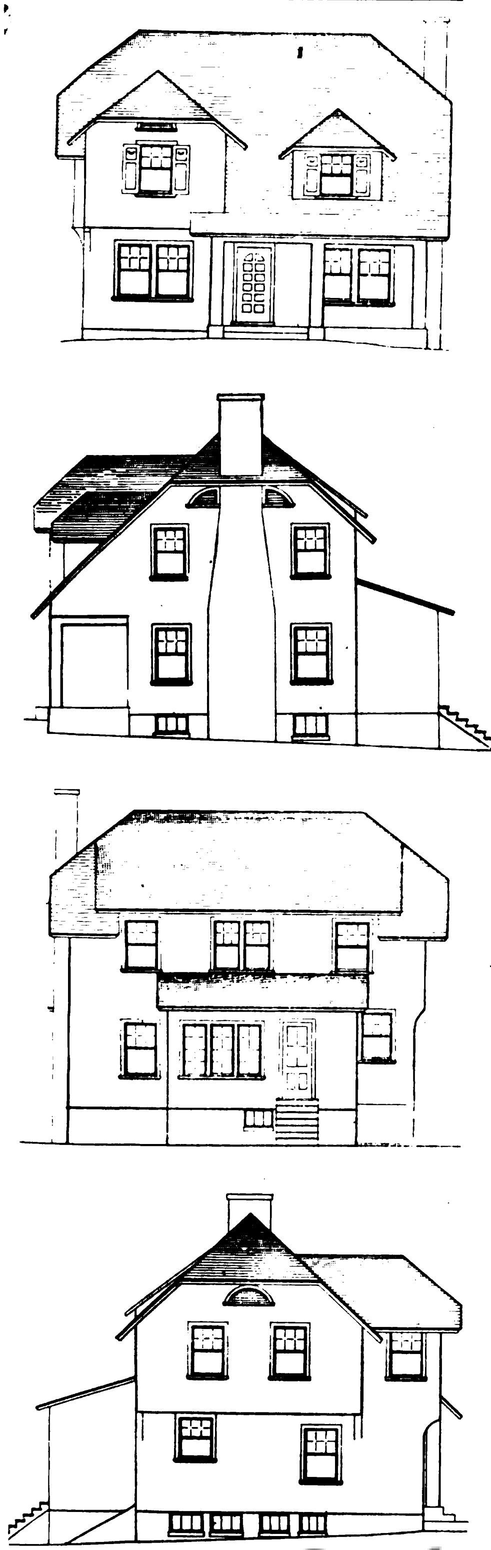


A simply designed fireplace is the feature of the living room appearance. There seems also to be a large amount of chipping that takes place on the inside corners of the door trim. If in the former case a hardwood door stop were used, and in the latter a hardwood corner moulding, the rest of the trim could be, with perfect satisfaction, softwood. Treated in a frank way, with absolutely no attempt made to harmonize

(*Continued on page 164*)




Plans, scale 1/16" = 1 ft.



Elevations, scale 1/16" = 1 ft.

# Increase Your Business by Proper Advertising

## *Making the Space You Buy Pull the Maximum Number of Inquiries*

By ROBERT F. SALADE

AFTER having studied the columns of both small-town and big-city newspapers, the writer is convinced that builders and contractors, as a class, are not as "strong" advertisers in the newspapers as are the average advertisers in other lines of business. This is mentioned not merely for the purpose of criticism, but rather for the purpose of bringing the builders and contractors to a more thoughtful consideration of this very important subject. It is easy for anyone to find fault. It is not an easy matter for one to offer the "remedy." With this fact in mind, the author will attempt to offer some *helpful* criticism.

In glancing over the newspaper—particularly the country weekly newspaper—we frequently see a "tombstone" worded after the manner of the following example:

> JOHN B. SMITH
> Carpenter, Builder and Contractor
> Main Street

A display advertisement of this kind fails in attracting more than ordinary attention for the reason that there are so many other advertisements of the same style in the average newspaper. No doubt you often look over the advertisements in your favorite trade journal. You know the class of display which first arrests your eye—the cleverly worded, illustrated advertisements that present their messages in unusual ways. It is the same with newspaper advertisements. Some of them seem to smile at you like a pleasant young salesman, and they seem to reach right out and grasp your hand!

There recently appeared in a well-known evening newspaper the advertisement of a builder which is worth while mentioning. It took up only the same amount of space that would be required to hold the "John B. Smith" card; nevertheless, it commanded close attention on account of its typographical arrangement and its power of suggestion:

> TIME to have that old-fashioned parlor changed over to a new-style Dutch Hall Parlor!
>
> *Telephone Main* 345
>
> PROGRESSIVE BUILDING COMPANY

There should be more and more advertising of this character on the part of the builders. Note the simplicity of the publicity card referred to, and the fact that it "tells its story" at a glance. Experts claim that an advertisement to be successful should possess four qualities: First, to attract attention; second, to hold interest; third, to create desire; fourth, to effect sales. Now, isn't it true that the little card in question has all four of these essentials?

Here is another small advertisement having the same good features:

> Beautiful, Polished, Hard-wood Floors in place of old, "squeaky" boards. Easy! Let us make the improvement for you.
>
> *Telephone Race* 567
>
> AETNA REMODELING COMPANY

To obtain the best results from your newspaper advertising, have the copy changed frequently; instruct the publisher to have the typography set in the same style and face of type, and when possible try to have the advertisement appear in the same position of paper continually. By following this system, the readers of the newspaper will form the habit of anticipating your advertisement every day, or every week, as the case may be. What we mean by the same style of typography is, for example, an advertisement composed in Goudy Oldstyle type, with a white-space border separating the text-matter from the rule border around the whole. With the advertisement constantly appearing in the newspaper, in the same Goudy Oldstyle, same white space, and same rule border, but with change of copy, the public will soon know your name and business merely through the "personality" of the typography. People will look upon your advertisement as upon an old friend, and they will read every word printed, provided that it is not a "long-winded" proposition. In good time you will have something, or rather will offer something which will strike this and that person psychologically.

At a recent convention of advertising clubs the writer heard one bright woman declare in her lecture, "No advertisement is big enough to contain two different messages." Isn't that forcibly true? If you are a steel bridge builder and also a house builder, you would not be doing well in making one advertisement "cover" the two different lines. If you do all classes of remodeling work, it would be all right to mention the fact in the closing part of your advertisement, but to accomplish the best results each one of your advertisements should concern only one particular specialty.

For instance, one advertisement would talk about Sun Parlors, another would refer to Porch Remodeling and still another would be devoted to Storm Windows. Think of the great variety of "specialties" you could mention *separately* every day of the year. Some of the newspaper readers would be especially interested in the subject of Sun Parlors, others would be interested in Remodeled Porches, and so on. Here is where you can understand the advantages of changing the copy for your advertisements every so often.

This seems to be a good place to insert another business-building suggestion which has some relationship to the subject of advertising:

In the residential section of a city a certain builder was doing some remodeling work on a house, and on the front of the building he hung a sign reading on this order:

**WILLIAM BROWN**
Builder
24 Carson Street

Now the idea of hanging out this sign, for the purpose of informing other owners in the neighborhood as to who was doing the reconstruction work, was a good one, but the sign was not a strong advertisement on account of its commonplace phraseology. Another certain builder is making use of a sign for the same purpose mentioned, and this sign is actually attracting new business by reason of its larger size, and its appealing message:

This Remodeling Work is
being done by
HAMMOND, THE BUILDER
463 Market Street
*Telephone Main* 68
CONSULT US

Reader, wouldn't you, in the rôle of a property owner, have more interest in the second sign than in the first? The second sign, simple as the wording is, *invites* you to consult with "Hammond, The Builder." It has "selling talk." It indicates that Hammond is proud of the work he is doing for your neighbor, and that he wants business from you, too. The first sign may interest some people, but somehow it suggests that "Brown" is not over-anxious for additional business.

In one of the suburban towns near Philadelphia there is located a builder who is using both newspaper and direct-by-main advertising with excellent returns. There are two weekly newspapers in the town and every issue of these papers contain good-size display advertisements of the builder. Whenever he completes the work on a nice home, church, store, garage or other building, he has a photographer take a picture of the structure; a halftone illustration is made from the photograph, and the plate is used in one of the newspaper advertisements. Over the picture is placed a line of display type, reading somewhat like this: "We Have Just Remodeled the Front of the North Wells Bank Building." Underneath the illustration the "copy" reads on this order: "Looks handsome, doesn't it? We shall be pleased to do work of this class for you. Write, call or telephone. We will give you the best of service."

Occasionally, this builder is making good use of advertising folders, booklets, mailing cards and circular letters, addressed to property owners, and to real estate agents of the town. One recent folder was of four pages, size of each page about 4 x 6 in. On the first page was printed a picture of a new suburban-style cottage which the builder had erected for one of the well-to-do business men of the district. On the second page was printed an illustration of a certain building as it had appeared before being improved. On the third page was shown a halftone of this same building as it now appears after all the renovating work had been completed. On the fourth page of the folder was some interesting copy matter stating briefly the builder's facilities for handling the class of construction referred to in the folder. The little publication was favorably received and it led up to considerable new business.

About four times during the year—during the early spring and fall and during the summer and winter, the builder sends out circular letters to a carefully selected list of owners, not only owners in his own town but also to those of nearby points. The letters are printed in imitation typewritten process on the regular steel-plate-printed letterheadings used by the builder for business correspondence. Merely for the purpose of giving the reader an idea of the "tone" of these letters, we reproduce a few paragraphs of one, changed slightly so as not to "steal" the matter as originally printed:

"You should be interested in the subject of a Sun Parlor for your home. Some folks call the Sun Parlor an 'inclosed porch,' or an inclosed veranda.' Call it what you please, it is an excellent thing for any home, and it is a contributor to the health and comfort of the entire family.

"When your friends come either during the day, or during the evening, there is great enjoyment for the whole party while you all spend a happy hour in the Sun Parlor. It is delightfully cool when Old Sol beams down upon the house on a hot summer day When properly screened and shaded, the warm sun rays do not enter in. On a cold winter's day the sunlight streams in, making things bright, warm and cozy. There is a hot water heating apparatus, of course, and when the hail or snow is falling, it's great fun to sit in the Sun Parlor (warmed for the occasion), and watch the white particles playing with the winds. How pleasant during the evenings to rest, sew or read in the Sun Parlor with a pretty pedestal lamp softly illuminating the apartment!

"The right kind of Sun Parlor, built of glass and wood, is proof against winds, rains, snow or sleet. In the good old summer time you remove the glass sash, and in their places you set in screens which keep out the flies and 'skeeters.'

"And, mind you, it does not cost a great deal to own a first class Sun Parlor. Have it built either in front, or in back of the house. Ask us to come over and give you an estimate on the cost of construction."

Reader, if you like the phraseology of this "Dummy" letter, you may try it out among your list of customers and prospects. Use first-grade letter paper, steel-plate-printed (if possible), at the top where your name and address appears. The better the quality and appearance of your business stationery, the better the impression among the recipients. You are "talking" to a refined class of people, and they will not pay much attention to poorly printed advertising matter. Money spent for "Class A" advertising literature and business stationery is always money well spent.

Speaking of Sun Parlors, there are several builders who are making sort of a specialty of them. One builder has adopted a very simple and inexpensive plan for a Sun Parlor which has been meeting with much success. This plan calls for the addition being built at the back part of the house, two supporting pillars extending up from the yard. The construction is comparatively easy when there is a bay window forming the connecting point. Three sides of the apartment are made of glass and wood. There is one or two hot water radiators to provide for the winter season. During the summer the glass sash can be lifted out, and screens can be inserted in their places. Both the interior and the exterior are painted white, gray or some other light shade. The floor is double on account of the open air being directly underneath.

In several instances this builder has handled commissions for Sun Parlors built over the tops of front porches. This plan works out well in cases where the porches are spacious. It is necessary, of course, to make the supporting columns of the porch-roof strong enough to hold up the additional room and its subsequent weight. In cases where there is a bay window extending partly over the porch-roof the front of the bay is removed and the space is added to the sun parlor. For one owner the builder inclosed the porch with glass-and-wood sides, in addition to building the apartment above. It made a handsome job when completed.

Shutters of glass and wood seem to be a new idea in suburban sections near Philadelphia. Quite a number of these shutters have appeared on the backs and sides of houses during the last winter. The shutters serve as "storm windows." They are ordinary plain wood shutters with the panels removed, and with plate glass inserted in the panels. Old shutters, on account of warping and spreading, are not well suited to the purpose. The builder should "talk up" the sale of new shutters in cases where the owners desire to have glass inserted in the panels. It is a good line to "fill in with" during the winter, or during the summer, for that matter.

In a certain small town there is a two-story residence standing at the confluence of two streets. The side of the house extends along the front of one street. The original construction of the side wall was "flat" with no bay windows. One day a certain builder when passing by noticed this fact. It would have meant nothing to a less thoughtful person, but it suggested some business to the observing builder. It happened that he was acquainted with the owner. What did he do but call upon the owner and tell him how much larger the middle, second-story rooms of the house would be with two bays extending from the side. The owner had never thought of the idea. He recognized the advantage of having the two rooms referred to enlarged. The builder received the order for the two bay windows.

Think of the countless number of "jobs" of this variety that the builder sees on every side of him! In many instances the owners are only waiting for somebody to make suggestions for the improvements. There are few houses in the United States which are not adapted to some change or addition for the better. For example, look at the fronts, sides and backs of any group of homes and note the things which ought to be done, or at least which could be done. Note the great number of houses which have no summer kitchens. Note the many front porches which are in need of repairs. There is no end to this vast field of business.

Just a little suggestion for a "side issue": Numerous porch-houses have terrace fronts with several concrete steps leading from the pavement to the floor of the porch. Children and elderly people like to have a railing on either side of the steps to assist them in ascending to the porch. There is plenty of business for any builder who would care to add metal railings to porch-steps of the kind in question. The railings are not only useful, but they enhance the appearance of the steps and porch.

Explain to the house owners what they need in the way of building work by means of advertising literature, and through personal calls. Be ready to quote prices, and to show rough plans for the proposed improvements. You will get all the business that you may care to handle.

# Cutting Costs in Wrecking Brick Walls

## *How One Builder Effected Considerable Saving by Practical Kink*

By A. G. DRURY

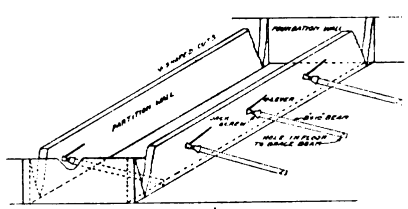
Suggestions of a labor or time saving nature which on their face appear good usually have greater force when supported by data confirming their value, which serves to fix them in the mind of the average builder, ready for use when similar occasions arise.

The writer is presenting the following example not in the sense that the method persued is novel or new, but that a case was presented in which a logical comparison is possible of the labor saved by a little ingenuity on the part of the contractor.

A new building was to be erected on the site of an old one which had been wrecked and all of the material taken away except three partition walls, extending from the cellar to the level of the first floor. The work was done by a wrecking company, who accordingly built a fence around the sides of the hole at the sidewalk to prevent accidents, and their work was complete. About two years later when the contractor was about to start on the excavation for the new building, it was necessary to tear down the three walls, sort out the useful bricks, and remove all debris. The walls were of ordinary building brick and were 18 inches thick, 10 feet high and 80 feet long.

This method of procedure was as follows: A laborer started at each end, and standing on the wall with a pick removed the brick so that the partition wall was freed from the main foundation wall at each end. His procedure was exactly that employed by all wreckers in tearing down walls. He dug over as small an area as possible in order to save time, and in order to reach the bottom tore out a "V" shaped area—six feet across the top and of depth equal to the height of the wall, i.e., 10 feet.

One man could tear out his "V" shaped hole in one hour. After the wall was thus freed from the foundations at both ends, the remainder of the job was accomplished by pushing the walls over in the following manner: The three walls were parallel and about fifteen feet apart. For convenience we will call




**The walls were cut V-shaped at the ends and then simply pushed over, as described in the article**

these walls numbers one, two, and three respectively. An 8 in. by 10 in. wood beam with a jack screw attached at one end, was placed at the intersection of wall number 2 with the ground. It was of such length that when leaned against wall number 1, it struck it about 5 feet above the ground, the end with the jack screw being placed against wall number 1.

Evidently when the jack screw was turned it would have the effect of lengthening the beam and pushing the walls apart. With one end at the base of the wall number 2 and the other about 5 feet from the base of wall number 1 it is plain that wall number 1 would be turned over. Three beams with jack screws were placed against the wall, and the whole wall forced over at once.

To overturn wall number 3, the ends of the beams were braced in holes dug in the cellar floor. After the partition walls were freed from the foundations, six men working at once—two at each jack screw, which they turned by means of a lever—were able to push over the three walls in five hours. The labor was therefore 6 men times 5 hours equaling 30 man hours.

We are now ready to make a comparison of this procedure with the method of tearing down walls by picking out the bricks.

From before we saw that to cut the "V" shaped section 6 feet across the top by 10 feet deep, an area of 30 sq. ft. torn down by picking required one hour.

To tear down one wall, 80 feet long, 10 feet high or 800 square feet of surface area at that rate would take one man 26 2/3 hours, i.e. 26 2/3 man hours and the three walls, 80 man hours.

Comparison of Time Required

| | | |
|---|---|---|
| By picking method............ | | 80 |
| By jack screw method: | | |
| By separating partitions from foundation .................. | 6 | |
| Pushing over walls............ | 30 | 36 |

Difference or time saved....44 hours

44 hours of labor at 30 cents per hour means a saving of $14.20.

A saving by persuing the method outlined above may be great or small, depending upon the job at hand, and it is possible for cases to arise where a very material saving in time and money can be effected.

# Designing Flitch Plate Girders Economically

## *Materials and Labor Required, Together with Practical Examples*

By ERNEST IRVING FREESE

For the purpose of arriving at the required thickness of timber in a flitch plate girder let the quantities in the following formulas be represented by letters, namely:

Let $W$ = the total uniformly distributed load to be carried by the girder, in *tons*.
$L$ = the length of span, in *feet*.
$d$ = the depth of the girder, in *inches*.
$t$ = the thickness of the steel plate, in *inches*.
$b$ = the required thickness of the timber, in *inches*.

Then, for yellow pine: $b = \frac{23WL}{d^2} - 16\,t$

For the purpose of showing the proper working out of the formula given above, I shall solve the example given in the February issue of BUILDING AGE, namely:

*Example:* Assume that a flitch plate girder is required to carry a safe load of 1000 lb. per lineal foot. The span is 17 ft. 3 in. The timber is yellow pine, and the steel plate that is to be used is ¾ in. thick and 12 in. deep. It is required to find the thickness of the timber.

*Solution:*

In this case, $W = 8.62$ tons
$L = 17.25$ ft.
$d = 12$ in.
$t = ¾$ in.

Hence, substituting the given values for the letters representing them in the formula gives:

$$b = \frac{23 \times 8.62 \times 17.25}{12 \times 12} - 16 \times \tfrac{3}{4}$$

$b = 23.7 - 12 = 11.7$ in., or, in round numbers, 12 in.

Since there are *two* timbers, the width of each will be 6 in.

In the same manner, the required width of timber for any other *kind* of timber can be found by the use of the following formulas:

For Douglas fir, $b = \frac{28WL}{d^2} - 20\,t$

For spruce or white oak,

$$b = \frac{35\,WL}{d^2} - 25\,t$$

For hemlock or white pine,

$$b = \frac{45WL}{d^2} - 30\,t$$

For redwood, $b = \frac{56\,WL}{d^2} - 40\,t$

It is thus seen, by the above formulas, that there is no necessity of calculating the amount of load that the steel and timber carry separately. The calculations are thereby greatly simplified, as has been shown in the solution of the foregoing example.

To render the above formulas entirely understandable, I shall put one of them into words. As has been shown in the example given, the formula for the width, or thickness, of timber for a flitch plate girder of yellow pine is as follows:

$$b = \frac{23\,WL}{d^2} - 16\,t$$

That is to say, take 23 times the weight, in tons, and multiply by the length of span, in feet. Divide the product by the square of the depth, in inches. Then, from the result, subtract 16 times the thickness of the steel plate. This gives the required thickness of timber, in inches. The process is the same for any kind of timber employed, except that the quantities, or "constants," given by the figures in the formulas, vary for the kind of timber used.

Now, in the example that has been worked out at the beginning of this discussion, it was found that a flitch plate girder composed of one ¾-in. steel plate and two 6-in. x 12-in. yellow pine timbers is required for the safe support of a total uniformly distributed load of 8.62 tons over a span of 17 ft. 3 in. The items making up the total cost of such a girder will be as follows:

*Material*

Two 6 x 12 timbers, 17 ft. 3 in. long.

One ¾ x 12 steel plate, 17 ft. 3 in. long.

Nineteen ¾ x 16 bolts.

Nineteen ¾ nuts.

Thirty-eight cast iron O. G. washers.

*Labor*

Drilling or punching 19 holes in steel plate.

Boring 38 holes in the two timbers.

Bolting and fitting the steel and timbers together.

Erecting the girder in place.

Now, looking in one of the steel handbooks, it is found that a single 12-in. I-beam will carry, for the same span, a total safe uniformly distributed load of 11 tons. Moreover, the steel I-beam weighs practically the same as the steel plate in the flitched girder. The items making up the total cost of the I-beam, for the same span, will be as follows:

*Material*

One 12-in. I-beam, 17 ft. 3 in. long.

*Labor*

Erecting the beam in place.

Hence, since the cost of erection is the same in both cases, and since the cost of the steel is also practically the same in both cases, it is plain to be seen that the additional cost of the flitch plate girder, *over and above the cost of the steel beam*, would be equal to the cost of the two timbers, plus the cost of the bolts, nuts and washers, plus the cost of drilling, punching, boring and fitting. In other words, a flitch plate girder is *not* an economical means of support. A steel beam is much cheaper, better, and will carry more load.

Finally, the timber of a flitched girder will shrink across the grain, while the steel remains the same depth. Hence, eventually, the timber either becomes split longitudinally due to the restraining action of the two rows of bolts, or it shrinks below the top of the steel plate, so that the total load is carried by the steel or else a part of it transmitted to the timbers through the bending resistance of the bolts. But the bolts are inadequate to transmit this load, for their resistance against bending is very slight. All in all, then, the flitch plate girder is not only uneconomical, but it is a structural makeshift. In fact, their use has about become obsolete, except, perhaps, in those rare cases where steel plate is to be had merely for the asking!

# Practical Pointers on Nailing Hardwood Trim

By OWEN B. MAGINNIS.

When nailing, never try to drive cut-iron nails or brads without first boring holes for them with a drill or shell bit. A gimlet bit is next best to the drill, as it cuts clean and easy, and pulls out the cores. It is wise to use wire brads, especially if the wood should be very hard or tough, like heart ash, maple or quartered oak, and the point of every brad should be dipped in wax or soap. When nailing in panel moldings, do not drive the nails or brads so slanting that they will go into the panels but keep each so nearly flat or horizontal that it will enter into the solid wood of the stiles, muntins and rails. By doing the job in this way the moldings will hold closely to the edges of the framed work, whereas if nailed into the panels, the panels as they shrink will draw the moldings away and leave open joints, besides likely splitting the panels.

When possible, make it a rule to do nailing so that the holes will be covered, or show as little as possible. For example, when setting hardwood door jambs, toe nail through the edges into the bucks or studding, as polished veneered or varnished woodwork, showing the natural grains and veins is defaced and marred by nailing through its finished faces, and no amount of puttying stopping or refinishing will ever restore its pristine beauty. So be tactful and careful, and if it must be nailed through the faces as on trim, be sure not to hammer too close and use a fine-pointed nail set.

Be sure there is never any grease, wax or soap left on the hammer head face, as each nail or brad is driven home, because if there is you will surely bend the next one.

The best way to make inside or outside joints is to scribe them. Frequently the stock is warped, and cutting a square joint against another only means resawing or plaining, which can be avoided and time saved by scribing. This applies particularly to hardwood base, cornice, moldings, chair-rails and such like. If it is compulsory on any machine to have to nail back a piece or length of very much spring or twisted stuff, such as hazel or sycamore wood, he should proceed cautiously, for kiln-dried timber is so brittle and non-elastic that it will not easily yield to pressure or impact, and will crack or split under strain. It should therefore be forced gradually and by gentle pressure into place, and always bored and slope or bevel nailed.

Iron planes seem to operate best on hardwood, especially when the wood is curly or cross-grained; some prefer good wood tools or wood and iron tools, but make it a fixed rule to keep all their cutter edges keen, sharp and free from nicks or gaps. Dull tools may be fairly well or pine or spruce, but they are useless on the hardwoods. Try and finish the work so that little scraping or sandpapering will be needed. A good block plane for butt joints is indispensable.

I would recommend that all joints and mitres be made directly with a fine panel or back saw. A first-class carpenter or cabinet maker will make his calculations and measurements so carefully that planning is unnecessary and always insure the certainty of each and every cut before making it.

Finally, proceed methodically and systematically and with close attention, and don't mark the finished work with the hammer face. Use a block if you need to drive the stuff and finish each job good and clean.

# A Farm House for $1,000

## *The Secret of Building Low Cost Houses by Proper Planning*

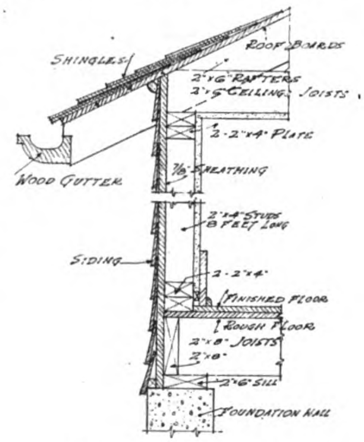
By R. S. WHITING, Architectural Engineer

"You can build this house for $1000" and "this house will cost $1000," are familiar expressions, but until we have been through the actual operation of building a house, we cannot fully appreciate the meaninglessness of them both.

It can be done, but how can the best results be accomplished? Shall we construct a cheap flimsy affair which may have to be rebuilt in the near future, or shall we apply some gray matter, good materials and hard work, and produce a real house? A house which may be added to from time to time, without detracting from its beauty is always an asset.

The architect referring to some recent residential work and analyzing actual costs is able, by comparison, to determine approximately the cost per square or cubic foot. By this means he is able to say about how many square feet in floor area can be allotted for a house not to exceed $1000. Assuming that a one-story house, with a cellar under a portion only, costs $2000, and by computation is found to contain 1400 square feet—a house to cost $1000, must contain, therefore, approximately 700 square feet when built in the same locality and under similar conditions, with like materials.

The retail lumber merchant tells us




Cross-section through wall

that joists in 12 foot lengths are more economical than those in 10 foot lengths; therefore, we determine on twice this length for the total width of our house, or 24 feet. Dividing 700 square feet by the determined width we have approximately 30 feet for the length. Starting with a floor area, therefore, of 24 ft. x 30 ft., the plan must be arranged to accommodate the necessary things and more, if possible.

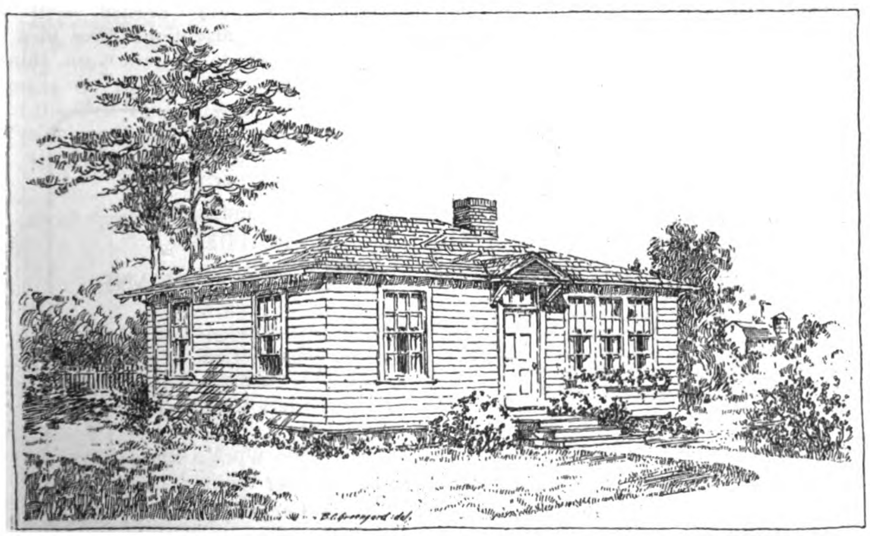
There should be at least two bed rooms, one double and one single; a kitchen; bath; and a living room, dining room, and porch—or some economical combination of the latter three.

By dividing the plan lengthwise in two bays, each 12 feet in width for economy of floor framing, one dimension of our rooms is determined. The kitchen at the rear and north side occupies a space 11 ft. 4 in. x 13 ft. 2 in., then the bath adjoining. The 9 ft. 6 in. remaining, of the 30 foot length, gives us a small bed room, 9 ft. 6 in. x 8 ft. 2 in., and a large bedroom, 9 ft. 6 in. x 11 ft. 4 in. allowing space for closets and entry.

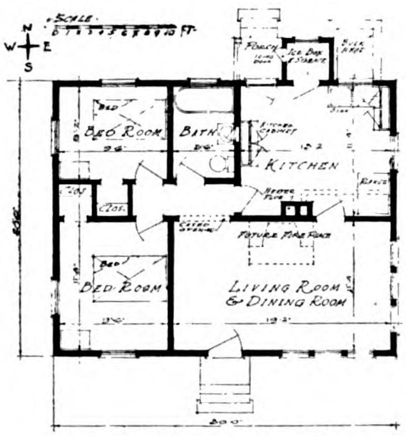
The remaining space, 11 ft. 4 in. x 19 ft. 2 in. is to be divided into a living room and dining room, or a combination of both. A more homey and commodious effect may be obtained by making one large room out of the living room and dining room. Since every farmer seems to feel the need of a back entrance, a porch is shown attached to the kitchen, combined with a built-in ice box. Plenty of glass in the southeast corner of the living room gives a sun parlor effect, which makes this part of the house cheerful and attractive.

An entry from bath room to kitchen enables the farmer to reach the bath without tracking dirt through the other portion of the house. The bath is also convenient to the bed rooms.

To keep the cost of the house within the stipulated sum, the fireplace, shown in dotted lines, in the living room may be temporarily omitted, but easily constructed in the future. Exterior blinds



A $1000 house that is attractive and planned right




Plan of farm house for $1000

may be omitted for the same reason. Contemplating the later addition of a second story, dotted lines are shown indicating stairs, both up and down.

The cellar may be excavated under part of the house only, for an area of about 20 ft. x 24 ft., for heater, storage of wood, coal and vegetables, but may be excavated the entire area at a very slight additional cost. When a second story is added, a stairs, both up and down, might replace the present entry and bath room, and the plumbing fixtures moved to a new location over the kitchen. The cellar can be entered temporarily through a bulkhead conveniently located outside.

Economical details of construction are important in keeping down cost. The detail drawings shown here indicate a simple method of frame construction, the stock for which the lumber dealer can furnish at a considerable saving over other methods. The following is a list of the lumber sizes required:

- 2 x 6 sill.
- 2 x 8 floor joists 12 ft. lengths.
- 2 x 6 ceiling joists 12 ft. lengths.
- 2 x 4's doubled for the plates.
- 2 x 6 rafters.
- 2 x 4's 8 ft. 0 in. length for walls.

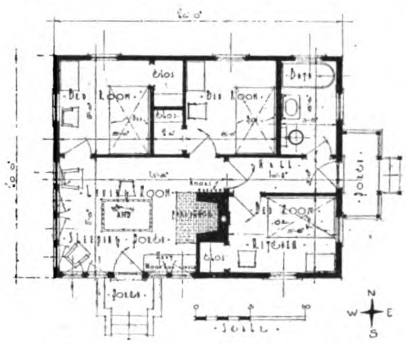
The 2 x 4 uprights in the wall framing are in 8 foot lengths, but the plates can be built up of shorter lengths by breaking joints and spiking securely. This type of framing prevents rapid spread of fire in the walls and also prevents vermin from working up through the walls from the cellar.

Economy can be used in the selection of finished floors by using shorter lengths since such floors can be purchased at a considerable reduction over long lengths. The labor in laying shorter lengths has been found to be no more and in many cases less. Oftentimes enough pieces can be selected from several bundles of flooring having a particular grain or color and used as a border around a room, laying the remainder in the center space, which is usually covered by a rug.

Careful consideration should be given the selection of windows as certain standard sizes can be procured at a much less cost than others. The size of windows to a great extent governs the cost of frames and interior finish. Two light windows, using 24 in., 26 in., and 28 in. glass are most practical and more economical. Small window lights make a most attractive exterior, but increase the cost somewhat.

Interior doors with four panels, or five cross-panel doors, make an attractive appearance and can be purchased at less cost than others. Plain trim, with back band, made up of light stock, such as is indicated on the detail drawing, is easy to apply and reasonable in cost.

The exterior design is given good scale by the use of wide siding and the use of well proportioned windows, which should be selected from stock sizes carried by the dealer. Shingles make a most attractive exterior design also, and when stained some carefully selected color, harmonize with rural surroundings. Always paint exterior as well as interior woodwork; its appearance is improved and life extended. A brush coat of creosote given the sills and such other woodwork as may come in contact with the foundation walls or earth will prevent possible decay. Lap siding

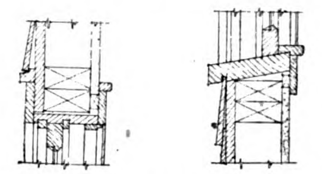


Plan of a cottage for farm help

is ordinarily placed smooth side out, but if placed rough side out and given a brush coat of creosote it is made most attractive and is more lasting and less costly.

A house, such as this, can be built for about $1000, in most localities, but should the cost appear to be running over this amount, some of the less important items may be temporarily omitted until such time as their installation is warranted and they become necessary.

Where quarters for farm help are not what they should be, and better and more



Details of window construction

modern living accommodations are necessary, this plan will supply the need. If the cottage is to be used only for sleeping purposes, and the help boarded at the farm house, the kitchen will answer as an additional bedroom, thus giving the cottage a capacity for accommodating at least five men.

In connection with the problem of housing farm help, which to-day is being given more consideration than ever before, a practical and elastic plan is shown, with dimensions of 20 ft. x 26 ft.

This plan will easily house three, and possibly four, single men if used only for sleeping quarters, giving them also a commodious living room and bath. By removing the partition running from the side porch to the fireplace, the bedroom and hall may be turned into one and the space used as a kitchen.

Lack of waste space, by the elimination of halls and by carefully locating furniture in each room, is a means of producing an economical plan. Carefully study your own particular needs, and plan the house to accommodate them. Local conditions and surroundings, and the points of the compass must always be considered.

# Card Used by Live Builder

This card was designed by a builder who is reaping excellent publicity by associating his name with the "Own Your Own Home" movement. Such a card, illustrated and well worded, will do much to attract attention. The idea is worth taking up, so we pass it on, thinking it will help you.


**IRWIN B. COX**

CONTRACTOR
and
BUILDER

**MORAY, KANS.**

Contracts taken for complete construction of buildings of all kinds.

All Orders Receive Prompt Attention.

Estimates Cheerfully Furnished. Shop Work a Specialty

Write or Telephone Your Order

*Shop at Residence* *See Me for Courteous Treatment*

# Farmers and the Building Program

There is no class of people better able to undertake an extensive building program to-day than is the farmer. This is said advisedly, because the prevailing prices for his products are high. With the Government's guarantee that his interests will be protected, his purchasing power has been enhanced.

The farmer's dollar will go further in buying building material to-day than it would in 1913. The amount of farm products which in 1913 would have bought one dollar's worth of building material in 1916 would buy $1.21 and in 1919 it will buy $1.51.

In 1913 the index numbers of the wholesale price of farm products was 100 and rose steadily to 220, or a gain of 120 per cent. On the other hand, lumber and building materials only rose during the same period from a level of 100 to 160, or a net gain of 60 per cent. This would tend to show that at the price the farmer is getting for his product to-day he can buy twice as much building material for his money as he could in 1913.

To go even further back, the wholesale index number of farm products in 1890 was 68, and rose steadily until in 1918 it reached 218, or a gain of 220 per cent. In the same period lumber and building materials rose from a level of 72 to 151, or a net gain of 100 per cent. A comparison of the figures of 1890 and 1918 in both products shows that the farmer's product will buy to-day 120 per cent more building materials than in 1890.

Government statistics go to show that the products of an acre will buy considerable more to-day than in 1914. They prove that a farmer selling the wheat from one acre can buy 33⅓ per cent more fertilizer, 28 per cent more Portland cement, 25.4 per cent more lumber, 24.7 per cent more gasoline, 21.4 per cent more plows and 14.5 per cent more wire fence.

A farmer's purchasing power is represented by farm products rather than by cash, and hence, according to statistics furnished by the Labor Bureau, a farmer can buy more building material to-day than he could in 1914. At that time it would have taken 746 bushels of corn to build a 14 x 40 ft. concrete silo. In 1918 the same sized silo could be built for 485 bushels. The same silo, in 1914, would have cost 659 bushels of wheat, or 22 average sized hogs. In 1918 it would have taken only 355 bushels of wheat, or 15.4 hogs.

The average farm needs more buildings. The time is not far distant when the dairy farmer who wants to have permanent and satisfactory help will build inexpensive, yet suitable, convenient and modern houses for the hired man and his family.

Better bred cattle require better buildings. To make livestock pay a profit the silo and other modern equipment must be introduced. The present high prices of machinery suggest the machine shed as a means of lengthening the life of all farm implements. The tractor, the truck and the automobile will have to be housed, if they are to render the best service.

Prosperity reigns in this country now, even though the purchasing power of the dollar is low. By considering the exchange value of labor and products, with less than usual consideration of the value of money, we will keep times prosperous.

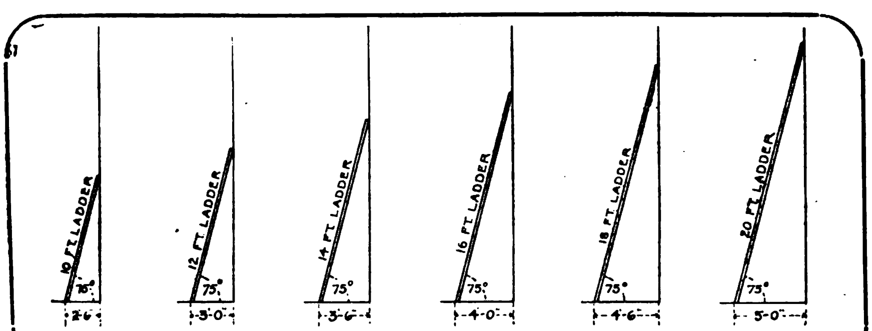
"Business better than usual" should be the slogan of every lumber dealer and builder to-day, with a realization that in the farmer he has the key to more business. A. C. S.

## Safe Angle for Ladders

Accidents will be avoided if those who use ladders study the safe angle at which they may be set. The illustration was made by the Central Safety Committee of the Bell Telephone Co. of Pennsylvania for the guidance of its employees.

It is quite possible to have stenciled or painted on the sides of the ladders the distance at the bottom they should be placed away from a vertical line dropped from where they rest at the top. Then in the shop or where the ladders are kept this picture may be posted after pasting on a stiff card and then varnished so it will stand exposure and washing in time if needed.

The older workman and man of experience will take no chances with a ladder that is not so placed as to have a proper slant and the inexperienced must be taught in various ways to avoid accidents even if they carry insurance.




Angle of inclination for ladders of various lengths.

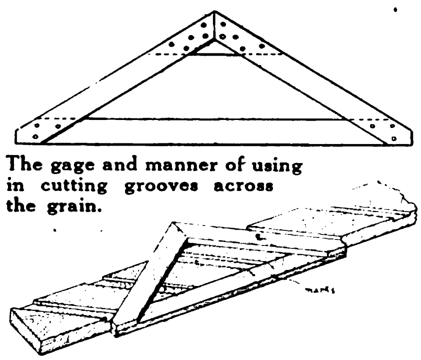
## Time Saving Dado-Gage

By HENRY SIMON

Where wavy like grooves have to be cut across the grain at the same angle, a dado-gage such as shown in the illustration will be found of great advantage.

The gage, which is easily made from a few pieces of one-by-four, will be found a great improvement over the old method of tacking a strip of wood along each new groove.

In the illustration a form of the gage is shown which permits the shaping of matching grooves running in opposite directions, the gage being shown set on one of a pair of sides for a staircase.



The gage and manner of using in cutting grooves across the grain.

The gage is here, therefore, in the shape of an equilateral triangle. If only one kind of groove is to be cut it is, of course, only necessary to pay attention to one side in making the gage, shaping the other as may be most convenient.

The gage consists of two slides working against the sides of the board or plank to be used and just permitting a sliding fit. A nail in one or both of the legs holds the gage in position while working, and two marks on the longer slide and coinciding with the edges of the grooves permit the gage to be moved from one position to the next without the possibility of error or loss of time.

Supposing, for instance, that the gage is made to cut the grooves for a tread of a staircase such as are often used for outside work, in basements, factories, etc., all measuring-off and laying-out of the work, such as is ordinarily necessary, is rendered superfluous. The marks automatically indicate the distance to the next groove without the possibility of error. In a staircase having twenty steps and therefore calling for forty dadoes it will be seen that this saving amounts to a good deal over the method of laying out the forty grooves with square and pencil and tacking a strip to them forty times.

The gage can be used to guide both a saw to be followed by a router or a rabbet-plane.

# Profits in Housing Automobiles

## *Garages Can Be Attached to Houses Already Built*

By RAY WATSON

The present-day popularity of the automobile rests upon the fact that a car is, to many, both a necessity and a convenience. Accessibility and enjoyment are enhanced if the car be kept on the premises.

Of course the separate small garage is popular—deservedly so. But often the location of the house on the plot, or the size of the lot itself, is such that it becomes difficult to properly place the garage to good advantage. In such cases the best remedy is to attach the garage to the house or to build it in. A fireproof wall is usually required by the building department, so that a firestop may be had between house and garage. Even if not required by local regulations, such a firestop should be placed for safety's sake.

Where the house is located upon a corner the garage can be placed as shown in either Fig. 1 or 2. In Fig. 1 the house was located in a terrace; this afforded opportunity for the garage to be partly placed underground, its flat roof forming a pleasant addition to the kitchen. As this garage is built of stone, it is fireproof. The roof of such a garage can easily be made into a kitchen enclosed porch. If the house is not built upon a terrace, the driveway can be sloped down so as to bring the garage roof the necessary height above grade, so that its roof can efficiently serve as a porch.

When the house is at street grade, a garage can be added at the back of the house, as shown in Fig. 2. Here the first story and ceiling are fireproof, with shingles for the second story to harmonize with the wall covering of the house. Architecturally, this method of handling a garage is more difficult than the one shown in Fig. 1, as the roof lines and general proportions must be made to scale in with the rest of the house. This has been well done in the example illustrated.

An attractive garage located at the side of the house is shown in Fig. 3. Here the garage is built of brick with fireproof ceiling. Brick pillars support shingled columns which rise up to support a pergola. The roof of this garage is railed in, flower boxes are attractively arranged around, and when the vines have covered the pergola the effect will be very fascinating indeed. Wherever provision is made for vines or flowers the beauty of the structure is considerably enhanced.

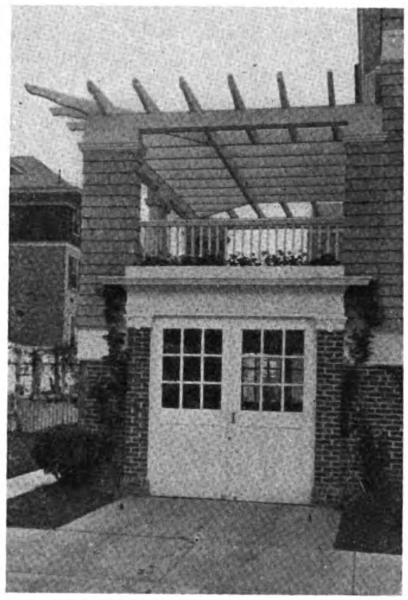


Fig. 3—A pleasant pergola is built over the roof of this garage, forming a porch and making the addition do double duty. The pergola costs but little extra, and is a decided asset to the looks of the house.

Fig. 2—This garage was built onto the rear of the house, care being taken to proportion it accurately. An attractive method, when well handled

Another method of adding a garage at the side of the house is shown in Fig. 4. Here not only a garage has been added, but the builder took advantage of the opportunity to economically add a sun porch and a sleeping porch. In this manner the house was given three of the conveniences so often desired by the modern home seeker. The suggestion carried out in this illustration is one especially worth while, and considerable business can profitably be developed by adding these three conveniences to houses which lack them. Indeed, such opportunities for profitable contracts in building additions should not be overlooked, for they form a very real method of increasing the amount of one's business.

Fig. 1—A garage can readily be added at the rear of a house like this. The roof can be made to serve as a kitchen porch.

Imposing is the garage pictured in Fig. 5. Here full advantage was taken of the location of the house; the sense of spaciousness afforded by the double stairway is well obtained. The garage itself is placed to center with the doorway of the house, being flanked on each side by a stairway U-shaped in plan; these two stairways meet and continue as one, their junction affording good opportunity for a landing. The garage can be entered through the rear from the house. The manner in which the brick attached columns of the front wall are handled contribute in no small measure to the success of the design. The wall is topped with a course of brick laid on edge, giving a warm note of color to the grey of the cement.

Where the house is high upon a terrace, another method of placing a garage would be to build it into the terrace near one end of the lot. If placed so as to balance well with the house, this scheme will result attractively.

Occasionally the plan of the house itself is such that part of the basement can be readily turned into a garage, the necessary fireproof walls and ceiling being built in. Solving the problem in this manner results in no room being taken up on the lot, outside of the space required by the driveway. Usually the entrance door to such a garage will be at the rear of the house, especially when the ground slopes in that direction. As much of the cellar space in a house which has the cellar extend entirely under it is wasted, the suggested arrangement will prove to be not detrimental to the plan.

The driveway should, whenever possible, be gracefully curved, for curves are

Fig. 4—Here garage, sun porch, and sleeping porch were all added by an enterprising builder who thus provided the house with features meeting up-to-date requirements.

always more attractive than are straight lines. If desired, two strips of cement for the car wheels can be laid, thus keeping as much grass as possible. Many people do not like the hard, cold appearance of the cement drive, preferring the softer texture and warmer color of the gravel drive, even though there be greater difficulty in keeping it in good condition.

Shrubs or evergreens planted at the entrance to the drive will do much to soften the hard aspect of cement, especially if directly after entering the drive curve around behind some shrubs, so that only the entrance part is visible. The graceful curve of the cement and its color contrast well with the green of the grass, and it has all the charm of a path of which one cannot see the end.

## First State-wide "Own Your Own Home" Campaign Is On in Indiana

The first state-wide "Own Your Own Home" campaign in the United States is on in the state of Indiana, and behind it as the directing force is the Indiana State Chamber of Commerce.

There are eighteen cities in the United States in which "Own Your Own Home" campaigns are under way or about to start, but the Indiana State Chamber of Commerce is sponsor for the first movement for a campaign to take in every hamlet, village and city in a state. It is understood that this campaign may be extended over a period of five years, and it is not improbable that the Indiana State Chamber of Commerce finally may decide to maintain as a permanent department of its organization an "Own Your Own Home" bureau, which will be on the job every day in the year.

All the machinery of the Department of Labor, in so far as it touches the Indiana field, will be lined up to co-operate and assist whenever opportunity offers.

# How I Made Contracting Pay

*The True Story of a Contractor Who Did Not Know the Difference Between Being Stingy and Being Thrifty*

I INHERITED a business—a business built up by my father, a business for which I was educated and trained. Further, it is one of those businesses which depend almost entirely upon the man at the head, and cease to be anything beyond a name and a lot of unsalable junk the moment he fails to keep it a going concern. You may know from that that we are in the contracting business. As a going concern we are rated as a three-million-dollar corporation, but if we fail to get big contracts we might junk our office furniture and our field equipment and get fifty or sixty thousand dollars for it.

My father was thrifty, thrifty to the point of stinginess. He exacted the last ounce from his workers, who loved and respected and feared him, and who were willing to do a double day's work because they knew he would do as much or more. He watched material as closely as he watched them, and it was one of his hobbies to see that tools lasted longer, that he saved more on machinery than any of his rivals did. He attributed much of his success to this thrifty spirit.

Under these circumstances it is small wonder that I accepted this as one of the foundation stones of success, and never questioned his judgment in that respect or doubted his theory.

At his death I found myself at the head of a company whose chief asset was a great reputation for reliability. The other assets were about two hundred thousand dollars, a good deal of machinery which had seen hard usage, a well-organized office and field force, and one of the best estimators in the business.

At the end of six years I awakened to the fact that we were not making money; that I was hustling for contracts that would keep the field force busy, even if we did not make a profit on the job; and that the two hundred thousand was being drawn upon heavily to replace worn-out machinery. I became alarmed, and I saved money on every item, trimmed requisitions for machinery and tools wherever possible, and within a short time was regarded as stingier and more penurious than father had been.

That year we showed a profit, and I imagined that by stopping the expenses I had started the firm upward again. The following season I had some big

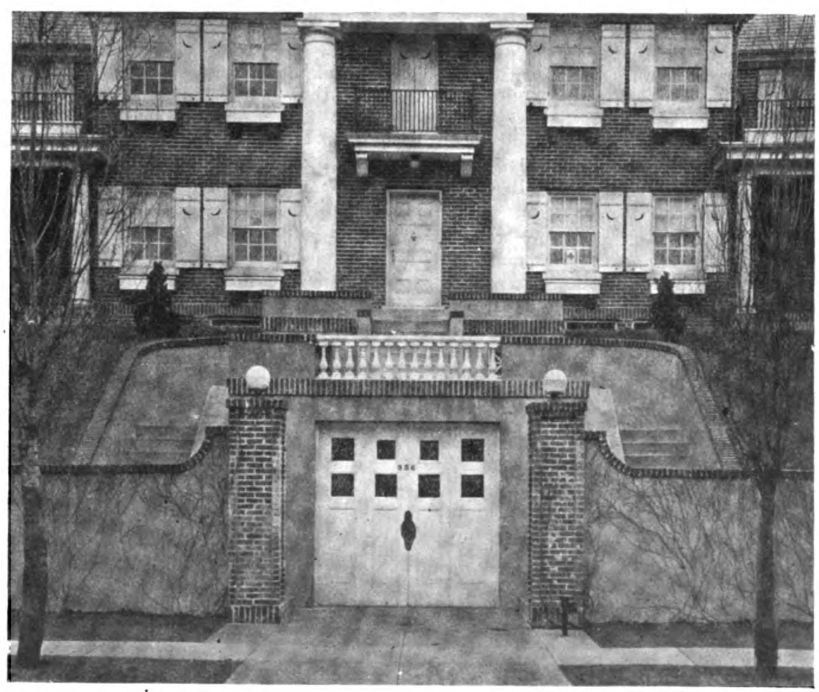


Fig. 5—Imposing is this entrance, the main feature of which is the garage. Gracefully curved stairways like this are always attractive.

railroad work and a huge state contract for making roads. We were compelled to bid very close to get the state contracts, but at our price it looked as if we would clear a comfortable profit. Immediately after starting the work a series of what I called accidents delayed the work. Machinery breakages were frequent, and expenses of replacing the breakages piled up rapidly. I called upon the foreman of our field force and practically accused him of carelessness and misuse of machinery. He resented it and resigned. His assistant took the position and carried through the work, but we showed a big loss on the job.

I quarreled with the engineer who had made the estimates, and he quit. By fall my field and office force was badly disorganized and I had quarreled with several of my best men. I was desperate and alarmed, and could not place my finger upon the weak spot which I knew existed. I pressed the orders for economy and skinned down requisitions to the last possible point. Several of the men rebelled openly, and instead of listening to them I told them that the wastage must stop and that machinery cost money.

*Disaster Follows Disaster*

That winter I had a big tunnel job. It was a disastrous piece of work from the start. Our borings proved misleading as to the character of the rock and soil through which we were forced to drive the shaft, and we struck a bed of hard pan which took the profit off the work in a month and proved hard on our worn machinery. It was almost the crowning misfortune. Before the job was completed my reserve was gone, and I was compelled to borrow money to complete the work, knowing that to throw up the contract and forfeit the bond was practically to surrender the business standing of the firm.

In the spring I found myself without capital or equipment to carry on big works and began bidding on small jobs. I cut down the working force, and while keeping up the pretense of being one of the big concerns really dropped back into the smaller field. My nerve was badly shaken, and I was afraid to enter into competition for big jobs.

That evening I went over my affairs carefully, and came near the conclusion that the best thing to do was to wind up the affairs of the company and take a salaried job. It seemed that I was losing money on all contracts, and, in spite of strict economy, was unable to hold down expenses. I blamed the increasing cost of materials and labor, blamed the foremen and superintendent for incompetence, and had several other "reasons," not one of which explained.

*A Live Wire Gets on the Job*

It was at that stage that I employed a young friend as superintendent. He was not a college man. He had taken a course in engineering at a night school and had worked on construction jobs. He was a hustler and he had ideas; but the reason I hired him was that he wanted a job and I could get him cheap. I was looking for cheap men.

The contract then on hand was the grading of a hill road. It was to be cut down, a heavy fill made across a valley, and the whole to be resurfaced. It was not a big job or one requiring any special skill. I was working in the field myself to save salaries, and the first morning we ran the lines and established the grades. The working force was to come into camp the next day. That evening my young superintendent and I were alone in camp. He was inspecting tools that came in on the wagons that day. He finished his work, came back to the shack and said carelessly:

"Better order a hundred new shovels."

"Look here," I retorted, "I have had to fire two superintendents for wasting money on reckless purchase of tools. I want you to save all the money you can. The shovels are good enough."

*When Economy Is Not Economy*

He looked at me in an odd sort of manner, whistled a little and strolled away. He came back in a few minutes, sat down and said:

"Say, is that what's the matter with this concern?"

I demanded to know what he meant.

"Just this," he said; "you're wasting a lot of money trying to save a few nickels. We can make money on this job with new shovels and one new power scoop, and the chances are we'll lose with the old equipment."

We fell into a debate, and I almost lost my temper. Finally he said:

"Wait a minute, I'll prove it."

He went to a pile of shovels, selected one of the worst and came back. He measured the shovel.

"This shovel is nearly two inches short," he said. "It is worn round at the corners and at one side. You lose more than twenty inches of sand on every shovelful. A shoveler working in this soft sand will toss seven shovelfuls a minute, that is more than four hundred an hour for eight hours—figure it for yourself."

There was nothing for me to do but express astonishment. Meantime he found a new shovel, and shoveled a load into a box. Then he took the old shovel and repeated the process, calling my attention to the difference in size of the piles. Without speaking he hunted up a pair of scales and weighed both, showing me the difference. He was whistling all the time and seemed to be enjoying himself, which feeling I did not share.

*Money Saved by Spending It*

"All right," I remarked. "You get the shovels. I'll order them by wire tonight."

We had a long talk that evening about economy, and I listened. He had shown me a big leak, due to my false ideas of saving money.

Two days later the new shovels came. He came to me with one in his hand and remarked:

"We'll have to send these back and get lighter ones."

"Look here," I expostulated, "I ordered these an eighth of an inch thicker than the others, so they will last. We wear out too many tools, and I wanted shovels that won't be eternally breaking or wearing out."

Instead of answering he got out the scales again and commenced his whistling. This time it did not irritate me, it interested me. I asked him several questions, and finally he laughed and remarked:

"I'm onto you. I can't win an argument from you without showing you."

He took one of the heavy shovels and weighed it, weighed a light shovel, scooped a load of sand with each, and weighed each separately. The weight of the sand slightly favored the heavy shovel. I started to laugh at his demonstration, and he only grinned.

"This shovel," he remarked, "weighs four and a half pounds more than the other. They hold approximately the same amount of sand. But suppose a fellow is shoveling sand all day. Each time he shovels he lifts about forty pounds of shovel and sand. Why make him lift sixteen pounds of shovel and twenty-four of sand when he can lift eleven pounds of shovel and twenty-nine of sand? That is what he will be doing up to the time he gets tired, and then he'll reduce the amount of sand he lifts. I've watched them work, and by the middle of the afternoon they toss about only five shovelfuls in a minute and cut down the size of the loads. You're simply tiring them out lifting dead weight.

I conceded there was something in his argument, and he added:

"You can afford to throw away all the new light shovels you buy once a week and still be ahead of the game."

*Ordering Right*

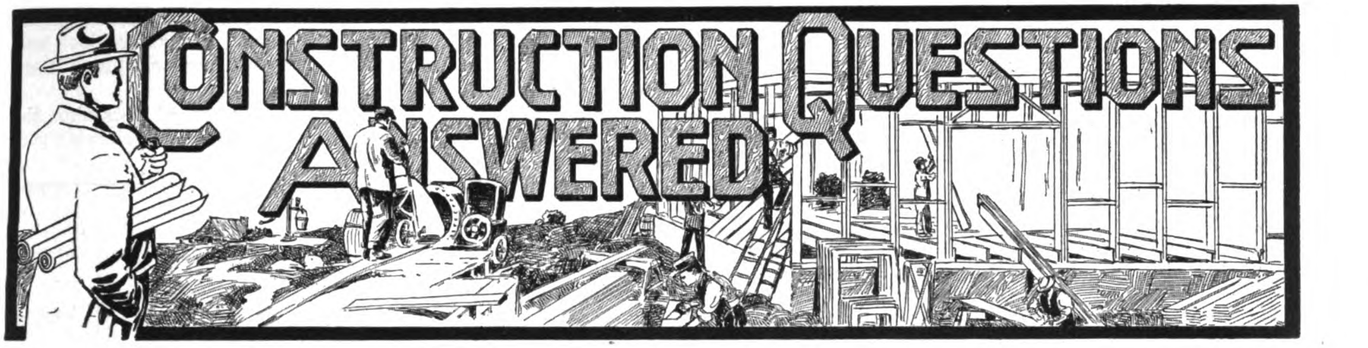
I sent back the heavy shovels and ordered the lightest ones I could get that would stand the strain. I also ordered the new scoops. The young man had convinced me. Not long after that we were talking in the office and I told him of father's methods and economies.

"I didn't know him," he remarked, "but I'll bet a dollar he never tried to save money by working with poor tools. In his day we didn't have this costly power machinery, and labor didn't cost so much, but I'll bet he never let a gang go to work with dull shovels."

My eyes were opened by that time, and I realized that he had struck the weak spot in our organization. Father's theory had been sound, but I had carried it to extremes and applied it to the wrong spot in the organization.

In three months our young friend had converted me entirely. I wanted to buy the best and newest machinery, and gave him free rein to order what was needed. We were making money again—making it on practically every contract, and regaining some of our standing.

It took us four years to get back to where we were when I started sliding downward. Since then it has been steady advancement.—*The American Magazine.*



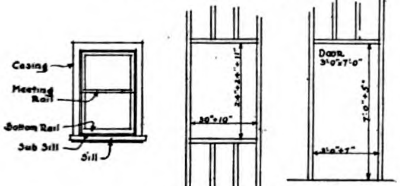

### How Are Door and Window Sizes Determined?

**From L. K., New Jersey**—I find the series of "Country House Details" very helpful and instructive. The remarkable clearness and accuracy of the drawings and the equally clear and practical information of the text accompanying these drawings, make this series a most valuable collection of construction details.

I shall appreciate it highly if you will let me know, in connection with the plate on "Wall Framing," which appears in the April issue of the BUILDING AGE, how to determine the sizes of door and window openings in a frame wall.

**Answer**: A—Windows. There are two ways of indicating sizes of windows: (1) Glass size, see Fig. 1, and sash size, see Fig. 2. In spacing the studs for the glass size, the carpenter would calculate the height thus: Sill, 2 in.; sub-sill (if any is used), 1 in.; bottom rail, 3 in.; glass in lower sash, 30 in.; meeting rail, 1 in.; glass in upper sash, 30 in.; top rail, 2 in.; space for head jamb, 2 in.; total, 71 in. The width between studs would be figured as follows: Width of glass, 24 in.; width of two stiles, 4 in.; width of two casings, 8 in.; total, 36 in. Stated briefly, the carpenter would add 11 in. to glass measurement to get the height between studs and 10 in. to glass measurement to get the width between studs.

In the case of the window in which sash size is given the carpenter would




Determining spacing of studs

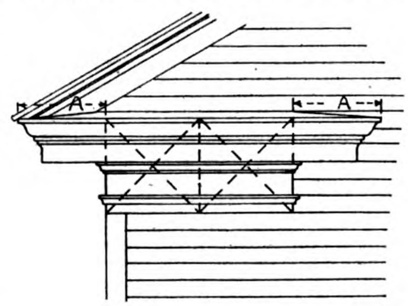
space his studding about 7 in. wider and 5 in. higher than those specified for the corresponding dimensions.

B—Doors. Door openings are estimated in the following manner: Let us assume the door to be 3 ft. x 7 ft. To the width of the door, 3 ft., add the width of both casings, 9 in.; total, 3 ft. 9 in., which is the distance between center to center of studs, or a clear distance of 3 ft. 7 in. between studs. To estimate the height of the opening from joist to header, proceed as follows: To the height of the door, 7 ft., add ¾ in. for finished floor, ¾ in. for rough floor, ¾ in. for threshold and 2 in. for head jamb; total, 7 ft. 5 in. In other words, space the studs for a door opening 7 in. wider and 5 in. higher than the corresponding dimensions specified for the door itself.

A. B. G.

### Proportioning Return Along Box Cornice

**From J. T. L., Idaho**—How far should a cornice return along a box cornice? I would like to have you tell me some sim-




Return is twice the height plus the projection "A"

ple rule that would result in a good-looking job.

**Answer**—A safe rule for the length of returns on boxed cornices to obtain a proper proportion is to make the length of return twice the height plus the projection "A," as indicated in the sketch.

W. G.

### Making Wallpaper Stick to Plaster

**From C. G. L., Texas**—I have a problem I want you to help me solve, knowing that you have had quite a lot of experience in this line. The old hotel building here, which I remodeled several years ago, is the "knotty problem." The old building has plastered walls and partitions, and hard white finish. The building was erected some thirty years ago and a number of walls, in fact practically all of them were full of cracks; that is, the plaster was badly cracked, as is always the case in old buildings where wood lath was used. Of course, a number of these cracks were small; in fact, most of them were merely hair cracks, but they were unsightly, and the walls had been papered a number of times, and it seems that each time the paper would not stick. When the building was remodeled I wanted my client to let me replaster the entire building, but the expense was too great, and the only thing I could do was to clean the walls thoroughly and repaper. I used gloss oil on the plaster and repapered the rooms. The paper has become loose nearly everywhere and the walls will have to be worked over. We do not want to remove the plaster and replaster the building, principally on account of putting the landlord almost out of business while this is being done, and also on account of the expense.

Is there anything I can do to the old walls, under their present condition, that will enable me to repaper the building so the paper will stick to the walls and not come off as it has done? If I cannot treat the walls with any degree of certainty that the paper will stay intact, then I will have to patch up the worst cracks and finish the walls in kalsomine, unless you can suggest something better as to what is best to do in this case.

**Answer**—It is not surprising to me that you have had trouble with the wall paper not sticking to the walls, as from what you write in your letter the walls seem not to have been properly prepared. The use of gloss oil on the plaster is the cause of the paper not sticking. If you want to repaper the walls you can do so successfully and the paper will stick if the following procedure is carried out. The first thing to be done is to remove all of the present paper. Then make up a strong solution of washing soda and warm water, which should be brushed onto the walls over every part where gloss oil had been previously applied. The solution of washing soda will remove the gloss and cut the grease, leaving the walls in a proper condition to receive the glue size.

To make size, glue is placed in water and heated over a stove. A weak solution of this size should then be applied to the wall with a broad, flat brush. When this has been done the walls will be in a proper condition to hang paper on. The flour paste with which the paper is hung is the only other thing to be taken into consideration to obtain a satisfactory result.

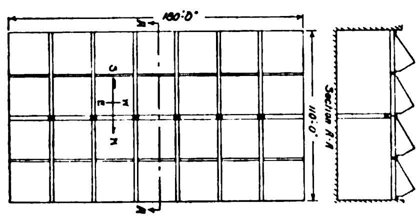
A good sticky paste can be made in the following manner: Place 2 lb. of fine flour in a pail, add cold water and mix well to a thin dough. Take a piece of alum about the size of a small chestnut, pound it fine, mix well; to this add about a pine of molasses, stir the entire mess thoroughly, then pour in about six quarts of boiling water, mix in the paste while hot until the whole is brought to a proper consistency. When this paste has cooled, it is then ready for use.

If the herewith before-mentioned directions are followed, there is no reason why the paper will not stick, and stick for all time. W. G.

## Construction of a Saw Tooth Roof

**From C. H. B., Iowa.**—I will surely appreciate a little help on the roof construction of a building I am putting up now. I want a saw tooth roof facing the north. I can have one row of posts running the length of the building that will give me 55 ft. spans, but how to get the saw tooth construction and still have it substantial is what I am up against.

**Answer**—In a building of the type that you outline I believe the only feasible way to support the saw tooth skylight construction between the 55 ft. spans would be to set lattice or other girders from the posts to the walls in a northerly and southerly direction. Of course, in this construction you must have contemplated placing girders on top of the posts running east and west.




Framing plan and section of saw-tooth roof

Now in order to support the walls and the roof construction in the center of the 55 ft. spans you must also have lines of girders running east and west, and set at the same level as those on the posts. These girders would have to be supported on top of the lattice girders, to gain head room they might be hung to the lattice girders, the tops being kept on the same level. W. G.

## How to Read Gas, Electric and Water Meters

**A. R. F., New York**—The article in the March number of BUILDING AGE, by W. G., was all right for any one that already understood how to read their meters, but it did not go any farther into the matter than the gas company does when it tells you that your meter reads 48,700. As I understood H. F., he wanted to know how these figures were obtained from the meter.

Reading a meter is just like telling time on a clock. The hands of the meter rotate in the same direction as the figures indicate on the dial, starting at 0 and turning toward 1, 2, 3 and so on. The hands on the next dial will turn in the opposite direction, as the hands are turned by a cog gearing, and all mechanics know the law of gearing.

Now over the dial in the Fig. 1 in the March number is written 1000, 10,000 and 100,000. Now on this first dial the hand turns to the right, just the same as the hand on a clock. 1000 is the limit of this dial, but it is not 1000 until the hand makes one complete revolution. Therefore it must be hundreds between the starting point around to the 0 again. Hence on the dial shown the hand has passed the figure 7 but has not reached 8; therefore it must read 7 or, as we are reading hundreds, the hand reads 700.

On the next dial the hand rotates in the opposite direction, but is read in the same manner; the hand has passed the figure 8 and therefore must be 8000. The hand on the next dial rotates the same direction as the first and has passed the figure 4; therefore it reads 40,000. Now coming to the old rule of addition, we have 48,700. This is the theory on which the reading is taken. But to make it short the meter reader starts with the high figure first. On looking at the meter he sees that the hand is past 4 but not yet 5, so he sets 4 down; on the next dial he sees that the hand is past 4 but not yet at 5, so he sets 4 down; on the next dial he sees that the hand is past 8 but not not yet at 8, so he sets 7 down, and as this dial is in hundreds he has to annex two ciphers; he then has 48,700.

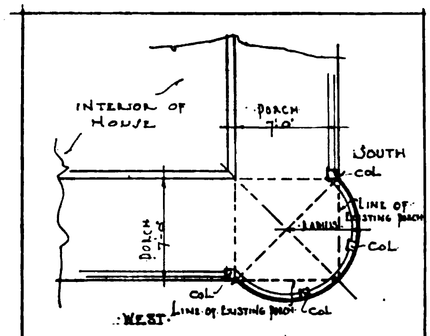
The same rule applies to electric meters with the exception that we will have watts and kilowatts on the electric meter in place of cubic feet.

## Obtaining Radius of Half Circle Porch

**From P. G., Nebraska**—I want to add a half-circle porch to a house and want to know how to obtain the correct radius for the circular portion.

**Answer**—A half-circle porch can be nicely added at the southwest corner of your present porch, and should look well in addition to making the porch more comfortable for use.

The proper manner of obtaining the correct radius for the new circular por-




Sketch showing how to lay out half circle porch at corner of existing porch 7'0" in width.

tion to be added for the width porch you describe yours to be is indicated in Fig. 1.

To find center of radius, extend lines of house, as indicated on the sketch, to outer edge of present porch. Then run lines from corner to corner of square so formed. Where these lines cross each other, drive a nail into floor of the porch. When this is accomplished, the correct center has been established.

Columns should be erected in the positions shown on sketch of a design to match those now in place.

Fig. 2 is a photograph of a house having a circular porch on the corner, as you want yours, and you should give a good idea how the cornice, roof, etc., of that type of house looks when finished. W. G.

## Designing a Wooden Roof Truss for 36 ft. Span

**From M. B. D., Penn.**—Would the truss shown on the accompanying drawings be strong enough? The roofing is Cary's Asphalt Roofing laid on a 1 in. x 4 in. decking which is supported on 2 in. x 10 in. joists. We have about 14 inches of snow here at times.

**Answer**—To analyze the roof truss shown in Fig. 2, a skeleton drawing is made as shown in Fig. 3. This is a diagram of the truss composed of single lines representing the center lines of the truss members. While these center lines do not actually meet as shown in the diagram, they are assumed to do so for the purpose of computing the stresses.

The weight of the roofing, decking and joists is estimated at 10 pounds per square foot of roof surface, and the live load will be taken at 30 pounds per square foot of roof surface. The weight of the truss itself is 1800 pounds.

The load W, tributary to each panel point of the truss, will be equal to the sum of the dead and live roof loads multiplied by the area tributary to each panel point which is the distance center to center of trusses times the distance between panel points. To this must be added one-sixth of the weight of the truss itself. Thus

$$W = (10 + 30) \times 16.5 \times 60 + \frac{1800}{6} = 4300$$

pounds.

The total height of the truss is 5 ft. 0 in. or the effective height for calculations, which is from center to center of the chords, is 4 ft. 1 in. The panel length is 6 ft. 0 in. and the center to center length of the inclined members is 7 ft. 3 in. as shown in Fig. 3. In the diagram the heavy lines are used to denote compression and the light lines denote that the members are in tension. The stresses in the members of the roof truss are obtained as follows:

**Tension in Inclined Web Members**

$$I_1 = 2\tfrac{1}{2}\, W \times \frac{a}{h} = 2.5 \times 4300 \times \frac{7.25}{4.08} =$$

19,100 lb.

$$I_2 = 1\tfrac{1}{2}\, W \times \frac{a}{h} = 1.5 \times 4300 \times \frac{7.25}{4.08} =$$

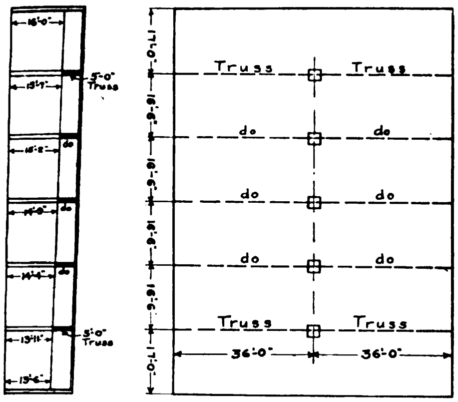



Fig. 1

11,500 lb.

$$I_3 = \tfrac{1}{2}\,W \times \frac{a}{h} = 0.5 \times 4300 \times \frac{7.25}{4.08} =$$

3,800 lb.

Compression in Vertical Web Members

$V_1 = 3 \quad W = 3.0 \times 4300 = 12{,}900$ lb.
$V_2 = 2\tfrac{1}{2}\ W = 2.5 \times 4300 = 10{,}700$ lb.
$V_3 = 1\tfrac{1}{2}\ W = 1.5 \times 4300 = 6{,}400$ lb.
$V_4 = 1 \quad W = 1.0 \times 4300 = 4300$ lb.

Tension in Lower Chord Members

$L_1 = 0$

$$L_2 = 2\tfrac{1}{2}\ W \times \frac{p}{h} = 2.5 \times 4300 \times \frac{6.0}{4.08} =$$

15,800 lb.

$$L_3 = 4 \quad W \times \frac{p}{h} = 4.0 \times 4300 \times \frac{6.0}{4.08} =$$

25,300 lb.

Compression in Upper Chord Members

$$U_1 = 2\tfrac{1}{2}\ W \times \frac{p}{h} = 2.5 \times 4300 \times \frac{6.0}{4.08} =$$

15,800 lb.

$$U_2 = 4 \quad W \times \frac{p}{h} = 4.0 \times 4300 \times \frac{6.0}{4.08} =$$

25,300 lb.

$$U_3 = 4\tfrac{1}{2}\ W \times \frac{p}{h} = 4.5 \times 4300 \times \frac{6.0}{4.08} =$$

28,500 lb.

These stresses could also be readily obtained by means of graphic statics.

In addition to the direct compressive stresses from the truss action, the upper chord members have bending stresses due to the joists resting directly upon them. The bending moment in the upper chord members will vary somewhat with the spacing and location of the joists but will be about equal to

$$M = \frac{Wp}{8} = \frac{4000 \times 6}{8} \times 12 = 36{,}000 \text{ inch lbs.}$$

Having obtained the stresses in the truss members, the next step is to investigate the members in detail to see if they will carry the above stresses.

The inclined web members are in tension and taking the allowable tensile stress per square inch for spruce at 800 pounds, the net area required $I_1 = 19{,}100 \div 800$ or 24 square inches. As the net area of a 2 in. x 10 in. stick, after deducting bolt hole, is only 17.3 square inches, two 2 in. x 10 in. sticks would be required. If long leaf yellow pine, which has a tensile strength of 1200 pounds per square inch, is used, the required net area would be 16 square inches and the 2 in. x 10 in. would suffice.

The required net area for $I_2 = 11{,}500 \div 800 = 14.4$ square inches. The 2 in. x 10 in. piece will therefore suffice for $I_2$ and also for $I_3$, which has a still lower tensile strength.

The vertical members, which are in compression, have an unsupported length of about 42 in. and a least dimension of 2 in. The allowable compressive stress for columns or struts is obtained from the following formula:

$$S = B\left(1 - \frac{l}{60d}\right) \text{in which}$$

$S$ = safe strength in pounds per square inch
$B$ = safe end bearing stress
$l$ = length of strut in inches
$d$ = least side of strut.

For spruce the allowable stress per square inch will be equal to

$$S = 1200\left(1 - \frac{42}{60 \times 2}\right) = 780 \text{ lb.}$$

As $V_1$ has a compressive stress of 12,900 lb., it should have a net area of $12{,}900 \div 780 = 16.5$ sq. in. Therefore, the 2-in. x 10-in. sticks will suffice, and as $V_2$ $V_3$ and $V_4$ have lower stresses it will be more than ample for them.

The bottom chord is in tension and the greatest stress is in $L_3$, which has a tension of 25,300 lb. The required net area will therefore be equal to 25,300 divided by 800, or 31.6 sq. in. As the net area of two 2-in. x 10-in. planks is 34.6 sq. in., they will be ample.

The upper chord members have direct compression, due to the truss action and bending stress due to the joists. To take care of the direct compression in $U_3$, the unsupported length of which is about 56 in., and the least dimension of which is 2 in., we have the allowable compression per square inch equal to

$$S = 1200\left(1 - \frac{56}{60 \times 2}\right) = 640 \text{ lb.}$$

Therefore, the area required for the compressive stress is $28{,}500 \div 640 = 44.5$ sq. in., and the two 2-in. x 12-in. planks will just suffice. However, to take care of the bending stresses there would be required a plank 12 in. deep and a width which is found from the equation:

$M = 1/6\ S\,b\,d^2$, in which
$S$ = allowable fibre stress due to bending
$b$ = width in inches
$d$ = depth in inches

$$\therefore b = \frac{6M}{Sd^2} = \frac{6 \times 36000}{1200 \times 12 \times 12} = 1.25 \text{ in.}$$

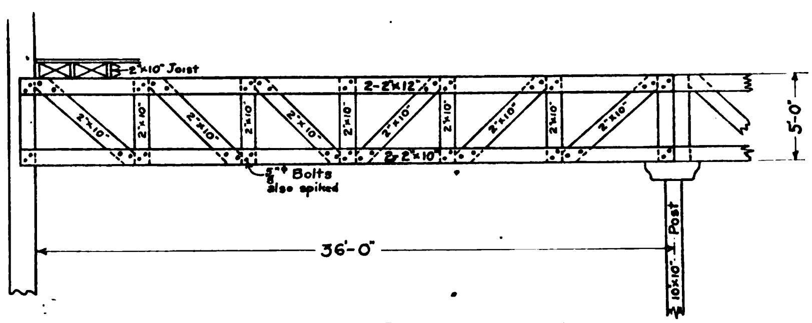



Fig. 2

Therefore, a 1-in. x 12-in. board should be fastened on each side of the $U_3$ members. Should yellow pine be used the two 2-in. x 12-in. planks would suffice.

It will be found by the method just described for $U_3$ that the two 2-in. x 12-in. planks would not suffice for $U_2$ unless yellow pine is used. If spruce is used the 1-in. x 12-in. boards on each side of $U_3$ should also be used for $U_2$. For $U_1$ the two 2-in. x 12-in. planks are ample.

Investigating the joints we find that the drawing calls for two ⅝-in. bolts to fasten the web members to the chords. The members are also to be spiked.

The safe load which the two bolts can transmit parallel to the direction of the web members is equal to

$$P = 2 \times \tfrac{5}{8} \times 2 \times 850 = 2100 \text{ lb.}$$

This is insufficient for any of the members, and the spiking called for must be ample to make up the deficiency.

L. Goodman, C.E.

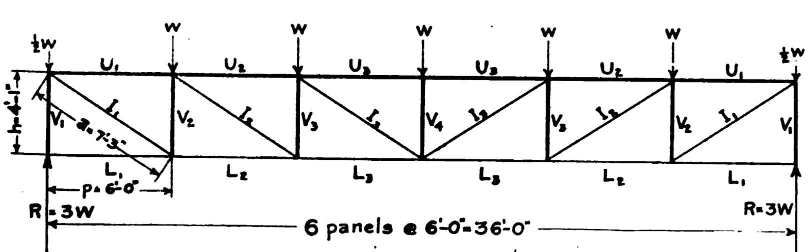



Fig. 3

# Stucco-Coated English Type of House

## *This Style Is Rapidly Growing in Popularity—Homelike Layout Typical of Design*

STUCCO for country houses is one of the most popular wall coverings of the house of to-day. Its permanent-appearing surface, together with the pleasing effect which can be obtained when the material is well handled, contribute to cause many people to favor it. With many the consideration of upkeep dictates stucco, for if the work be well done an occasional cleaning will keep it in good condition.

Stucco is especially adapted to the English type of country house, a type which is one of the latest to creep into popular favor in this country. Stucco with half-timber has long been associated with English domestic architecture, and the Americanization of the design has brought a popular appeal that has done much to bring variety in country house architecture in the United States.

With the English type of house, pleasing irregularities of exterior are readily obtained, although in this type, as in others, plan and design are dependent one on the other. Yet more freedom is allowable in the handling of the plans, as enforced irregularities on the exterior can be so handled as to lend enhanced charm to the peculiar characteristics of the design.

Proportion in this type of house is especially important, perhaps even more so than it is in other types of architecture. Simplicity must be dominant although the half-timber effect lends a variety to the wall surface that cannot readily be obtained in many other styles of architecture, excepting perhaps by the utilization of lattice.

The manner in which the front gable is handled in the house illustrated is especially interesting. One side is carried down in a free sweep over the doorway, furnishing a covered entrance without the necessity for the projection of a porch. This method of handling a gable is worth noting, for seldom should an entrance door be unprovided with shelter from the weather for visitors, and yet considerations of design may render it desirable for the door to appear flush with the house wall.

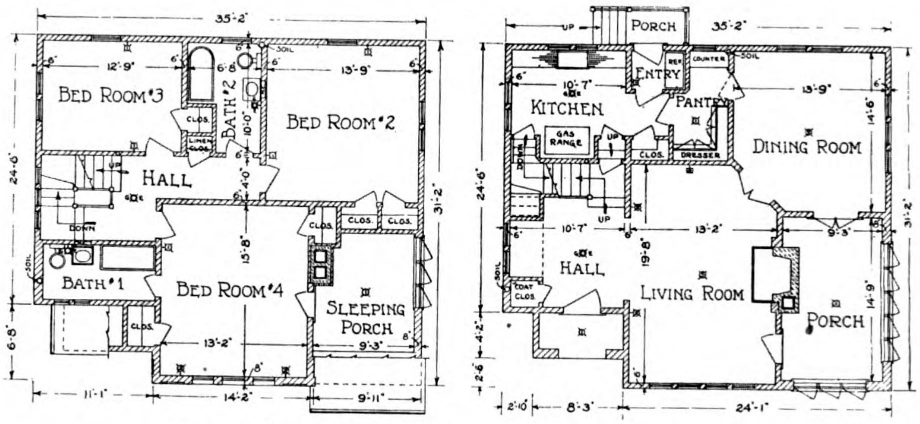
The main roof is "chipped" on each side, preventing the house from appearing too tall for its width. The stucco chimney is effectively placed to offset the continuation of the gable.

One enters into a hall, and a pleasing vista is presented of the living room and dining room, which latter is rather unusually placed through its angular connection with the living room. The wide cased opening between the hall and living room renders the former really part of the living room.

The main feature of the living room is a well designed fireplace, at the right of which is an entrance to a sun porch. This can also be entered from the dining room; thus it can be used as a breakfast porch if desired.

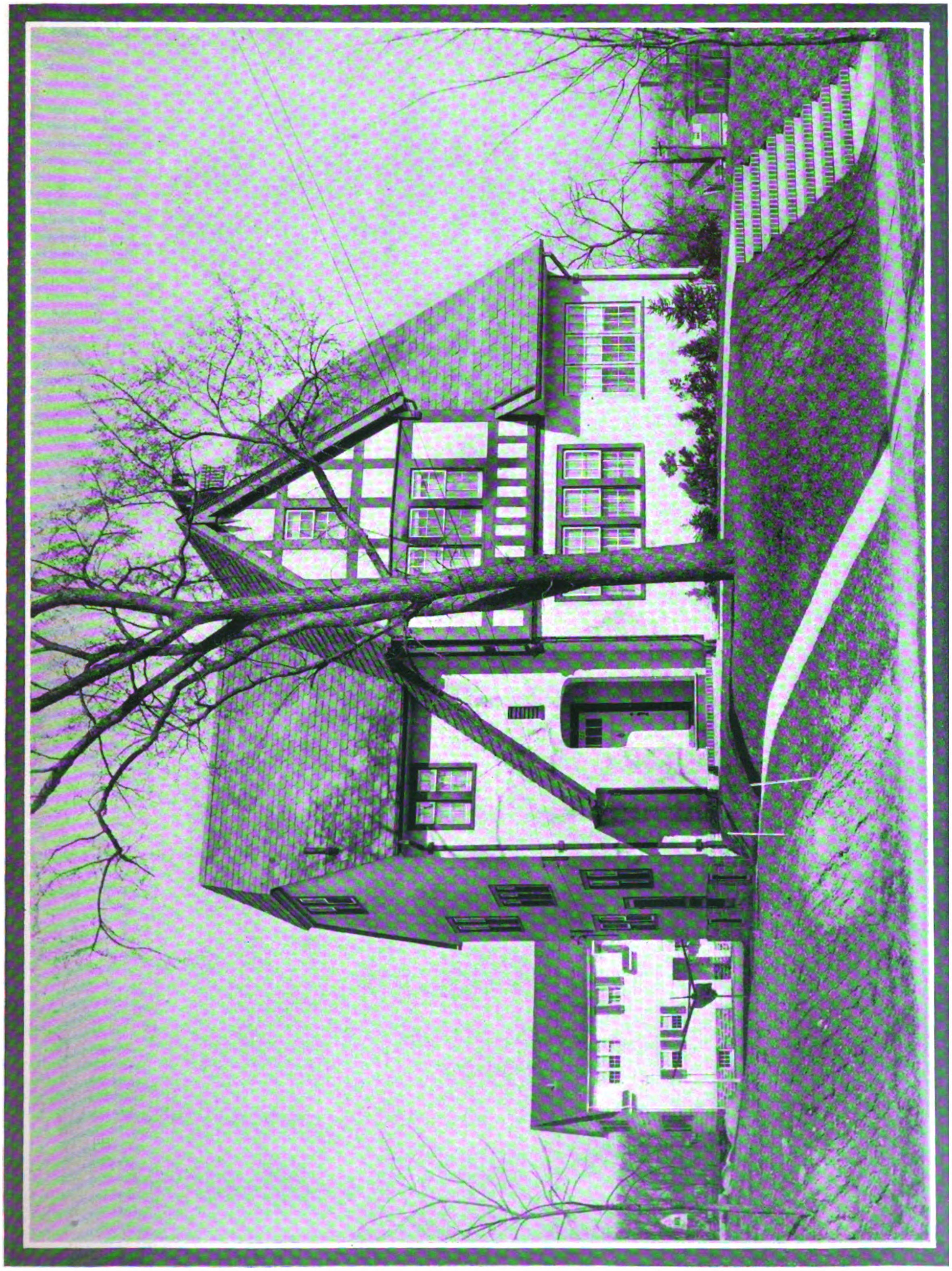
The pantry and kitchen arrangement are interesting, as being a trifle out of the ordinary. The pantry does not communicate directly to the kitchen, but rather enters it through an alcove, which contains an entry looking out onto the rear porch. The pantry doors are so placed that one cannot look from the dining room into the pantry or into the kitchen. Exceptionally spacious closet arrangement for dishes is provided in the pantry, which also contains a counter handy in serving.

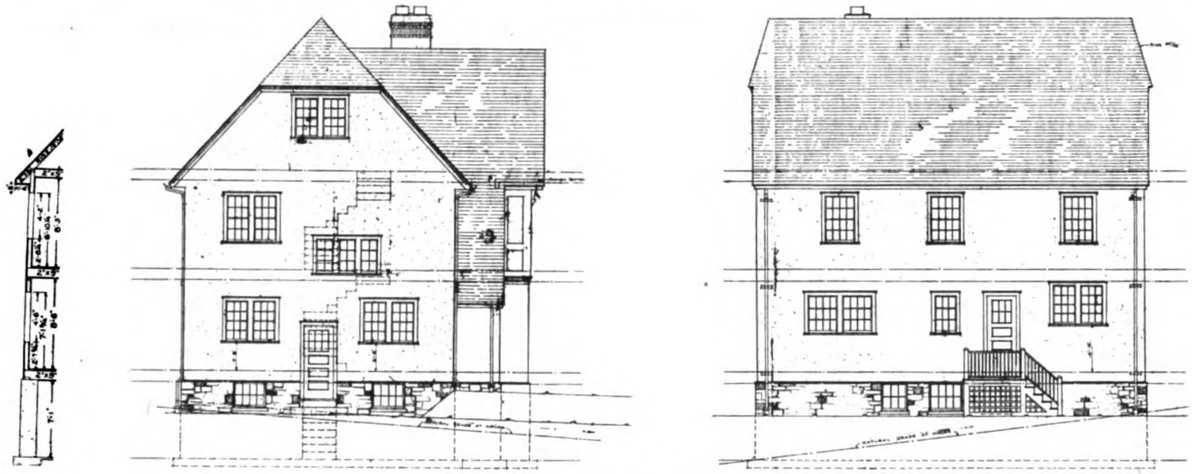
The kitchen contains a sink placed directly under a double window, and on either side of it is a long drain board. This feature of a drain board on either side of the sink is an arrangement seldom carried out, although it is a decided convenience to the housewife. The gas range is placed in a recess, and so is comparatively out of the way. This recess is provided by the stair arrangement, which is




Floor Plans and Elevations, Scale 1/16" = 1 Ft.


Third Floor Plan and Front and Right Side Elevations, Scale 1/16" = 1 Ft.





Cross section through wall and rear and side elevations, scale 1/16″ = 1 ft.

economical in the utilization of space.

The stairs are of the combination type, a door on either side of a short passage serving to make both the kitchen and hall stair side pleasing in appearance.

The second story contains three bedrooms, all well provided with closets.

The master's bedroom has a private bath and a sleeping porch; two big closets are also provided. This arrangement illustrates a popular tendency of today, for it is usually desired by the owner that at least one of the bedrooms have a sleeping porch and private bath adjoined.

The third story contains two bedrooms, one of which is provided with a wash basin, and a large storage room which could readily be turned into an extra bath if desired.

The house is not so large as one would imagine from a glance at the colored insert, for the dimensions are only 35 ft. 2 in. by 31 ft. 2 in. in plan.

This house is located in Mt. Vernon, New York, and was designed by Lewis Bowman, architect, of the Milligen Company, architects and builders, now known as Gramatan Homes, Inc., 154 East First Street, Mt. Vernon, N. Y.

# Getting the Money for Home Building

## *Legislation Proposed Will Help Financing—Write Your Congressman*

How can the builder best help to start building in his own town? That is the question uppermost in the mind of every builder to-day. Of course he is supporting the "Own Your Own Home" movement in his town and advertising in the daily press that he is willing to fill the every want and need of Mr. Prospective Builder, but what more can he do? This much more—he can sit down to-night and write his congressman, urging favorable action on the Federal Home Loan Bank Bill, which will come up befor the next regular session of Congress.

A clothing merchant might just as well advertise dress suits; a shoe dealer, shoes; and an automobile firm, limousines to the half-dressed, shoeless, uncivilized inhabitants of Africa with the expectation of success, as for a builder or lumber dealer to advertise "Own Your Own Home" to the man in his community who has not the price to build it, and no way to get it.

Of course, the "Own Your Own Home" campaign in your town has its virtues and should be vigorously supported, as there are thousands of eager and willing people to own their home. But there are many more thousands who, having every desire to own their own home, yet do not possess, and have not laid plans to possess a home. How can we, as builders and lumbermen, keep them and also help ourselves?

Federal Home Loan Banks are the answer. Officials of the United States League of Building and Loan Associations have conferred with Government officials and have prepared a bill to be presented to Congress, with the object of promoting home building.

The principal feature and object of this bill is to create a system of Federal Home Loan Banks, such as we already have in both the Federal Reserve system and the Federal Farm Loan Banks.

The general functions of such banks will be to act as the medium through which the building and loan associations of any community can obtain sufficient funds to meet local demands. By the issuing of bonds and the sale thereof, these Home Loan Banks will be in position to advance money upon real estate, first mortgage securities of the Building and Loan Associations, whose local supply of money cannot meet the demands.

These Home Loan Bonds may be bought and sold by Federal Reserve Banks in the same way, and to the same extent, as they are now permitted to buy and sell securities of counties, districts and municipalities. In other words, the system is designed for the purpose of shifting surplus funds from communities where the demand is short to those communities where the demand exceeds the supply.

The tentative draft of the bill provides for a Federal Home Loan Board, of five members. Under the direction of this board regional banks will be established and the membership in these will be restricted to building and loan associations. No bank may be established with less than a paid-in capital of $100,000. Whenever ten or more building associations, located in a given district, with aggregate assets of not less than $5,000,000 shall associate themselves together and comply with the requirements of the law, they may organize a district Federal Home Loan Bank.

The next Congress will be called upon to pass this law, and to inaugurate and install Federal Loan Banks and the necessary machinery to their proper functioning.

Builders and lumbermen can perform no greater service to themselves than promoting and urging upon their Representatives in Congress favorable action upon this proposed legislation.

Why not start now and make the slogan "A Home for Every Family" a reality through the establishment of a building and loan association in every community?

The Pessimist says: "It *can't* be done!"

The Optimist says: "It *can* be done!"

The Peptomist is the guy who goes and *does* it!

Why not be a "Peptomist" and go to it?
—ARTHUR C. SMALBACH.

# Money-Saving Wall Board Kink

## *An Ingenious Method of Getting a Frieze in Theatre*

By H. J. PAYTON

It may be that all doing a wall-board trade are not on to the following kink and so pass it on.

Some time ago I was putting up a theater, the interior of which was wall-board finished. A frieze 36 in. deep and stenciled in a continuous pattern had me thinking hard for some time with this result.

I got a few samples of the best unsaturated building papers and tested, by wetting with water, the center of each sample. The sample that seemed to suit my purpose best expanded when wet and contracted when dry and was a soft but tough paper weighing about 10 lb. to the 100 sq. ft. and came in 3 and 6-ft. rolls containing 400 and 800 ft. respectively.

I cut the paper the full length of the walls, laid it flat on the floor, and with clean water in a spraying can (such as is used for spraying disinfectants) sprayed the paper until it was just damp enough to expand but not wet enough to tear in handling.

I then nailed the wet paper in place over the wall-board, using lath nails about 4 in. apart along all edges. When dry the paper shrunk drum-tight on the wall entirely free of buckles, waves or blisters, and when painted and stenciled was identical with the wall-board but without any decorative strips to break up the stencil design. Since then I have frequently used this for drop ceilings on wall-board jobs.

During the past winter I papered the walls and ceilings of the upper floor of a farm house that had been finished inside with shiplap and papered with wall-paper. I removed all wall-paper and applied the building paper direct to the boards, shrinking it on as above described. When dry I gave all two coats of flat wall paint, then covered the joints with ⅜-in. x 1⅝-in. wood strips.

At this time and place wall-board was $4.70 per 100 sq. ft.; the paper used cost $1 per 100 sq. ft., and when the work was completed none but an expert could detect any difference between the papered walls of the upper floor and the wall-boarded walls of the ground floor.

## Saving Money with Interior Trim

(*Continued from page* 149)

the two woods, the result would be very gratifying and also economical, if adhered to throughout the whole house. For instance, a yellow pine trim could be stained with a light oak finish, and the corner moulding and door stop could be of oak darkened with a deeper stain approximating an Engnish oak finish. On the other hand, the pine might be stained with a golden oak stain and the oak stop and moulding be kept at a shade similar to light fumed oak.

Another place where the trim wears out will be shown by the average window stool. The rest of the trim does not indicate much sign of wear, so if hardwood were set into the window stool it would be perfectly practicable to make the trim of the rest of the window of softwood. However, the same frank treatment of finish should be carried out, and the hardwood be treated with a different intensity of stain than that used on the softwood. Contrast should always be maintained, and then the hardwood will not tend to cheapen the appearance of the soft, but if any attempt is made to match them the result is very unsightly.

There is no place like the stairs for the combination of hard and softwoods. The treads and the handrails should always be of hardwood, while the risers, the newels and all other parts will be satisfactory for the use of softwoods. A combination of some cheap softwood painted white with the use of a hardwood tread and rail stained mahogany is too well known to warrant any discussion. But this is by no means the only combination possible.

The use of a hardwood moulding about 2 in. high at the bottom of a high baseboard will often save the expense of making it entirely out of hardwood. The saving found in the combination of a hardwood floor border with a yellow pine center is considerable, where there is much fancy flooring to be done. Where softwood is used for the trim it also makes possible the use of softwood doors, which, if carried throughout the entire house, means a very extensive saving.

Another feature of using softwoods where economy results, is the possibilities they offer for painting, and consequently the opportunity to use the cheaper grades of wood where there are present a few defects that could not be permitted, if staining and varnishing were to be the finish. If the few knot-holes and pitch deposits are thoroughly shellacked, no staining of the paint will result. In the attic, in closets and in the less important places of the house this painted finish on a cheaper grade of lumber will be quite satisfactory. Where a first-class white finish is desired, however, such soft "hardwoods" as gum and basswood should be used.

Where the trim is to be stained and varnished it is always best to apply a thin coat of oil to the surface before staining, because certain portions of the surface may be very much softer than others, which differences appear as spots, giving a cheap appearance to the wood. By the application of oil, the suction of these soft spaces is, in a measure, avoided. Some very highly desirable effects can be obtained with stains of various types, if this care is exercised. Among a few are suggested for cypress the following stains: Cherry, walnut, dark oak and sage green. For yellow pine and Douglas fir and also Western hemlock, the following are excellent stains for rich effects: Light oak, golden oak, light brown, olive green, dark forest green and dark brown. Softwoods left unstained are generally very unsatisfactory after their first freshness has worn off. It is quite doubtful whether they should ever be so treated. At least the common practice of finishing, either cypress or yellow pine, naturally, where it is the trim of the kitchen, ought to be deplored, for nothing stains and absorbs quicker the smut of the kitchen, and after only a couple of years the woodwork has a very forlorn appearance.

One of the biggest economies which can be practiced on interior trim is the utilization as far as possible of stock mouldings from the mills. This is well known by the speculative builder, but the average architect has the greatest scorn for these stock mouldings, and he insists on designing his own, which often are nothing more than a reproduction of some of the stock types.

The type of jointing which is used also determines the cost of trim, and if a careful study of details is made it will be noticed that the common mitred joint, which is almost universally used for finishing the corners, is an exceedingly wasteful one. If we should compare a detail where the top member was carried entirely across the width of the casing and then the side pieces merely butted up against the underside, forming what is called a butt joint—if we should compare this detail with the old-fashioned mitered joint, and considered that the width of our casing was 4½ in., we would discover that where the mitered joint was used we would have to have 9 in. more of trim for each door and window than would have been required for the butt joint. Now this does not seem a great deal until you consider that the average house has about fifty-four doors and windows which must be cased. If we are able to save 9 in. of trim on each one the total amounts to 486 in. on one side only, or in all a saving of 40½ linear ft. of interior trim would have been effected. This of course does not show the amount saved in labor, or consider that the doors have two sides to case.

There is hardly any reason at all in these days to argue for the simplest mouldings. It is quite self-evident that the simpler they are, the more economical they become, not only in the labor spent upon them in setting them up, but also in the labor required to revarnish or paint them. Generally speaking, the simpler patterns in the softwoods appear the best, especially where broad surfaces of flat areas are left for the grain of the wood to make its full appearance.

In some localities a saving can be made by having the trim put together at the mill and shipped ready for setting up. A careful study of local conditions often allows for such economies, sometimes not revealed by a hasty glance.

Department of
# Masonry Construction
CONCRETE, BRICK, ETC.
*Practical Ideas Which Will Help You Do A Quicker and Better Job*

# How to Build and Fireproof with Hollow Tile--XIII

## *Construction of Combination Floors—Form Work Required—Details of Reinforcing*

By J. J. COSGROVE

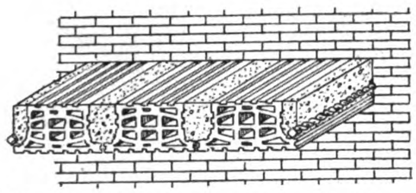


**Fig. 94. Combination floor of hollow tile, reinforcing bars and concrete beams, forming a built-up floor slab. There is no thrust to this type of floor.**

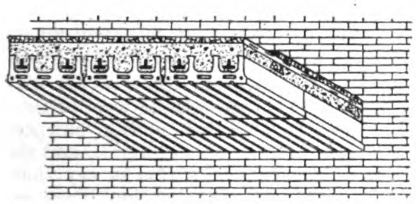


**Fig. 95. Another type of combination floor. Here, as in Fig. 94, special tile are required**

Closely akin to flat arches, but not in the true sense of the word arches, are combination floors of hollow tile and reinforced concrete. The reinforced flat arch shown in the last issue of BUILDING AGE is the missing link between a flat arch of hollow tile and a combination floor of hollow tile and concrete. In the reinforced flat arch wire truss reinforcement is used, but just enough cement mortar is employed to embed the reinforcement and make a good joint between the blocks. In the combination floors of hollow tile and concrete we have hollow-tile blocks, reinforcing bars of members of steel and concrete beams.

One form of floor construction which combines all these elements is shown in Fig. 94. A study of the illustration will show that when finished this floor presents a flat ceiling underneath and a flat floor surface above, well keyed for a cement or tile floor if such is to be laid, or ready for wooden floor sleepers if wood is to be the finish.

This combination of hollow tile, steel and concrete is not an arch, but a big built-up floor slab which may either rest on masonry walls or be supported by means of steel I-beams. One characteristic of an arch is that it exerts a thrust on the abutments; there are no abutments for this form of construction, and no thrust. The slab rests on end supports just as a plank would, and in design must be treated more as a beam than as an arch.

Another characteristic of an arch, whether flat or segmental, is that it must be keyed. Remove the key from an arch and it will fail. There is no hollow-tile block, or row of blocks, in this floor slab, the removal of which would cause the floor to fail.

The strength of the slab lies in the reinforced concrete beams, and the tensile strength of the beams depends upon the steel rods embedded in the bottom of the concrete just above the lower member of the tile. The steel reinforcing rods must be long enough to extend continuously from one bearing to the other, otherwise the floor will fail.

A combination floor of this kind is very easy to lay, and can be put in without the least trouble even by the inexperienced. A falsework of planks is first erected, on which is laid the tile in the places and positions they will finally occupy. The reinforcing rods are then very carefully put in place, the ends bent upwards toward the top of the slab, and held in that position. The concrete is then poured and the centering left in place until the concrete has had at least the initial set, and preferably until it has had its final set.

An entire room ceiling can be constructed in one span with a combination floor of this kind, which makes it a very good form of construction for tiers of toilet rooms which are located one above another.

In Fig. 95 is shown a different form of construction, but built upon exactly the same principle. The method of erecting is similar to that of Fig. 94 except that the design of hollow-tile blocks differs, and the floor requires somewhat more concrete filling. The steel reinforcement, too, is different, T-irons being used instead of plain or twisted steel rods. No cement concrete shows through the joints of either of these arches, so they can be used, as they are without finish, in loft and factory buildings, a coat of whitewash being all that is required. Blocks for these arches are made up with depths of 4, 6, 8, 10 and 12 in.

In the two preceding illustrations special blocks of hollow tile are used. In the construction shown in Fig. 96 common, ordinary, every-day hollow-tile blocks are all that are required. This floor is a combination of hollow-tile blocks laid in courses between beams or joists of reinforced concrete.

A great deal can be learned by a study

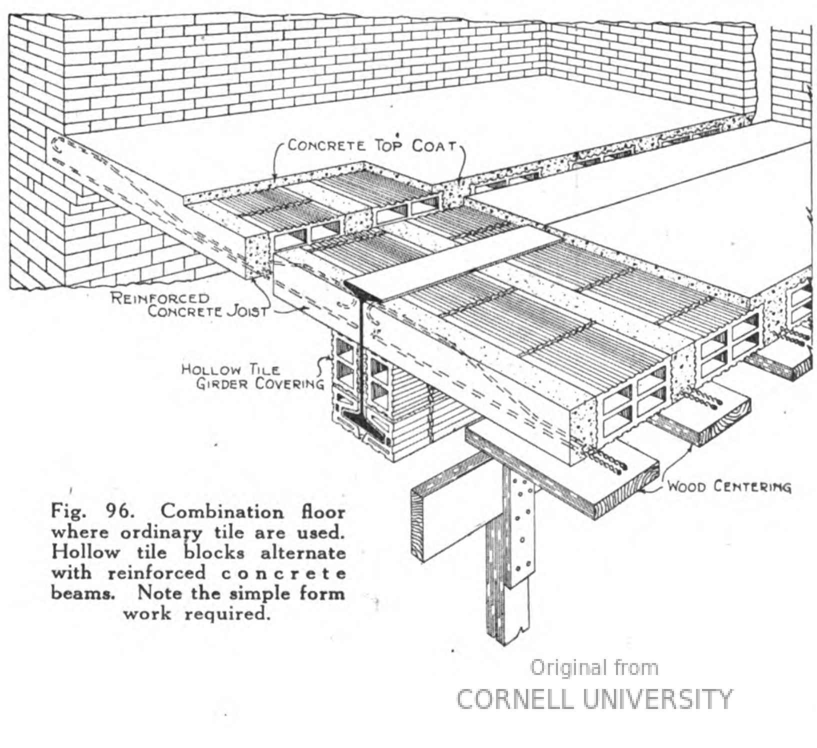



Fig. 96. Combination floor where ordinary tile are used. Hollow tile blocks alternate with reinforced concrete beams. Note the simple form work required.

of this illustration. In the first place it shows the practical builder how the wood centering to support the floor should be placed. It is not necessary to cover with planking the entire space to be floored, but just place a plank where a concrete beam will be poured.

The simplicity and economy of forms will also be appreciated by those who know the cost of building reinforced beams or girders, on account of the carpenter work involved. In this construction one plank of wood centering serves in the double capacity of centering and form bottom. The two adjacent rows of hollow-tile blocks then serve as the sides of the form, so all that is necessary is to place the steel reinforcing in position, pour the beams, wait for them to set and remove the wood centering, when you have a completed floor of great strength and lightness.

It is customary with floors of this kind to lay a top coat of cement concrete. This top coat of concrete not only serves as a finished floor, but adds greatly to the strength of the construction. Two inches is the usual depth of concrete for this top coat of concrete.

The method of reinforcing the concrete beams is shown in dotted lines. Twisted steel is shown in the illustration, but square steel, round rods, lug-rods or any other kind of reinforcement can be used for this purpose. Two rods are used for each beam. One rod is carried straight across near the bottom of the beam and to a secure bearing at each end. The other rod is carried across the bottom of the beam at the same level, but is bent up as it approaches the ends to near the top of the beam, and terminates in a downward curved hook.

The slab-like construction rather than arch construction can also be seen. One end of the slab rests—does not butt against—the brick wall, while the other is carried on hollow-tile girder coverings supported by the lower flange of the steel girder.

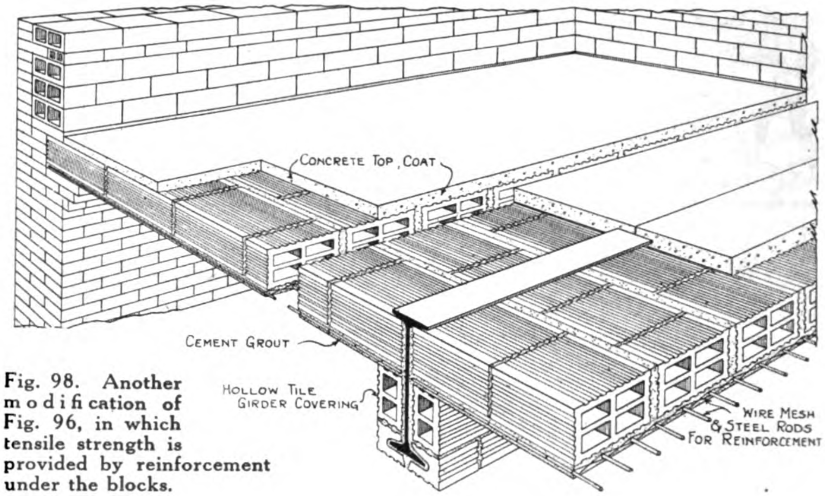



Fig. 98. Another modification of Fig. 96, in which tensile strength is provided by reinforcement under the blocks.

A modification of the floor construction shown in Fig. 96 is illustrated in Fig. 97. The wood centering for this is the same as for the former slab, but the hollow-tile blocks are so formed that the lower shells meet under the reinforced concrete beams, so that no concrete shows in the ceiling. The shells of the hollow-tile blocks are thicker in this type, and the cells are oval, one cell alone taking the place of four cells and cross webs in the ordinary type of blocks.

Less concrete is required for this type of combination floor, for the beams are only about one-third the size, and do not extend clear through to the centering. What they lack in concrete, however, they make up in reinforcement, three steel rods instead of two being used, one of which is carried across the steel I-beams.

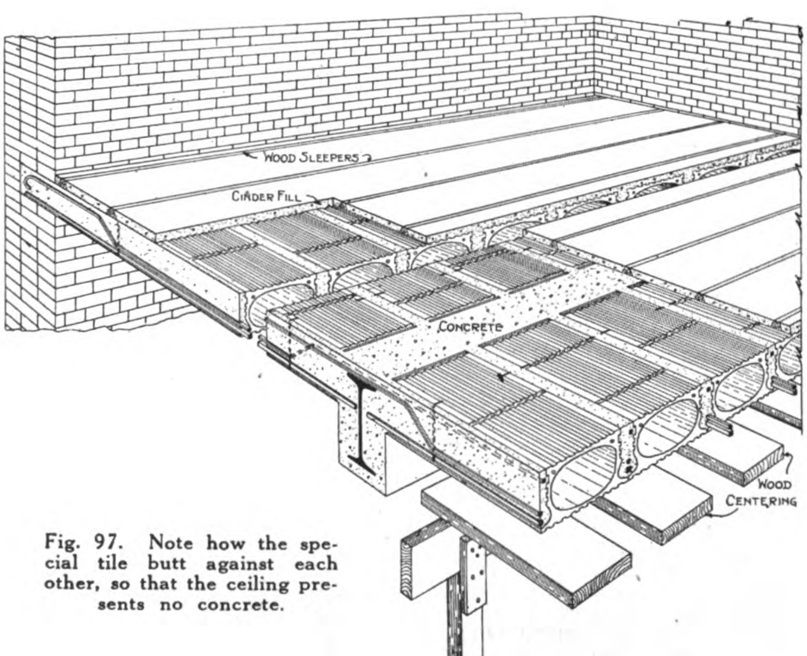



Fig. 97. Note how the special tile butt against each other, so that the ceiling presents no concrete.

Instead of hollow-tile girder coverings the steel I-beam is bedded in concrete, the support thus formed becoming an integral part of and bearing for the joists.

Instead of concrete top coat in this case, the slab is intended for wooden floor covering. To this end wooden sleepers are bedded in cinder concrete fill, and the wooden sleepers are beveled to key them into the cement, thus holding them securely dove-tailed into place. Steel hangers are provided with the reinforcement, to hold the reinforcing rods the right distance from the bottom of the tile forms so they will be properly spaced to develop the greatest strength in the beams.

In Fig. 98 is shown still another modification of Fig. 96, in which the beams are smaller and the tensile strength of the ceiling instead of being in the beams or joists is contained in a thin slab of concrete which forms the entire under side of the floor construction. The thin under-slab is doubly reinforced. In the first place, steel rods extend longitudinally from bearing to bearing, and they may be bent up at the ends where they come between courses. Then a wire mesh covers the entire surface of the floor slab, adding its strength to that of the steel rods.

It might be well to add that the methods shown in the illustration are given as suggestions more than as set types. Any combination of the three methods shown may be used within reason, the object being in each case to get a good fireproof construction, economical to install, and strong enough to carry the loads to which it will be subjected in use. It might be well to again state and emphasize the fact that none of the floors shown in this installment are arches. In many ways they are simpler and better than arches, but they are not arches.

One feature of combination floor construction which recommended them to favor was the fact that they would span large openings and present flat surfaces.

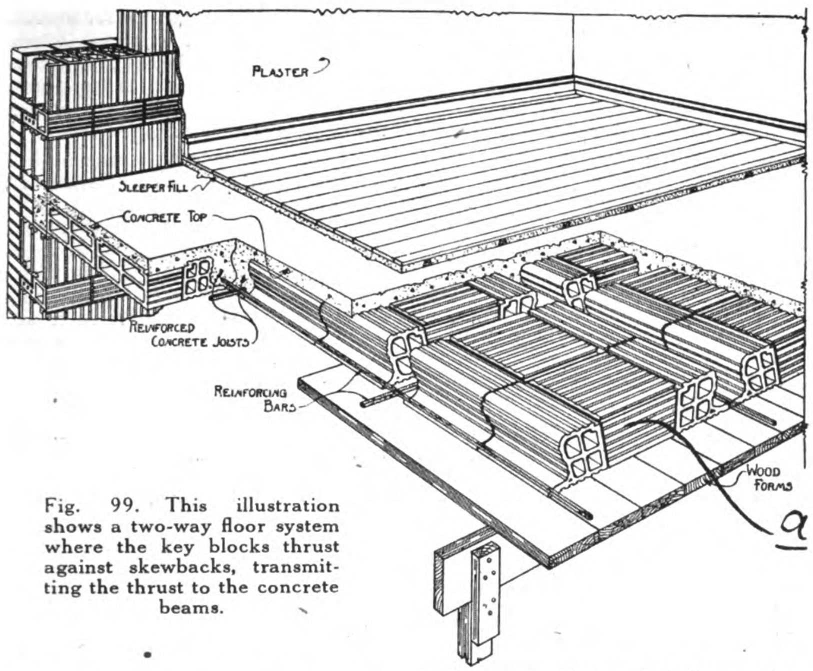



Fig. 99. This illustration shows a two-way floor system where the key blocks thrust against skewbacks, transmitting the thrust to the concrete beams.

That was a distinct advantage over the old-type arch construction, but recent improvements in arch construction have overcome that lead. Larger openings can now be spanned economically by means of long-span arches than by combination floors. Nevertheless combination floors of hollow tile and reinforced concrete fill a perfectly useful niche in building practice, and their use is constantly increasing as their economy and value are becoming more widely known.

In Fig. 99 is shown a form of floor construction which is unique in the fact that while it is a combination hollow-tile and reinforced concrete type, the arch principle is used, not to support the floor as a whole, but inlaid so as to form a series of beams and bays. A study of the illustration will show that one of its distinguishing features is, in addition to the longitudinal beams, cross beams of reinforced concrete which divide the floor up into a number of squares. So independent are the beams of the hollow tile, other than as fillers, that the beams could be poured first and the tile set afterwards. For convenience in construction, however, the tile are set in place, the reinforcing set and the concrete poured. It will be noticed that there is a key tile, *a*, to each one of these squares, and that if these keys were removed the tile portion would fail. Also, the tile are held in place by the pressure of these keys thrusting the skews against the sides of the concrete beams, both of which characteristics stamp the construction as that of an arch.

In this two-way system the beams extend across both the short and the long span, carrying the load to four sides instead of two as in the one-way system. The two-way system is most efficient for bays where one side is not more than 50 per cent longer than the other. Where the percentage is greater the one-way system is better. By carrying the load to four sides it is possible to reduce the thickness of the slab and the depth of the supporting girders, but obviously it is impossible to build a two-way floor in which the percentage of tile substituted for concrete will be as high as in the one-way system.

*(To be continued)*

# Forms for Circular Concrete Surfaces

By H. COLIN CAMPBELL

Careful planning of forms pays in almost every class of concrete work if for no other reason than obtaining economy of lumber and a pleasing surface. However, some classes of concrete work require careful planning of forms for other reasons. Concrete objects having unusual shapes require that arrangements be made to build forms in sufficient sections or to so divide them as to make removal from the object easy.

Fig. 1 shows the section of forms for a column having twenty-four flutes. In this case it is necessary that the form be divided into six sections so that each may be withdrawn in the direction of the arrowhead, without binding at any point. The dotted lines parallel to the direction of the arrowhead show that the form will clear all flutings without injuring the edges. In this particular case the flutings are shallow. If they were deeper, these sections could not be withdrawn without injuring the edges. In such a case the form would have to be divided into more than six sections.

It is always necessary first to lay out the column in plan to determine the number of sections required. The form which is described is supposed to be of cast iron, but of course for making the cast iron form a wood pattern is required, so carpenter work enters into this form construction first if not last. The

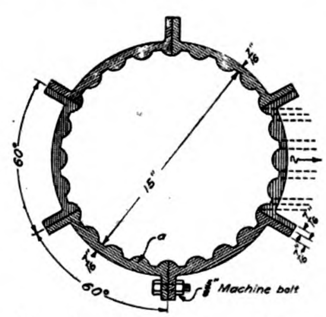



Fig. 1. Form for a column having 24 flutes. The form is made of steel, in 6 sections.

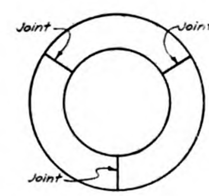



Fig. 3. For making a plain circular column, the form should be made in three parts.

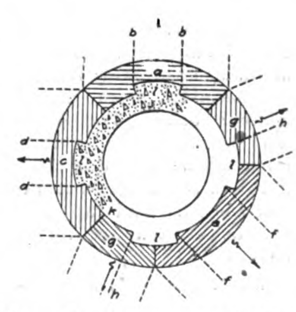


Fig. 2. Where projecting surfaces are required, this kind of a form is good.

sections are bolted together. It is possible to use wood forms for casting such a fluted surface, but it is supposed that a surface of this kind may have to be repeated indefinitely as perhaps in casting some standardized commercial column, then the wood forms would not be economical because of their tendency to swell when wet and because being of wood they could not be used repeatedly as can metal forms.

Fig. 2 shows in section a form for a

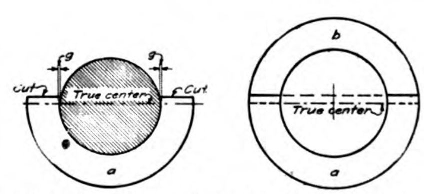



Fig. 4. Illustrating the danger when the form is divided into only two parts

concrete product having projecting surfaces such as pilasters or lugs. The form is shown partly filled with concrete to illustrate the object "k," which, for purpose of illustration, may be considered the section of a column. There is a correct and an incorrect way of making forms for such objects. Segment "e" has joints at the middle points of projections "l." When withdrawn in the direction of the arrowhead the form will clear the concrete, as is indicated by the parallel dotted lines f-f. This is the correct method if the form is divided into four segments similar to "e." If the form is divided into four segments similar to "a," having joints midway between two projections, the segments cannot be withdrawn in the direction of the arrowhead nor in any other direction without breaking the edges of the projection, as shown by the parallel lines b-b. If the edges of the projection on the product are parallel with the line drawn through the center of the product, as shown at "c," then joints midway between the projections would be permissible and the form could be divided into four segments similar to "c." These segments could be withdrawn in the direction of the arrowhead, as indicated by the dotted lines "d." If the form were divided into eight parts, then each part would be similar to segment "g," which could be withdrawn in the direction of the arrowhead without injuring the edges of projections, as shown by line "h" parallel to the face of this projection.

These examples illustrate underlying principles of correct and incorrect methods of dividing forms for practically all circular concrete objects. Others require only special planning that the differences of shape and surface involve, which means only a slight variation of the principles illustrated.

For circular objects having no irregularities on that surface, in other words, having a plain surface, it is best to divide the form into three sections or segments, as shown in Fig. 3. It is of course possible to divide the form in two segments and have it work. However, any slight variation from cutting it at the exact diameter of the circle, as well as any unusual swelling that may take place due to moisture from the concrete, is certain to make it bind and prevent removal without possibility of injuring either the form or the concrete surface.

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# Country House Details

## *Brickwork and the Comparative Strength of Different Bonds—Mortar Required for Various Conditions*

By A. BENTON GREENBERG, *Architect*

By bonding is meant the arrangement of brick in such a manner as to avoid continuous vertical joints. The mortar joints are the weakest part of a brick wall, hence the necessity of having the bricks overlap each other. Besides the firm tie which results, bonding has the additional advantage of distributing the load which comes upon one brick over a larger number of bricks below.

Of the three principal bonds illustrated on this plate, the English bond, Fig. 1, is the strongest. This bond has so many headers, however, that it tends to give a wall in which it is employed an appearance of weakness which is decidedly unattractive. The Flemish bond, Fig. 2, since it contains only two-thirds as many headers, is not so strong as but considerably more pleasing than the English bond. The American or common bond, Fig. 3, is the one most extensively used in this country. Its comparative strength, when properly jointed, and the ease and rapidity with which it can be erected are its chief points of advantage.

Whichever bond is used, it is essential that the bond be maintained along the entire length of the wall. This is accomplished by means of "closers," which are fractions of a brick. They are thus called because they finish or close the bond at the ends of the wall. They avoid the vertical joints in two adjacent courses from coming directly over each other. See Figs. 1 and 2. They are made by cutting ordinary bricks into any convenient size. When cut longitudinally they are known as king or queen closers. When cut transversely they are called "bats," which are designated according to the proportion they bear to the whole brick, as can be seen in Fig. 4.

The names and thicknesses of the more common joints used in brickwork are shown in Fig. 5. The mortar in the joints serves a triple purpose: (1) It binds the whole wall into one solid mass; (2) it fills the crevices between the bricks and thus prevents moisture from entering, and (3) it distributes the pressure evenly by filling in all irregularities between the bricks. If the joint is made excessively thick, the mortar will be squeezed out when the wall is built up. When the mortar thus forced out beyond the face of the wall hardens, it catches the rain, which gradually works its way into the mortar and causes it to crumble away when frost sets in. To prevent this disintegration pointing is resorted to, i.e., the joints are raked out to a depth of about one inch and are refilled with grout, which is a thin mixture of one part cement and one part sand.

Lime mortar is used for ordinary brickwork above grade, except where heavily loaded. It is made by mixing clear, sharp sand with thoroughly slaked lime, in the proportion of one part of lime to about four parts of sand. Lime mortar, however, will not harden in damp places, nor will it set in places not exposed to the air. For such work cement should be added to the lime mortar.

Cement and lime mortar—its cheapness, its rapidity of setting and the strength it acquires on exposure to the air explain the reason for its extensive use in all kinds of masonry work. A mixture that will give satisfactory results is the following: One part of cement, six parts of sand and one part of lime. The main precaution to be taken is to see that the lime mortar is worked at least forty-eight hours before the cement is added and then only small quantities of cement should be added at a time.

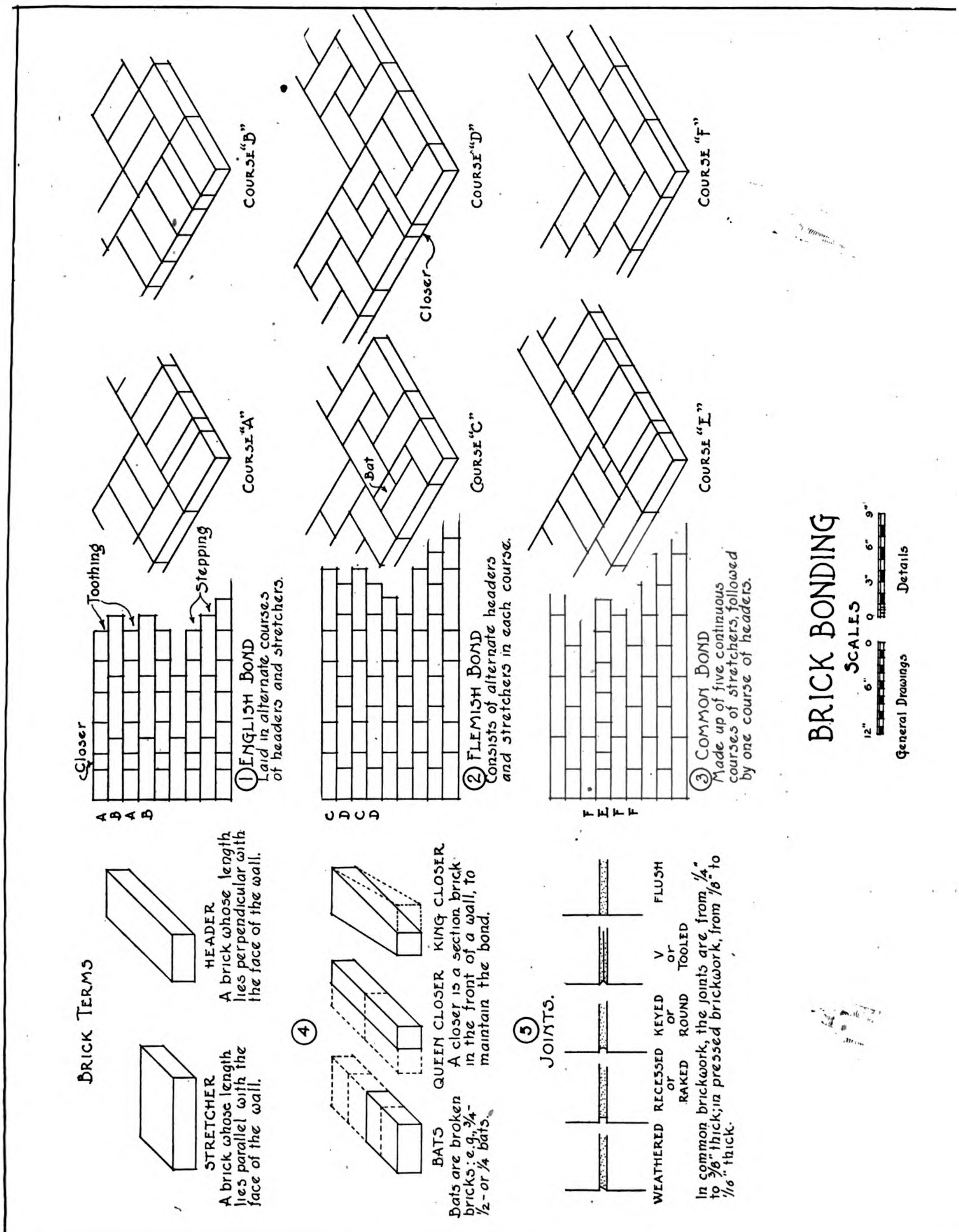
Cement mortar is used for brickwork which is below grade or which is required to carry heavy loads. It is also employed for such exposed parts of a building as the copings of walls and tops of chimneys. Cement mortar is made of cement and sand in the proportion of one part of cement and not more than three parts of sand.

Too much attention cannot be bestowed upon the laying of brick, for upon this operation depends the stability of the structure. All bricks should be laid in full beds of mortar. They should be pressed down so as to force the mortar into the pores of the brick. They should, furthermore, be laid with a "shove-joint," that is, they should first be made to project over the course below, then pressed down and finally shoved into place. The shoving completely fills the joints with mortar and the pressing insures maximum adhesion between the brick and the mortar. Bricks, particularly when laid in warm or dry weather, should be dampened before laying. There are two reasons for this practice: (1) It removes dust and other foreign matter from the surface and so permits the mortar to adhere firmly to the brick, and (2) it prevents the absorption of water from the mortar and thus gives the mortar a chance to set properly.

No wall of any building should be built up in advance of the others. They should all rise about the same time; otherwise unequal settlement will result and cracks will appear on the surface as a consequence. Where it is absolutely necessary to carry one part of a wall higher than another, the higher part should be built up with "steppings" and not with "toothings" to connect it with the rest of the work. See Fig. 1.

The following table gives the approximate sizes of some of the best known and most widely used varieties of bric[k]

Standard, $2\frac{1}{4} \times 8\frac{1}{4} \times 4$ in.; Roma[n] $1\frac{5}{8} \times 11\frac{5}{8} \times 3\frac{7}{8}$ in.; English, $2\frac{7}{8} \times 8\frac{7}{8}$ [x] $4\frac{3}{8}$ in.; Norman, $2\frac{1}{4} \times 11\frac{3}{8} \times 4$ in.



# How I Applied Stucco Twenty Years Ago That Is Uncracked To-day

By D. W. DALEY

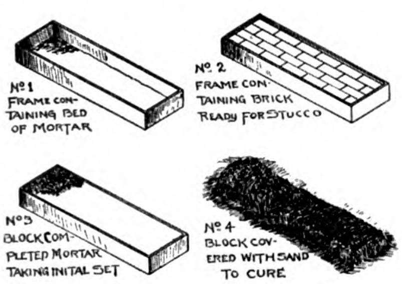
A residence I built in 1898 is shown in Fig. 1, and as the stucco is as good to-day, after 20 years' wear, as when first applied, I am sending you the data concerning the method of application. I am sure the methods of construction will be interesting to the readers of BUILDING AGE, who, as a class, are always interested in novel and economical methods of construction.

I proceed with the work as follows: After obtaining a supply of worn-out paving brick, I get sufficient ⅞ in. x 6 in. lumber to make enough collapsible

Fig 1—Appearance today of the stucco residence erected twenty years ago

frames to require about one-half day to fill. I then place the frames on the ground and spread about 1 in. of cement mortar in same. In this mortar I place the brick, properly bonded, with large, roomy joints. I then thoroughly fill the joints with cement mortar and put mortar flush with the top of the frame. I then press the dash into the mortar, being careful that the mortar does not cover the top of the dash.

The block remains in this condition until the cement gets the initial set, when I cover the block with damp sand and leave it remain covered until ready to place it in the wall. I find the block is equally as rigid as a piece of stone in the same dimensions. The blocks are




**Progress sketches illustrating various steps in constructing the blocks**

built into the walls the same as stone ashlar. When completed I wash the building down with water at about 80 lb. pressure, using a hose.

Fig. 2 gives a fair idea of the appearance of the completed work, but the building must be seen to properly appreciate the effect of the four colors of

**Detail photograph showing the appearance of the finished job**

marble and crushed glass—white, red, pink and black. The dash I passed through a screen several times to get it properly mixed.

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## Effect of Colors on Tensile Strength of Cement

By O. R. SMITH

In order to determine the effect of various commercial colors used in concrete work, upon the tensile strength of portland cement, the following series of tests were made.

Usual cement testing procedure was followed in all the tests, the test pieces being aged in water. Ten per cent of the color was used in each case except black, of which 5 per cent was used.

The results given in the table herewith are self-explanatory—in each case the average of three tests which were made.

The setting time of the cement with the various additions of the color was nearly normal in every case excepting where the black color was used. This caused the cement to set very quickly.

| Age | No Addition | Brown 10% | Red 10% | Black 5% | Yellow 10% | Buff 10% |
|---|---|---|---|---|---|---|
| 24 hours, neat | 400 | 370 | 373 | 290 | 375 | 385 |
| 7 days, neat | 710 | 670 | 640 | 690 | 645 | 610 |
| 28 days, neat | 785 | 830 | 710 | 640 | 750 | 760 |
| 3 months, neat | 800 | 910 | 875 | 785 | 840 | 830 |
| 1 year, neat | 890 | 890 | 810 | 800 | 790 | 800 |
| 7 days, ⅓ sand | 300 | 340 | 310 | 240 | 300 | 320 |
| 28 days, ⅓ sand | 360 | 360 | 380 | 320 | 420 | 470 |
| 3 months, ⅓ sand | 490 | 410 | 520 | 360 | 475 | 400 |
| 1 year, ⅓ sand | 445 | 445 | 420 | 410 | 400 | 440 |

The permanence of the color was also noted, at each period, by comparing it with the color of test pieces made out of the same batch, but allowed to age in moist air. No change of color was apparent.—*Concrete.*

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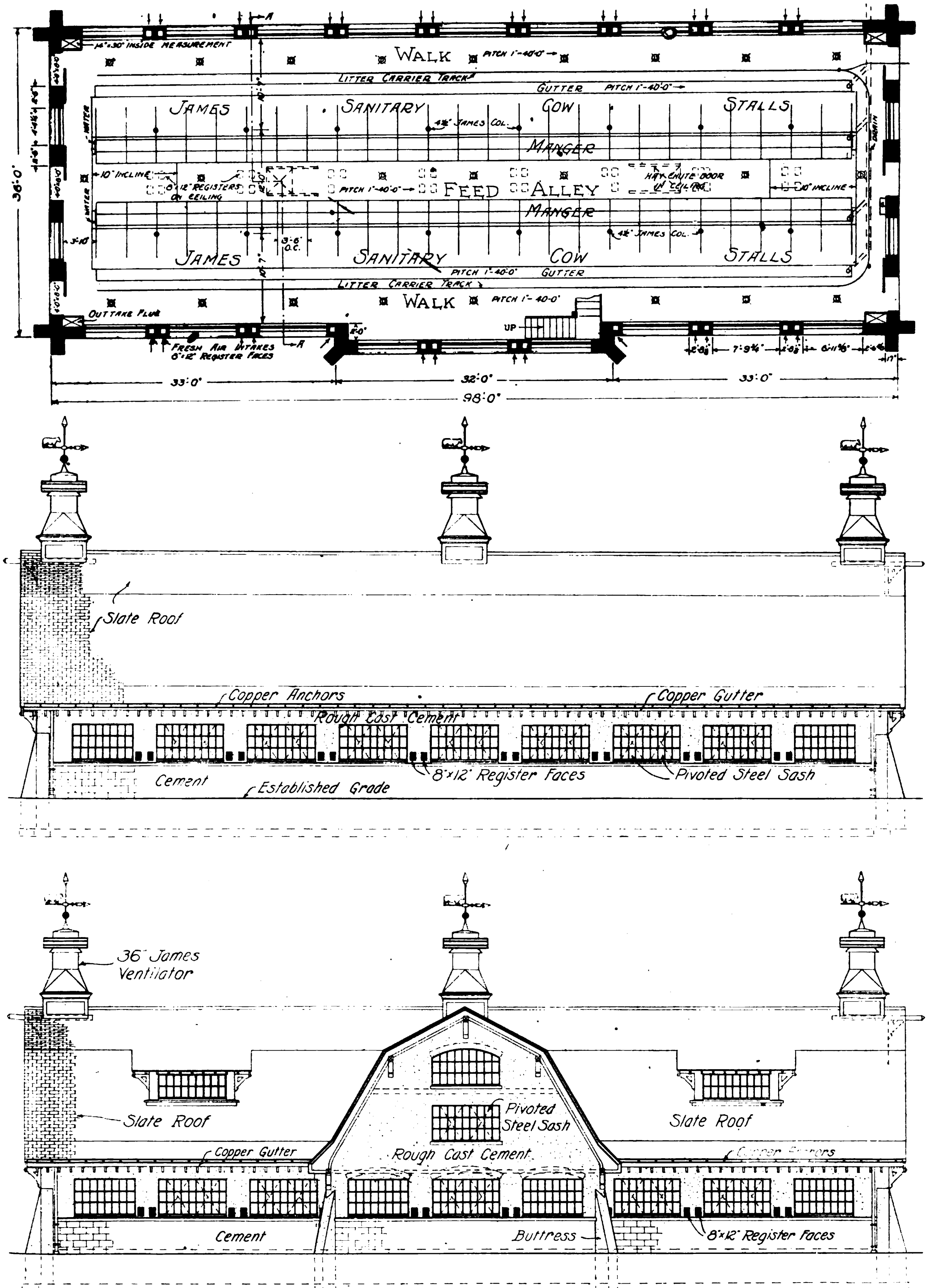
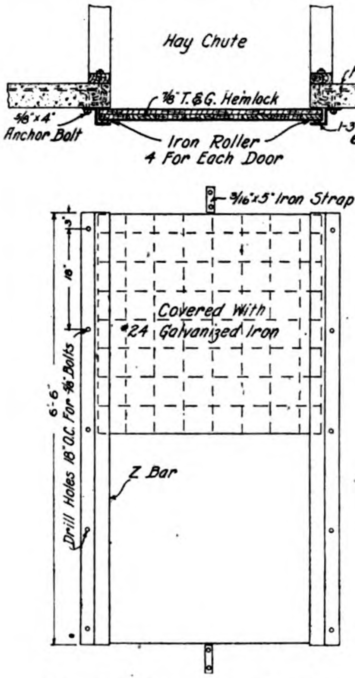
# Fireproof Dairy Barn for 50 Cows

*Details Showing Construction of Concrete Floors and Stairs*

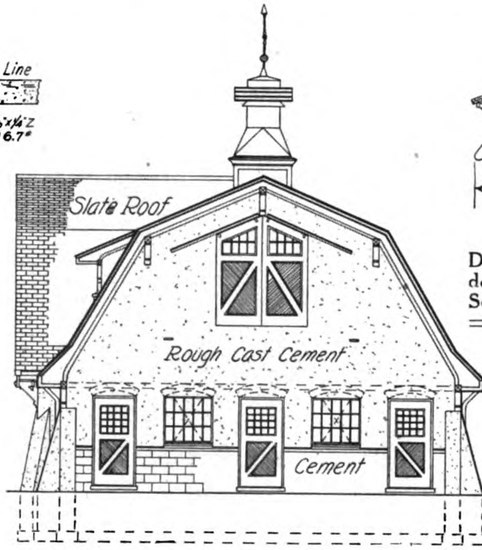
Many farmers to-day are desirous of having their more important buildings fireproof, especially when valuable cattle are to be housed. The permanence and safety of such buildings carries an appeal which often more than offsets



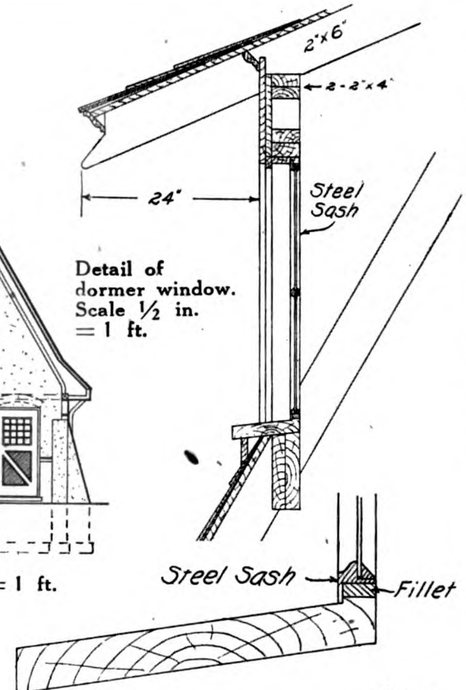

Floor plan and side elevations. Scale 1/16" = 1 ft.




Detail of sliding door for hay chute. Scale 1/2 in. = 1 ft.

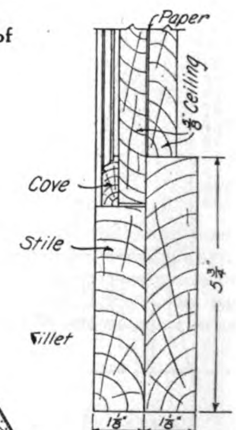



End elevation. Scale 1/16 in. = 1 ft.

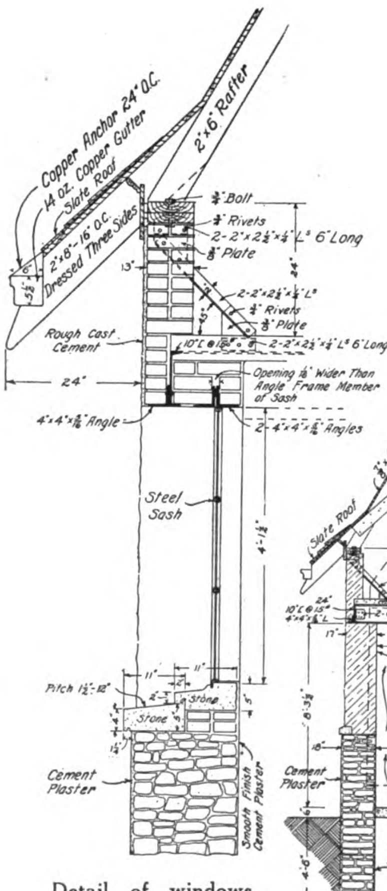



Detail of dormer window. Scale 1/2 in. = 1 ft.

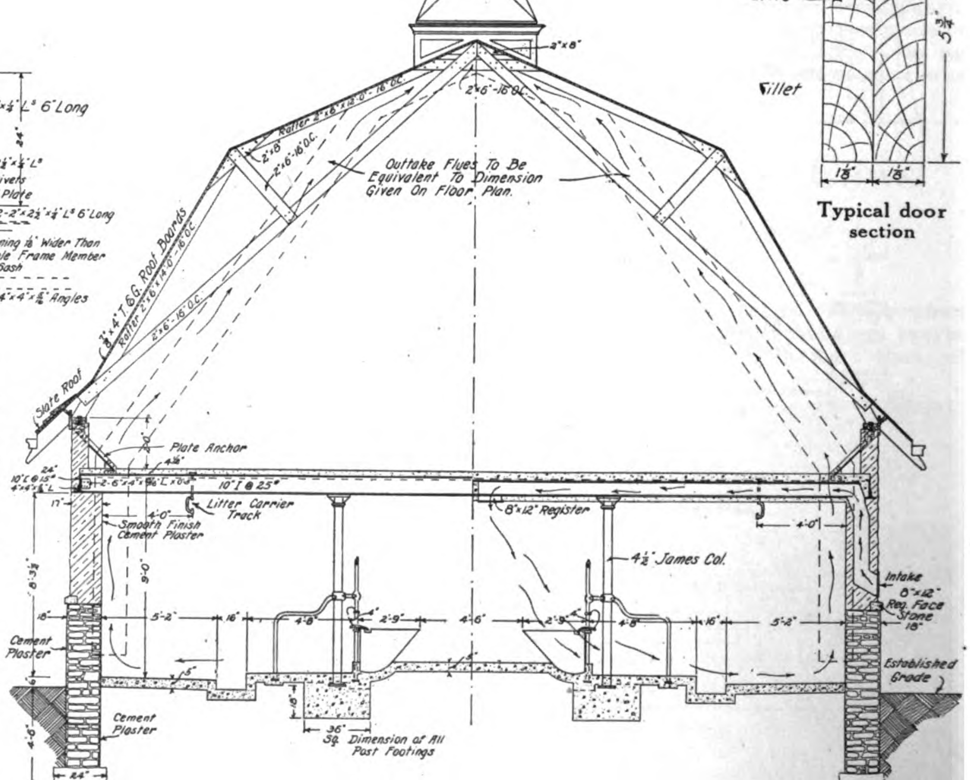
Detail of sill of dormer



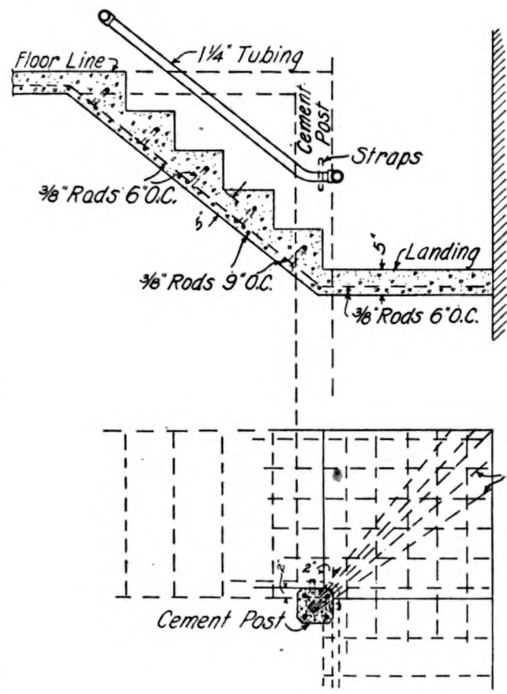

Typical door section

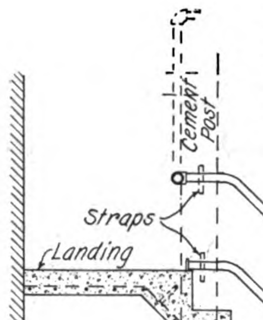


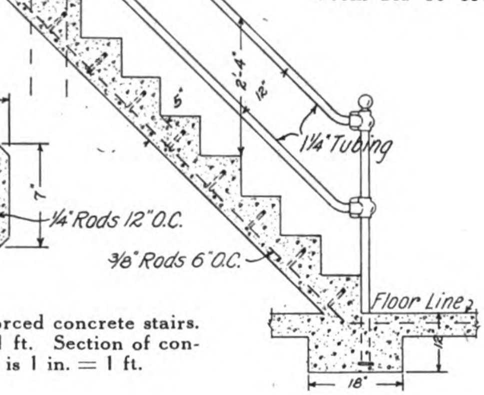

Detail of windows, cornice, etc. Scale 3/8 in. = 1 ft.

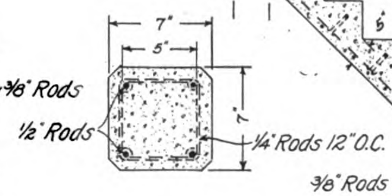



Section at A-A of plan shown on p. 173. Scale 3/8 in. = 1 ft.



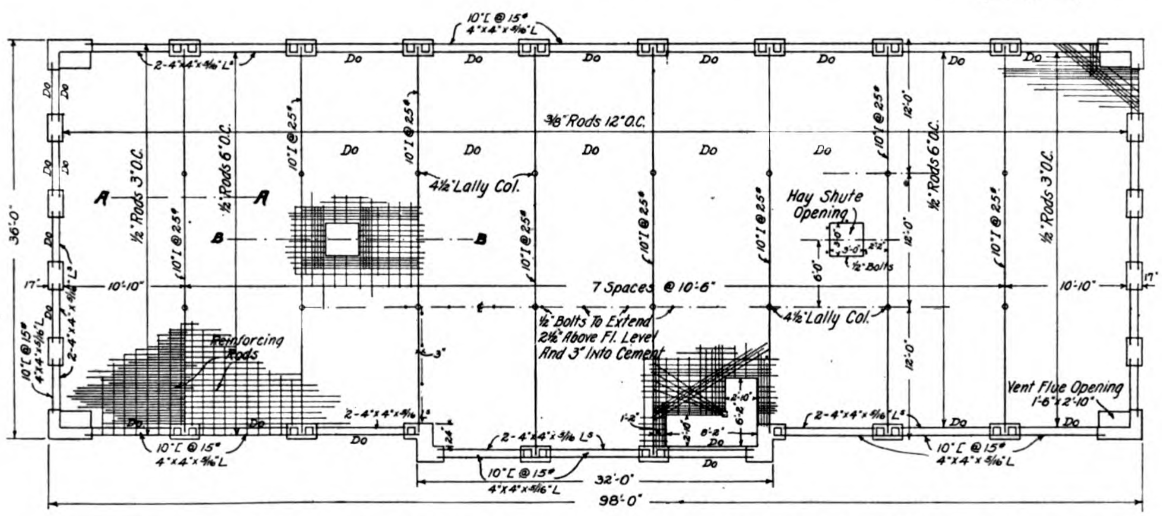



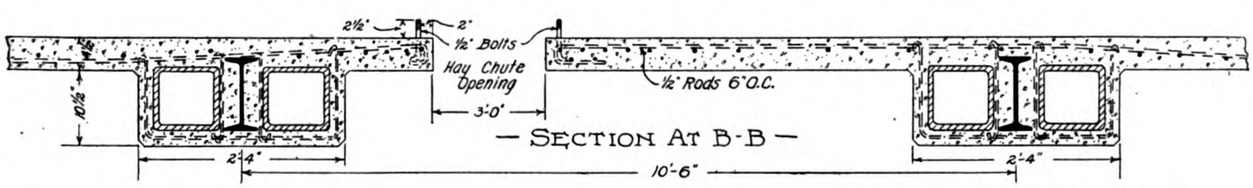




their extra cost. The barn illustrated is stucco coated, with reinforced concrete floors. The roof is covered with Johns-Manville asbestos shingles. Three vents on the roof carry off the foul air taken from the floor level by flues. Fresh air is taken from outside and discharged from registers in the ceiling. Sash are of steel, thus carrying out the idea of fireproof construction. The barn has room for 50 cows.

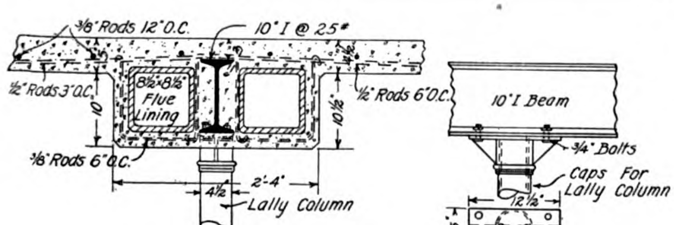
Details of reinforced concrete stairs. Scale ¼ in. = 1 ft. Section of concrete post is 1 in. = 1 ft.




Plan of steel members. Scale 1/16 in. = 1 ft. Scale of sections below ½ in. = 1 ft.




— SECTION AT B-B —




— SECTION AT A-A —

As an exceptionally complete set of details are presented in connection with this article, there is no necessity for a detailed description. A study of the drawings will show the reinforcement for the stairs, floors and other details of the building, thus enabling the contractor to obtain a good idea of the construction necessary in a building of this type.

The barn is located in Reading, Pa., and was erected in accordance with plans and specifications prepared by the James Mfg. Co., Fort Atkinson, Wis., for D. W. Dietrich.

# Legal Department

## Should Architect be Paid Extra if Revised Drawings are Necessary?

The case of an architect who sued for preparing revised drawings, for acting as an arbitrator, for a commission on the value of old material used in a new building and for a compensation for a delay in the construction of a building, was recently appealed to the Supreme Court of Pennsylvania, which is the highest court in that state.

Suit had been instituted by the architect for services rendered, and although a judgment had been rendered in his favor for $1,858.88 he appealed.

It appeared that on September 3, 1919, the architect had written to a bank which contemplated the construction of a new building, as follows:

"I propose and agree to furnish the plans, specifications and detail drawings necessary to erect your building, including supervision of the work, preparing of contracts, and the usual and customary services of an architect for a commission of 5 per cent upon the cost of the work, exclusive of the interior equipment of the vaults and furniture, rugs and draperies."

The bank accepted the architect's proposition and made an agreement with a contractor for the erection of a new bank building for $59,000. Various changes were made from time to time until the cost amounted to $114,880.87. The architect was paid 5 per cent on the total cost of the building and thereafter instituted suit on the various claims set out above.

The court decided that he was not entitled to recover on these claims, because where an architect agrees to furnish all the necessary plans and specifications for a building not only the plans already prepared are contemplated, but also any and all plans which may be called for, and where he receives a commission on the total cost of a building after a change of plans has greatly increased its cost he is not entitled to recover for his services in preparing revised drawings for changes in plans required by the owner.

As to the architect's claim for compensation as an arbitrator, the court decided that where an architect in consideration of a percentage of the total cost of a building agrees to prepare contracts and perform the usual and customary services of an architect, he is not entitled to extra compensation for services as an arbitrator in case of a dispute between contractor and owner where the usual clause appears in the contract that disputes are to be referred to him, and that his decision is to be final.

The court decided that his claim for a commission on the value of materials of an old building given to the contractor for use in the new building must likewise be disallowed, as an architect who undertakes to prepare plans and specifications for a percentage of the cost of the work is not entitled to a commission on the value of materials where he knows old building materials are to be so used and he specifically permits such use with his approval.

The architect's claim for damages for delay was also denied on the theory that an architect is not entitled to extra compensation because there is a delay in the construction of a building when his contract fixes no time within which his services are to be completed.

**Are you in need of any information as to building law? If you are, just put your problem up to our legal adviser, George F. Kaiser, LL.B., and you will be answered without charge.**

**Address Legal Department, Building Age, 243 West 39th Street, New York City.**

## When Can Owners Take Over Work?

A Connecticut decision was recently rendered in a case where the construction contract provided that if the contractors failed to diligently prosecute the work, the owners could furnish labor and materials required to complete the work at the contractor's cost. Provision was made that the architect should certify to such lack of diligence before the owners could terminate the contract and take over all tools, materials and equipment. In this case the architect simply certified that there was a failure to prosecute the work diligently, without certifying that such failure was a sufficient ground for terminating the contract.

The contractors brought suit against the owners to recover the reasonable value of services rendered, which they alleged the owner had improperly refused to allow them to perform, and also to recover for the value of tools and appliances seized and appropriated by the owner. The court allowed the contractors judgment for $4,927.02.

## Are Property Owners Liable for Services of Men Employed by Committee or by Architect?

The liability of property owners or prospective builders for services of persons employed by committees, architects, or other persons who are acting for them is always an interesting proposition to the trade.

There have been numerous cases decided in the courts where the law governing the authority of persons within the above classification has been laid down.

In one case where the building committee of a church which had authority to have plans prepared for a new church building which was to cost not more than a stated amount went ahead and had plans prepared for a more expensive church, it was decided that the church could not be held liable for the architect's compensation. Of course, the architect was allowed a personal action against the members of the committee for the amounts which he had earned by preparing the plans and specifications which they had ordered.

The right of an architect to bind his principal by a contract for the erection of a building or the performance of work upon it is limited by his agreement with the owner.

Under ordinary circumstances his duties are limited to the direction and supervision of the work which is to be done by the contractor, and to seeing that the plans and specifications are faithfully and honestly followed.

Thus, in one case it was decided that architects employed to superintend the building of a county court house had no authority to bind the county by agreeing with a sub-contractor to continue the work after the principal contractor had become insolvent and had gone into bankruptcy. The architect's agreement that the sub-contractor should be paid directly by the county was held not to be binding on the county.

It is, of course, well settled law that an architect or other agent performing similar duties has no power to change or modify the contract or to authorize work in excess of that provided for in the contract, unless special authority is given.

Naturally, however, where an owner tells a contractor that everything is up to the architect or is in complete charge the case presents a different aspect, and the contractor may recover against the owner.

Thus, in one case the court held:

"Where contracts, including plans and specifications, involve a great amount of detail, and the merits of claims for alterations and extra work are difficult to determine, and adjust, after the work is done, a provision requiring the contractor to submit itemized statements of the expense of proposed alterations or extra work, and that the orders of the architect thereon shall be in writing, is reasonable and tends to a more definite understanding and avoids controversies.

"The contractor is not required to make changes or perform extra work unless he first receives written authority therefore, and the contract is therefore neither unreasonable nor severe, and it should be enforced.

An agent cannot enlarge his own powers by waving the limitations thereon . . . A building contract which makes an architect an agent of the owner, and limits his authority in regard to alterations and extra work, as in this case, is entirely different from a contract providing that the contractor shall not be paid for alterations or extra work unless the same are ordered in writing by the owner.

"A party to a building or other contract can waive a promise inserted therein for his benefit."

Superintendents are another class of persons whose authority to bind the owner for whom they are engaged in the work is limited by the authortiy specifically delegated to them in their agreement with the principal.

Civil engineers, independent contractors or even contractors who act as the agent of others who are likewise limited to do only what they have been authorized to do, and the burden is upon parties dealing with any of them to ascertain the scope of their authority as agent before accepting their orders or doing work ordered by them if they wish to make sure of a cause of action against the principal in the event of non-payment.

### Is Material Man Favored Over Contractor by Lien Law?

**From C. P. A., Rochester, N. Y.**—Is there any New York State rule as to giving a contractor who furnishes materials a preference over one who furnishes labor, or labor and materials, or vice versa?

**Answer**—In the case of Jackson vs. Egan decided in New York some time ago, the court held that by a mistake in framing the mechanics' lien law in New York the lien law provided that the material man had a preference over other material men who had also supplied labor, even though the latters' liens were first to be filed.

The mistake was corrected by Chapter 507 of the laws of 1916, and in the case of Siberman vs. Simon, 58 L. J. 357, October 30, 1917, it was decided that the case of Jackson vs. Egan was no longer effective.

# Uncertainty in the Material Field Being Gradually Removed

## *Improvement in Conditions—Optimism Now Prevailing*

During the past month lumber dealers and members of the building fraternity dropped a word from their vocabulary and added one. The word dropped was "if," while the one added was "do." Good progress is reported from the "Own Your Own Home" campaigns in Illinois and other states and it is now beginning to bear fruit. The lumber dealer in the sections where this is happening is wearing a broad smile. However, dealers and builders in sections of the country where the dose "didn't take" need not become downhearted, for, after the Victory Loan has been floated, the "building air" will clear and they will get their share of business.

Perhaps the most interesting phase of the material market during the past month has been the efforts of the Government to stabilize prices of building material.

At this conference the whole situation was canvassed very thoroughly and all of the details brought out. The lumber manufacturers submitted to the board the fact that they were not in a position to make any offer, but felt that the board should be the aggressor and make suggestions as to what they thought the lumber industry should do. This the board refused to do, saying that they were not a committee with any mandatory powers, but were there to help the industry in any way they might in order to stabilize prices, with the thought and hope of stimulating a revival of business.

They cited the fact that the steel industry had met them and voluntarily reduced its prices in order to help bring this about, and declared they felt the lumber industry should follow the steps of the steel industry and make some reductions in its present prices for the same reason. The lumber manufacturers pointed out that the steel industry was in a different position than themselves; that steel prices had soared to a very high figure during the war period and had already begun to decline before the hearing of the industrial board; also that that industry was in a position to reduce its prices because of the conditions which surrounded its business, and without materially affecting its investment or a reasonable profit. They also pointed out that there were so few of them they could unite through a national association or general agreement, which would bind the whole industry.

On the other hand, the lumbermen contended there were something like 35,000 manufacturers of lumber in the United States, only a small proportion of whom are in any association at all; and that there was no association which could speak for the lumber industry as a whole.

As a result of the conference held between the Government and the lumbermen, the matter is still in abeyance. However, it is the opinion of members of the lumber trade that no reduction in the price of lumber will be made.

As a matter of fact, if a $2 reduction in the price of lumber is agreed on and, basing our figures on the fact that 20,000 feet of lumber go into a $5,000 house, this will mean a mere saving of $40. Not much to wait for an entire year.

To get away from lumber for a moment, the price of Portland cement has been stabilized at $3.25 wholesale, having been reduced from $3.85. This stabilized price is guaranteed by the cement manufacturers until the end of 1919. The price of lime has also been stabilized for several months to come. The price of steel has been cut and the price of lumber is as low as it is going to be for the next few years.

During the past few weeks the responsibility for the lack of building activity has been shifted from the shoulders of the building material manufacturers and dealers to the investor and prospective builder. In short, the prospective builder has by this time been brought to realize that lower prices for the next few months in building materials are almost an impossibility, and that the logical time to build is NOW. In other parts of the country recent price drops have been met by the prospective builder with the statement that "Now, we've got them on the run; we'll wait some more for further drops." But the far-seeing builder is not concerning himself so much with how low the prices drop as to how long they will stay low.

What, then, is holding building back? Labor? There is now a surplus, and after a slight readjustment, the building trades will have more than they will be able to handle.

Finance and loans, one builder has said, is the crux of the situation. The only answer to this is that after the floating of the Victory Loan money will be freer and this question will in a way be solved.—ARTHUR C. SMALBACH.

# THE EDITOR'S PAGE

## What Will Replace Saloons in Meeting Public Needs?

The advent of Prohibition strongly emphasizes one of the great public needs of to-day—adequate toilet facilities, or comfort stations, as they are generally called.

What will replace the saloon, that Mecca which has often been sought under the spur of necessity? Surely some accommodations must replace it. Male citizens, both of large cities and small towns, have relied upon it, often buying a beer for no other reason than to make use of the facilities that the saloon affords.

Office buildings will in many instances be called upon to make good the lack. Yet managers of such buildings are showing an increasing tendency to restrict to tenants the use of facilities of buildings under their charge.

Citizens of small towns will have to depend on railway stations, where the key is frequently in charge of an agent who only hands it out to those possessing a ticket. Small towns are notoriously slack in providing accommodations for strangers.

Comfort stations should at least be one to the square mile in larger cities, while in small towns one should be placed at the intersection of the main streets; this is the minimum. Such comfort stations need not be unsightly, but may be made architecturally attractive. They may be placed underground, being lighted from above by sidewalk lights. If a proper ventilating system is installed and the stations kept clean, this type will prove satisfactory.

London has made good provision for her citizens, her comfort stations being mostly underground. Clean and well kept, they afford marked contrast to the many places here, which are malodorous and unsanitary in the extreme.

In many European cities the back of a store is utilized, the front being rented as shops, thus bringing in a profit to the town.

Much of a town's prosperity is gained from travelers, either resident or transient. Their importance in the local scheme is more than sufficient to warrant attention being paid to their comfort.

Comfort stations, although designed primarily for the convenience of citizens and therefore necessarily being free, may yet have pay closets for those who desire additional sanitary conveniences, on the scheme followed in the terminals of many railroads. Such revenue will go far toward meeting the expenses of upkeep and attendants to keep the place in proper condition.

Now that the need for comfort stations will be emphasized more than ever before, it behooves municipalities to devote some attention to this matter. Builders and architects can do much to secure better facilities for their town by bringing the matter before the local authorities. The need is there; the cause is worth helping. Will you do your part?

### *VICTORY!*

**Now is the time to clean up the war. The last of the great loans is before us. One final effort is required.**

**Instead of black uncertainty, we have the vision of prosperity beckoning us on. And we can buy, *buy, BUY* with a lightness of heart that we have not felt before.**

**Victory! A victory that came sooner, far sooner than any of us expected. And worth paying for, too.**

**The gratitude in our hearts can be shown by the way in which we dig down into our pockets. It is up to us to buy all we can. It is the last time, thank God, and I for one will do it cheerfully.**

**How about you?**

*THE EDITOR*

## Develop the Business That Other Builders Don't Think Of

A little grocer in a southern town of 600 thought that although he was apparently getting all the business in sight, yet some more might possibly be developed. So he got busy.

Like all country grocers, he carried a stock of glass jars, used by the farmers' wives to do up preserves. He sold some 100 dozen jars each year.

As is the custom in most country localities, plenty of fruit was raised—and allowed to rot where it had fallen on the ground. So Mr. Grocer decided that it was up to him to induce the local people to put up this fruit, incidentally giving him an opportunity to sell more jars. Consequently he had signs put up pointing out the money saved by putting up the fruit, the pleasure of having it on the table at all seasons, and so on.

Did his idea work? It did, sufficiently for him to order a carload of jars that season and a carload and a half the next.

Now the point is this: The business was there, waiting for someone with ideas to grab it. The grocer grabbed it. That's all.

There are plenty of like opportunities in small towns, just waiting for the man with ideas. Bringing old homes up to date, adding porches, building garages, turning vacant lots into income bringers —why not be like the little southern grocer?

# Building Activity in the United States

The feeling of uncertainty is gradually being dispelled. With labor steadily becoming more abundant, builders who were holding aloof more because of the labor situation than because of high prices, are going ahead. That the expected boom is under way is borne out by the fact that contracts let during March were greater than any year since 1911, except 1917, when urgent Government requirements made the record abnormal.

Government encouragement, the "Own Your Own Home" movement, high rents, war wage savings of the thrifty, and needs of expanding business, constitute factors which are pushing construction. The crisis is past. From now on the building trades and material manufacturers should gradually enter upon an era of prosperity that may even surpass the hopes of the most optimistic.

The latest reports, received direct from city building departments, show a gain of 35 per cent in permits granted for March, 1919, compared with March, 1918, the totals for 175 cities being $56,997,854 for March this year as against $42,044,451 last year. That the prosperity is widespread is shown by the fact that 124 cities report gains, as against 51 reporting losses.

Eastern cities report a gain of 41 per cent, 43 out of 65 cities showing increases; middle states cities report 27 per cent gain, 34 out of 47 showing increases; southern cities 34 per cent gain, 31 out of 40 cities showing increases; and western cities report 24 per cent gain, 16 out of 23 cities showing increases. This favorable condition shows widespread activity in all sections of the country.

CITIES IN EASTERN STATES

| | March, 1919 New Work Permits | March, 1919 New Work Value | March, 1919 Repairs Permits | March, 1919 Repairs Value | March, 1918 New Work Permits | March, 1918 New Work Value | March, 1918 Repairs Permits | March, 1918 Repairs Value |
|---|---|---|---|---|---|---|---|---|
| •Albany, N. Y. | 22 | $102,400 | 193 | $57,690 | 14 | $53,400 | 141 | $38,565 |
| Allentown, Pa. | 32 | 123,800 | 20 | 23,950 | 18 | 152,650 | 7 | 1,635 |
| •Altoona, Pa. | 37 | 67,513 | 62 | 21,984 | 3 | 13,700 | 31 | 8,629 |
| •Atlantic City, N. J. | 9 | 40,130 | 107 | 60,722 | 11 | 11,575 | 80 | 44,897 |
| Auburn, N. Y. | 12 | 2,410 | ... | ... | 18 | 18,160 | ... | ... |
| Binghamton, N. Y. | 80 | 56,072 | 135 | 40,685 | 56 | 24,485 | 94 | 23,351 |
| Boston, Mass. | 78 | 1,306,860 | 410 | 470,274 | 35 | 367,800 | 234 | 233,836 |
| •Brockton, Mass. | 18 | 22,435 | 27 | 23,419 | 3 | 2,875 | 12 | 4,890 |
| •Buffalo, N. Y. | 248 | 802,600 | 115 | 159,400 | 286 | 524,000 | ... | ... |
| Camden, N. J. | 70 | 58,624 | ... | ... | 49 | 362,922 | ... | ... |
| Easton, Pa. | 11 | 13,407 | 20 | 9,710 | 4 | 20,000 | 15 | 6,030 |
| •Erie, Pa. | 109 | 196,368 | 71 | 51,203 | 64 | 91,106 | 50 | 64,338 |
| •Fitchburg, Mass. | 10 | 16,950 | 15 | 6,270 | 9 | 13,780 | 3 | 2,500 |
| Harrisburg, Pa. | 39 | 186,910 | ... | ... | 31 | 513,605 | ... | ... |
| •Hartford, Conn. | 253 | 2,549,335 | ... | ... | 72 | 136,677 | ... | ... |
| •Hoboken, N. J. | 5 | 35,000 | 15 | 10,590 | 3 | 41,337 | 6 | 1,790 |
| •Holyoke, Mass. | 19 | 119,210 | 10 | 4,425 | 2 | 5,250 | 5 | 3,415 |
| Jersey City, N. J. | 19 | 71,798 | 48 | 41,250 | 12 | 331,990 | 38 | 50,514 |
| •Lancaster, Pa. | 12 | 15,225 | 27 | 16,185 | 5 | 8,290 | 19 | 18,810 |
| •Lawrence, Mass. | 26 | 164,000 | 9 | 8,250 | 10 | 23,650 | 7 | 22,725 |
| Lowell, Mass. | 92 | 89,120 | ... | ... | 41 | 431,370 | ... | ... |
| •Manchester, N. H. | 27 | 23,150 | 62 | 88,204 | 15 | 11,880 | 30 | 7,045 |
| •Mt. Vernon, N. Y. | 24 | 126,700 | 21 | 16,448 | 14 | 53,210 | 13 | 9,100 |
| Newark, N. J. | 219 | 595,070 | ... | ... | 167 | 799,731 | ... | ... |
| •New Bedford, Mass. | 77 | 222,850 | ... | ... | 18 | 39,350 | ... | ... |
| New Britain, Conn. | 28 | 37,725 | 17 | 9,035 | 20 | 59,700 | 19 | 12,725 |
| •New Haven, Conn. | 79 | 312,483 | 69 | 55,915 | 29 | 27,995 | 48 | 30,650 |
| New York: | | | | | | | | |
| •Manhattan | 24 | 2,222,450 | 296 | 1,866,210 | 17 | 545,700 | 273 | 828,270 |
| Bronx | 50 | 353,350 | 207 | 85,625 | 32 | 687,150 | 154 | 78,120 |
| •Brooklyn | 358 | 2,571,580 | 499 | 422,936 | 97 | 1,310,480 | 651 | 447,612 |
| •Queens | 1011 | 2,551,715 | ... | ... | 367 | 1,330,220 | ... | ... |
| •Richmond | 122 | 177,526 | 55 | 26,437 | 53 | 124,696 | 38 | 47,240 |
| Niagara Falls, N. Y. | 48 | 85,898 | ... | ... | 32 | 92,347 | ... | ... |
| Nutley, N. J. | 8 | 5,355 | 4 | 551 | 6 | 8,825 | 2 | 25 |
| •Bayonne, N. J. | 25 | 53,450 | ... | ... | 12 | 28,450 | ... | ... |
| •Cambridge, Mass. | 74 | 63,847 | ... | ... | 49 | 15,865 | ... | ... |
| •Chelsea, Mass. | 7 | 23,300 | ... | ... | ... | ... | ... | ... |
| •Passaic, N. J. | 15 | 26,300 | 8 | 9,750 | 12 | 16,675 | 12 | 1,500 |
| •Paterson, N. J. | 45 | 194,582 | 83 | 69,545 | 25 | 64,023 | 55 | 26,602 |
| •Philadelphia, Pa. | 619 | 1,130,785 | ... | ... | 997 | 2,662,290 | ... | ... |
| Pittsburgh, Pa. | 243 | 705,910 | 163 | 276,805 | 291 | 1,024,021 | 149 | 190,575 |
| Portland, Me. | 15 | 13,980 | 25 | 18,310 | 7 | 45,080 | 14 | 71,100 |
| •Quincy, Mass. | 91 | 132,155 | ... | ... | 56 | 70,470 | ... | ... |
| •Reading, Pa. | 58 | 120,750 | 228 | 65,025 | 29 | 14,600 | 142 | 19,100 |
| •Rochester, N. Y. | 162 | 275,335 | 115 | 84,707 | 57 | 95,615 | 56 | 81,585 |
| •Schenectady, N. Y. | 56 | 44,855 | 30 | 11,205 | 24 | 47,465 | 19 | 7,090 |
| •Scranton, Pa. | 51 | 41,250 | ... | ... | 16 | 14,775 | ... | ... |
| Springfield, Mass. | 118 | 139,917 | ... | ... | 87 | 221,679 | ... | ... |
| Stamford, Conn. | 31 | 21,941 | ... | ... | 38 | 30,843 | ... | ... |
| •Syracuse, N. Y. | 91 | 79,205 | 110 | 67,710 | 51 | 88,250 | 69 | 34,620 |
| •Trenton, N. J. | 84 | 153,100 | ... | ... | 46 | 115,039 | ... | ... |
| Utica, N. Y. | 31 | 85,900 | 19 | 15,400 | 24 | 100,655 | 11 | 13,475 |
| East Orange, N. J. | 66 | 125,174 | ... | ... | 46 | 226,655 | ... | ... |
| •Elizabeth, N. J. | 45 | 207,635 | ... | ... | 19 | 181,833 | ... | ... |
| •Wilkes Barre, Pa. | 68 | 62,536 | ... | ... | 78 | 46,880 | ... | ... |
| •Worcester, Mass. | 124 | 160,693 | 79 | 86,216 | 41 | 30,411 | 50 | 29,930 |
| York, Pa. | 15 | 14,305 | 47 | 6,854 | 17 | 54,460 | 35 | 9,885 |
| •Fall River, Mass. | 39 | 39,757 | ... | ... | 24 | 18,405 | ... | ... |
| •Haverhill, Mass. | 16 | 34,250 | ... | ... | 3 | 1,800 | ... | ... |
| Malden, Mass. | 40 | 10,346 | ... | ... | 25 | 71,980 | ... | ... |
| •Medford, Mass. | 41 | 118,105 | ... | ... | 21 | 29,560 | ... | ... |
| Salem, Mass. | 25 | 7,055 | ... | ... | 16 | 8,722 | ... | ... |
| •Somerville, Mass. | 29 | 22,125 | ... | ... | 13 | 11,100 | ... | ... |
| •Woonsocket, R. I. | 15 | 8,300 | ... | ... | 3 | 3,350 | ... | ... |
| Yonkers, N. Y. | 26 | 97,100 | ... | ... | 21 | 113,300 | ... | ... |
| | 5641 | $19,539,962 | 3421 | 4,288,895 | 3761 | $13,694,157 | 2582 | 2,472,174 |

CITIES IN WESTERN STATES

| | March, 1919 New Work Permits | March, 1919 New Work Value | March, 1919 Repairs Permits | March, 1919 Repairs Value | March, 1918 New Work Permits | March, 1918 New Work Value | March, 1918 Repairs Permits | March, 1918 Repairs Value |
|---|---|---|---|---|---|---|---|---|
| •Berkeley, Cal. | 21 | $60,958 | 72 | $16,783 | 11 | $44,300 | 38 | $17,800 |
| •Phoenix, Ariz. | 45 | 86,159 | 30 | 16,330 | 39 | 93,730 | 5 | 975 |
| •Colorado Spgs., Col. | 11 | 15,042 | 18 | 5,112 | 8 | 8,030 | 9 | 3,150 |
| •Denver, Col. | 147 | 360,750 | 104 | 73,750 | 140 | 93,000 | 115 | 79,650 |
| Eureka, Cal. | 3 | 600 | 3 | 1,400 | 1 | 3,000 | 4 | 1,750 |
| Fresno, Cal. | 68 | 182,057 | 60 | 26,700 | 65 | 425,510 | 64 | 31,198 |
| •Long Beach, Cal. | 323 | 613,469 | ... | ... | 185 | 264,330 | ... | ... |
| •Los Angeles, Cal. | 510 | 947,591 | 351 | 174,824 | 307 | 669,038 | 245 | 147,911 |
| •Oakland, Cal. | 206 | 433,891 | 98 | 60,816 | 178 | 335,148 | 73 | 26,858 |
| •Pasadena, Cal. | 95 | 93,606 | ... | ... | 66 | 34,383 | ... | ... |
| •Portland, Ore. | 517 | 506,325 | 354 | 179,284 | 278 | 270,490 | 186 | 74,085 |
| •Salt Lake City. | 103 | 245,100 | ... | 22,668 | 74 | 112,525 | ... | 37,250 |
| •Sacramento, Cal. | 103 | 133,650 | ... | ... | 61 | 87,659 | ... | ... |
| San Diego, Cal. | 46 | 58,260 | 48 | 15,435 | 56 | 141,850 | 63 | 30,442 |
| •San Francisco, Cal. | 87 | 662,400 | 312 | 246,431 | 57 | 622,697 | 323 | 135,119 |
| •San Jose, Cal. | 33 | 42,176 | ... | ... | 31 | 38,995 | ... | ... |
| Seattle, Wash. | 1087 | 705,780 | ... | ... | 954 | 931,155 | ... | ... |
| Stockton, Cal. | 71 | 97,695 | ... | ... | 50 | 120,910 | ... | ... |
| Spokane, Wash. | 64 | 29,440 | 60 | 15,808 | 63 | 36,312 | 50 | 26,350 |
| Tacoma, Wash. | 157 | 153,366 | 195 | 78,040 | 116 | 192,649 | 76 | 44,481 |
| •Pueblo, Col. | 72 | 57,955 | ... | ... | 36 | 18,806 | ... | ... |
| •Tucson, Ariz. | 22 | 42,000 | 16 | 10,260 | 14 | 25,000 | 8 | 16,050 |
| •Boise, Idaho. | 18 | 25,200 | 41 | 17,937 | ... | ... | 35 | 12,240 |
| | 3809 | $5,553,470 | 1762 | $961,578 | 2788 | $4,575,517 | 1294 | $685,309 |

CITIES IN SOUTHERN STATES

| | March, 1919 New Work Permits | March, 1919 New Work Value | March, 1919 Repairs Permits | March, 1919 Repairs Value | March, 1918 New Work Permits | March, 1918 New Work Value | March, 1918 Repairs Permits | March, 1918 Repairs Value |
|---|---|---|---|---|---|---|---|---|
| •Atlanta, Ga. | 80 | $619,575 | 228 | $130,715 | 61 | $425,333 | 181 | $109,913 |
| •Baltimore, Md. | 365 | 647,761 | 749 | 188,920 | 118 | 202,249 | 459 | 91,800 |
| •Charleston, S. C. | 38 | 87,385 | 15 | 16,435 | 19 | 32,625 | 13 | 3,155 |
| •Charlotte, N. C. | 17 | 67,390 | 6 | 2,450 | 26 | 85,345 | 2 | ... |
| •Chattanooga, Tenn. | .. | ... | 231 | 107,130 | ... | ... | 181 | 35,625 |
| Columbia, S. C. | 9 | 13,750 | 80 | 18,350 | 13 | 31,394 | 53 | 10,285 |
| •Corpus Christi, Tex. | 16 | 30,330 | ... | ... | 11 | 3,325 | ... | ... |
| •Lexington, Ky. | 88 | 139,005 | ... | ... | 48 | 136,913 | ... | ... |
| •Dallas, Texas | 105 | 346,275 | ... | ... | 61 | 161,995 | ... | ... |
| •El Paso, Texas | 122 | 126,454 | ... | ... | 101 | 76,759 | ... | ... |
| •Fort Worth, Texas. | 110 | 1,489,576 | 65 | 79,097 | 26 | 131,025 | 17 | 149,866 |
| •Galveston, Texas. | 41 | 14,854 | 596 | 21,365 | 33 | 9,753 | 166 | 5,936 |
| •Jacksonville, Fla. | 25 | 58,265 | 36 | 116,495 | 8 | 107,830 | 18 | 21,832 |
| •Houston, Texas | 108 | 255,973 | 155 | 32,443 | 84 | 156,315 | 124 | 19,817 |
| •Huntington, W. Va. | 68 | 94,280 | ... | ... | 37 | 64,832 | ... | ... |
| Louisville, Ky. | 33 | 79,525 | 171 | 143,675 | 32 | 199,416 | 135 | 55,564 |
| •Memphis, Tenn. | 194 | 202,575 | ... | ... | 68 | 130,292 | ... | ... |
| •Miami, Fla. | 52 | 79,700 | ... | ... | 44 | 53,250 | ... | ... |
| •Augusta, Ga. | 163 | 61,440 | ... | ... | 80 | 17,366 | ... | ... |
| Knoxville, Tenn. | 14 | 49,612 | 85 | 29,648 | 24 | 276,700 | 66 | 29,225 |
| Macon, Ga. | 39 | 45,020 | 46 | 7,216 | 52 | 122,810 | 35 | 9,575 |
| •Montgomery, Ala. | 12 | 13,790 | 144 | 20,848 | 6 | 3,359 | 101 | 12,600 |
| •Muskogee, Okla. | 19 | 51,460 | ... | ... | 4 | 43,000 | ... | ... |
| •Portsmouth, Va. | 33 | 123,900 | ... | ... | 11 | 41,130 | ... | ... |
| •Nashville, Tenn. | 12 | 172,000 | 158 | 36,924 | 9 | 24,850 | 103 | 54,238 |
| New Orleans, La. | 27 | 116,000 | 29 | 23,798 | 37 | 440,962 | 23 | 17,846 |
| •Norfolk, Va. | 85 | 733,491 | 20 | 69,100 | 62 | 358,990 | 17 | 284,015 |
| Oklahoma City, Okla. | 108 | 448,410 | ... | ... | 105 | 892,330 | ... | ... |
| •Pensacola, Fla. | 5 | 7,350 | 123 | 16,455 | 15 | 6,220 | 141 | 1,109 |
| •Richmond, Va. | 47 | 560,552 | 64 | 85,654 | 35 | 167,170 | 45 | 34,180 |
| San Antonio, Tex. | 340 | 276,275 | ... | ... | 291 | 471,000 | ... | ... |
| •Savannah, Ga. | 29 | 45,725 | 7 | 5,400 | 20 | 24,425 | 9 | 2,815 |
| •Shreveport, La. | 47 | 115,848 | 55 | 41,039 | 21 | 51,045 | 42 | 10,194 |
| •Tampa, Fla. | 27 | 51,220 | 58 | 21,205 | 14 | 21,175 | 61 | 8,733 |
| •Washington, D. C. | 136 | 697,035 | 251 | 132,550 | 127 | 591,100 | 254 | 194,765 |
| Wheeling, W. Va. | 1 | 4,000 | 44 | 15,898 | 7 | 45,600 | 61 | 26,115 |
| •Wilmington, Del. | 140 | 221,848 | ... | ... | 80 | 135,625 | ... | ... |
| Birmingham, Ala. | 94 | 139,245 | 256 | 50,520 | 83 | 393,450 | 235 | 41,848 |
| •Covington, Ky. | .. | 13,900 | ... | 3,950 | ... | 19,475 | ... | 2,150 |
| •Ft. Smith, Ark. | 19 | 42,295 | ... | ... | 11 | 3,713 | ... | ... |
| | 2868 | $8,343,089 | 3672 | $1,417,279 | 2184 | $6,033,387 | 2542 | $1,233,201 |

CITIES IN MIDDLE STATES

| | March, 1919 New Work Permits | March, 1919 New Work Value | March, 1919 Repairs Permits | March, 1919 Repairs Value | March, 1918 New Work Permits | March, 1918 New Work Value | March, 1918 Repairs Permits | March, 1918 Repairs Value |
|---|---|---|---|---|---|---|---|---|
| Bay City, Mich. | 10 | $9,550 | 26 | $5,450 | 28 | $19,375 | ... | ... |
| •Canton, Ohio | 195 | 515,753 | ... | ... | 123 | 270,575 | ... | ... |
| •Cedar Rapids, Iowa | 20 | 73,000 | 15 | 11,000 | 10 | 74,000 | 9 | 7,000 |
| Chicago, Ill. | 197 | 1,758,150 | ... | ... | 93 | 2,376,000 | ... | ... |
| •Cincinnati, Ohio | 121 | 164,610 | 261 | 135,720 | 108 | 165,800 | 335 | 125,550 |
| •Cleveland, Ohio | 249 | 2,158,500 | 835 | 297,950 | 171 | 2,296,000 | 845 | 413,055 |
| Columbus, Ohio | 184 | 212,130 | 111 | 69,540 | 148 | 325,240 | 88 | 53,570 |
| Davenport, Iowa | 115 | 97,857 | ... | ... | 94 | 611,241 | ... | ... |
| Decatur, Ill. | 36 | 107,525 | 17 | 15,600 | 32 | 41,000 | 13 | 6,000 |
| Des Moines, Iowa | 104 | 301,950 | ... | ... | 78 | 174,170 | ... | ... |
| •Detroit, Mich. | 1042 | 3,230,700 | ... | ... | 517 | 1,101,155 | ... | ... |
| Duluth, Minn. | 127 | 97,708 | ... | ... | 113 | 266,342 | ... | ... |
| •East St. Louis, Ill. | 10 | 317,000 | 32 | 27,070 | 37 | 119,429 | ... | ... |
| •Ft. Wayne, Ind. | 29 | 54,815 | 23 | 96,312 | 22 | 50,675 | 16 | 11,250 |
| Bloomington, Ill. | 11 | 60,900 | 6 | 45,000 | 45 | 165,000 | ... | 92,000 |
| Fargo, N. D. | 3 | 8,000 | 12 | 15,000 | 6 | 16,000 | 17 | 17,000 |
| •Grand Rapids, Mich. | 130 | 164,343 | ... | ... | 73 | 76,530 | ... | ... |
| •Hamilton, Ohio | 10 | 37,381 | 11 | 4,225 | 7 | 11,634 | 16 | 6,100 |
| •Indianapolis, Ind. | 313 | 390,004 | 293 | 139,310 | 226 | 237,005 | 236 | 97,664 |
| •Jackson, Mich. | 67 | 48,833 | ... | ... | 40 | 9,530 | ... | ... |
| •Joplin, Mo. | 16 | 102,610 | 7 | 5,525 | 19 | 15,300 | 16 | 7,535 |
| Joliet, Ill. | 7 | 22,500 | ... | ... | 8 | 71,500 | ... | ... |
| •Kalamazoo, Mich. | 11 | 21,600 | 5 | 7,160 | 3 | 4,950 | 3 | 1,435 |
| Kansas City, Kan. | 17 | 19,000 | 27 | 18,695 | 32 | 121,125 | ... | ... |
| •Kansas City, Mo. | 342 | 505,330 | ... | ... | 163 | 228,970 | ... | ... |
| •Lansing, Mich. | 52 | 113,530 | 9 | 2,960 | 7 | 2,875 | 5 | 2,400 |
| •Lincoln, Neb. | 76 | 93,552 | ... | ... | 37 | 58,995 | ... | ... |
| •Milwaukee, Wis. | 362 | 1,138,108 | ... | ... | 188 | 445,911 | ... | ... |
| •Minneapolis, Minn. | 423 | 627,130 | ... | ... | 436 | 588,995 | ... | ... |
| •Peoria, Ill. | 31 | 88,960 | 12 | 21,050 | 13 | 12,600 | 4 | 7,000 |
| •Richmond, Ind. | 8 | 5,225 | 11 | 9,410 | ... | ... | 10 | 3,500 |
| St. Louis, Mo. | 265 | 196,018 | 417 | 250,300 | 271 | 372,611 | 371 | 183,525 |
| •Sioux City, Iowa | 62 | 225,900 | ... | ... | 39 | 149,650 | ... | ... |
| Terre Haute, Ind. | 57 | 34,107 | 41 | 19,630 | 50 | 72,000 | 31 | 33,025 |
| •South Bend, Ind. | 94 | 97,140 | ... | ... | 59 | 29,467 | ... | ... |
| Springfield, Ill. | 18 | 30,235 | 42 | 30,245 | 21 | 40,375 | 35 | 24,905 |
| •Springfield, Mo. | 13 | 35,200 | 33 | 16,575 | 13 | 7,225 | 24 | 12,500 |
| •Toledo, Ohio | 269 | 408,721 | ... | ... | 156 | 155,539 | ... | ... |
| •Topeka, Kan. | 18 | 18,935 | 9 | 6,765 | 23 | 16,895 | 12 | 11,175 |
| •Youngstown, Ohio. | 156 | 295,135 | 31 | 76,100 | 155 | 346,785 | 24 | 16,600 |
| •Zanesville, Ohio | 25 | 9,175 | 20 | 6,380 | 20 | 3,000 | 15 | 2,856 |
| •Dubuque, Iowa | 23 | 126,359 | ... | ... | 12 | 13,300 | ... | ... |
| •Omaha, Neb. | 145 | 385,642 | ... | ... | 55 | 263,340 | ... | ... |
| •Saginaw, Mich. | 64 | 50,680 | ... | ... | 12 | 28,965 | ... | ... |
| Springfield, Ohio | 60 | 62,280 | ... | ... | 56 | 65,280 | ... | ... |
| St. Joseph, Mo. | 50 | 28,385 | ... | ... | 40 | 224,962 | ... | ... |
| •Superior, Wis. | 74 | 100,799 | ... | ... | 68 | 71,525 | ... | ... |
| | 5711 | $14,650,965 | 2306 | $1,332,972 | 3927 | $11,818,841 | 2125 | $1,125,645 |

# New Publications

**Architectural Styles for Country Houses.** Edited by Henry W. Saylor. When a builder or architect is selling a house that he has built on speculation, it is a help to him to be able to bring out the characteristics of the design. With a Colonial house, for instance, he can point out the simplicity so characteristic of the design, the traditional treatment of windows, the staircase with its twist, and the other slight romantic features that undoubtedly appeal to the sentiment of the woman buyer. Again, the domestic appeal of the English design, or the Spanish mission, or the other styles which have left their imprint on American architecture can be well brought out in selling the house.

The various styles are described by writers prominent in their respective fields of design, such as Aymar Embuy II for the Dutch colonial, R. Clipston Sturgis for the Tudor, Allen W. Jackson for the English half-timber, etc. Illustrations of numerous country houses illustrate the salient features of the respective styles.

This book is a new and enlarged edition of a book first published in 1912. It contains 113 pages, size 7½ x 10 in., is illustrated, bound in cloth, published by Robert M. McBride & Co., and sells for $2.50.

**Course in Wood Turning.** By Archie S. Milton and Otto K. Wohlers. This book explains the kinds of wood turning tools, together with their proper use. The manner of using the tools is clearly described by the aid of numerous halftone plates showing just how the tools are held in actual work. The book contains numerous problems, all fully dimensioned; describes the proper care of the lathe, tools, etc.

The book is intended for use in schools, being the outgrowth of problems given to high school pupils by the writers, its arrangement making it also valuable for reference.

The book has 339 pages, size 9 x 6 in., is illustrated, bound in cloth, published by the Bruce Publishing Company, and sells for $1.50.

**Credits and Collections.** This book, although intended primarily for bankers, gives some worth while points which the lumber dealer can make use of in keeping track of the credit standing of builders and prospective clients. It describes routine plans for recording and filing credit data, simplifying credit duties, etc.

Another way in which this book will prove of value is by showing the seeker of credit the attitude of bankers. Understanding the banker's viewpoint, he can better "sell" his desirability when it becomes necessary to request a loan.

The book has 267 pages, size 5½ x 8¼, is illustrated by forms, is bound in cloth, published by the A. W. Shaw Company, and sells for $3.

**Accounting as an Aid to Business Profits.** By Wm. R. Basset. Waste is much more likely to be realized when reduced to cold figures. And such waste to-day must be eliminated in order to meet the higher costs of operation.

One of the greatest aids to business is the keeping track of accounts, of where money comes from and where it goes. When transactions are reduced to figures a comparison is possible and the actual conditions of the business can be more easily understood.

The book under review aims to show how that information may be obtained, easily and clearly. It is not a treatise on accounting but an explanation of accounting and cost accounting for the business man in order that he may use his records to earn greater profits. It is written for the man who wants to know how best to manage his business and to put it on a sound financial footing.

The book starts at the very beginning and explains the subject in a popular and clear style, being more readable than most books on this subject. It aims to to present the subject in such a manner that the reader will be able to decide just what records are needed, to keep them properly, and to use these records to eliminate waste and point to betterments. Of special interest to builders are the chapters on Keeping a Record of the Cost of Materials, How to Figure the Cost of Labor, How to Determine the Overhead Expense, Effective Purchasing Methods and Records, etc.

The book contains 316 pages, size 6½ x 9½ in., is fully indexed, illustrated by forms, bound in cloth, published by the A. W. Shaw Company, and sells for $5.

**Greenwood's Approved Business and Income Tax Record.** The recent experience of many builders with the income tax has shown the need of some simple record which would keep track of all money collected and spent. It is especially desirable that the system should require no knowledge of bookkeeping or accounting, being as simple as possible.

The book under review is a simple system which can readily be used by any builder, as it needs no special knowledge. It provides a place for the recording of everything bought, of everything sold, of all cash received and all cash paid out. It also shows bank deposits, etc. Bookkeeping terms are not used, so that there may be no misunderstanding of terminology. The book is intended to last 52 weeks.

This record is 11 x 17 in. in size, is bound in green cloth, published by the Greenwood Co., and manufactured to sell for $5. Our book department has made arrangements, however, to furnish this record to subscribers for $3.

# New Goods of Interest

## A New Bench Saw

The Wallace Bench Saw, illustrated in Fig. 1, is a bench tool, portable and designed to operate on the electric lighting circuit, yet it has power to take a full two in. cut through the hardest of wood, making it possible to use this machine for 80 per cent, if not all, of the work generally done by hand or on the big circular saw in pattern, cabinet, jobbing and contracting carpenter shop or woodworking plant.

To cut at an angle the saw is tilted on the Wallace Bench Saw instead of cocking up a heavy table. This makes it possible to cut long stock without fear of breaking the angle by the stock coming in contact with the floor, as is so often experienced when attempting to cut long stock on a table tilting machine. Other advantages accruing from this saw tilting design are, first: the operator is working on a table which is always in a horizontal position; second: the exact angle of cut is set without difficulty by simply spinning the hand wheel until the angle desired is registered on the dial in the front of the machine; third: no time is wasted adjusting the machine, for, as is often the experience when attempting to set a table tilting machine, the heavy table drops a few

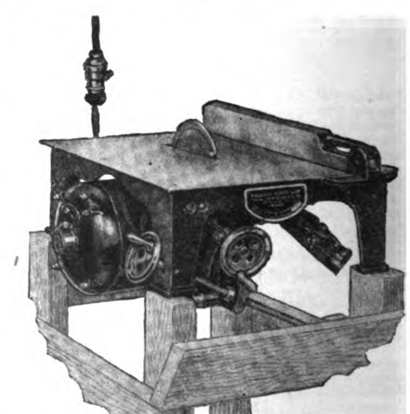


Fig. 1—The Wallace bench saw

degrees before the screw is tightened, making it necessary to do the work over again or if the drop goes unnoticed the cut is taken and the stock either spoiled or the job must be done over.

This tilting mechanism is controlled by a hand wheel mounted on a perfectly cut screw acting on a swiveled nut. This swings the cradle in which the motor, driving mechanism and saw are mounted. While it is very easy to make this adjustment, the screw holds the cradle rigidly.

The saw can be raised and lowered so as to cut or groove the stock any depth up to two in. The raising and lowering mechanism is similar to the tilting mechanism and is controlled by a hand wheel in the front of the machine.

A ½ h.p. General Electric Motor supplies ample power. The Cross Cut Fence is built into the machine but can be thrown under the table when not in use. It is, however, never off of the machine and lost.

The Rip Fence is finished on both sides so that it can be used on either side of the saw. This fence is of the box type and is clamped to both sides of the table by means of a handle conveniently located. This handle works on an eccentric and locks by going over the center of the eccentric.

The Wallace Shutter Saw Guard is built into the machine, and for that reason is always on guard. This guard slips back as the stock goes through and is so designed that it never interferes with the efficient operation of the Bench Saw.

## Casement Window Hardware

"Air-Way" Multifold Casement Window Hardware, illustrated in Fig. 2, is made by the Richard-Wilcox Co., Aurora, Ill., for installation in sun parlors, sleeping porches and other window openings where it is desired to secure a maximum of light and ventilation, and on occasion to close tightly against storm and cold.

Fig. 2 shows the interior of a sun parlor and shows sash on the front side wide

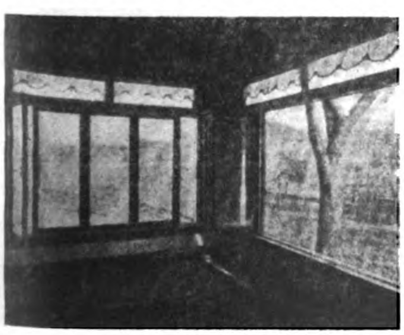


Fig. 2—Interior of a sun parlor in which "AIR-WAY" hardware is used

Fig. 3—Sash links used in "Air-Way" hardware

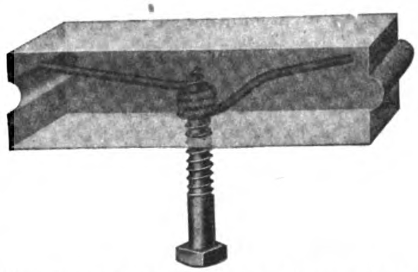


Fig. 4—The Craig reinforced screw bore, used in concrete work

open, leaving the window opening clear of obstruction, as the sliding mullion moves to the end of the opening and stands against the folded window sash. The grooved track in the window sill is visible in this picture. This grooved track is installed above as well as below the sash and is so constructed that neither

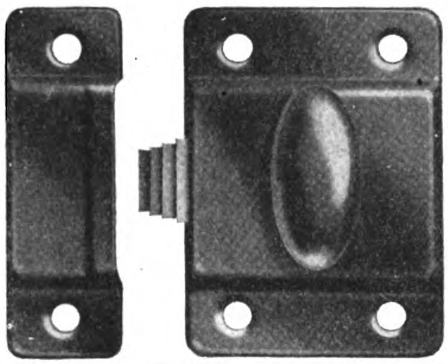


Fig. 5—Moss-Ochs cupboard latch

wind nor capillary attraction can force rain through the window.

The window on the end of the sun parlor (at the extreme left in Fig. 2) stands open at an angle of about 90 deg. The "Air-Way" sash links, which connect at the top and bottom of each sash in the

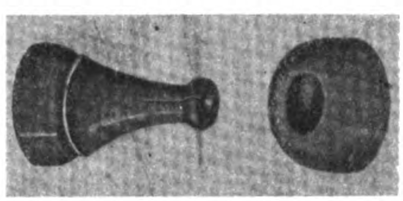


Fig. 6—The Berthold door check

string with the one adjacent are visible at the opening between this open sash and the adjacent closed sash.

Each sash is opened by grasping the bow handle and pulling, the back sash or the one hinged to the frame being pulled first and then each succeeding sash until all the sash in the string stand side by side at the end of the window opening. If only a slight opening is desired, this may be had at either end of the string of sash. Beginning with this small opening, any desired quantity of ventilation may be secured by opening additional sash. The position of one sash does not determine that of adjacent sash, as one sash may stand wide open and the next one partly closed or in any other desired combination of positions.

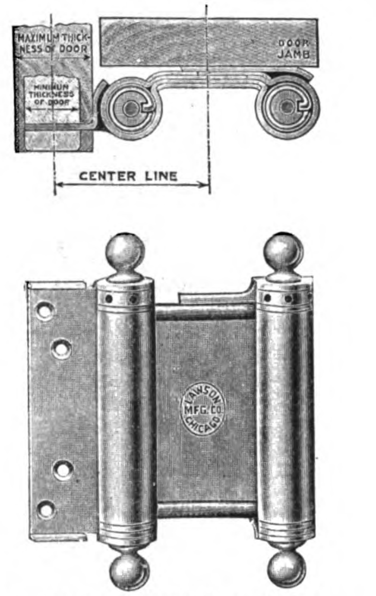



Fig. 7—Lawson "Nu" jamb hinge

The windows operate easily and positively and are stated to be foolproof. The fact that the windows open inside of the building permits their being easily cleaned. "Air-Way" hardware is applied with equal advantage to any number of windows the builder may want to place in a row and is manufactured in stock sizes for windows having panes of various widths in suitable styles of finish.

The hardware consists of patented sash links, as shown in Fig. 3; connects sash at top and bottom; metal tracks for top and bottom guides; butts for sash adjacent to fixed jamb; a combination fastener and handle; brass chafing plates; rubber stops; and safety locks for each sash. For high windows it is desirable to use two fasteners for each sash. In that case the bow handle may be used near the bottom and the finger grip type near the top.

## Window Catch That Fastens Even When Window Warps

A new cupboard catch and turn and window and transom ctach has just been placed on the market by the Moss-Ochs Company of Cleveland, Ohio. The plunger of each, as shown in Fig. 5, is made with steps instead of being straight. The object of this is that generally the door and window on which the catch is placed warps, but with this step-like plunger the catch is claimed to be always sure to fasten.

With this latch, if the door or window does not warp, the plunger will catch in the first step. Should the door warp a little, the plunger will catch in the second step and so on, allowing the door to warp almost a half inch and at the same time, assuring that the catch will fasten.

## Lag Screw for Use with Concrete

All contractors in building lines have occasionally a need of fastening some parts of their work to concrete work, and with a view to simplifying their labor, David Craig, 70 Broad Street, Boston, Mass., has invented and patented a device known as the Craig Reinforced Screw Bore, shown in Fig. 4. In one a lag screw of a special type, threaded to suit the wire, is shown with the wire reinforcing end attached and ready to be embedded in a wall where it will be fastened by applying the concrete, or to be embedded in a slab where, after the concrete or cement has hardened, the lag screw can be withdrawn and the opening left for attaching hinges for heavy sheet metal doors, the braces for cornices, the hangers for carrying a pipe line or for fastening the slab of a water closet stall. These devices are particularly adapted for use in the erection of buildings made of concrete slab.

### New Type of Jamb Hinge

A jamb hinge arranged so as to avoid the use of a hanging strip, as shown in Fig. 7, has just been placed upon the market by the Lawson Mfg. Co. Chicago, Ill. The use of a hanging strip is avoided by forming the barrel or barrels on the edges of the center and on one face, which leaves sufficient space between the barrels and the jamb to avoid frictional engagement, whether the hinge is a single or double-acting type. The jamb leaf of the hinge is applied direct to the jamb without any mortising, and the door leaf is mortised into the door. This method of application therefore saves the price of a hanging strip. The company claims that a hinge applied direct to the jamb has a more solid support than one applied to a hanging strip. The hinge body is formed from a plate to produce the barrels and center or web so that the edges or ends of the plate will meet diagonally from top to bottom. This center is then made rigid by means of rivets, causing the strain to be distributed throughout the body on both of the center leaves instead of centrally on one leaf, which would be the case if the meeting edges were in the center from top to bottom, or if they merely overlapped each other. An exterior reinforcing or stiffening plate is provided, having extending edges bracing against the barrels and turned over top and bottom flanges, thus producing a very rigid body piece between the barrels. These hinges are furnished in all the standard hardware finishes, and special finishes are made on request. This new style is called "Nu" Jamb spring hinges.

### Wooden Door Check

A type of door check placed upon the market by C. Berthold, Richmond Hill, New York, is shown in Fig. 6. This check is made of wood, the part of the check fastened to the wall being grooved so that it contracts when forced into the socket, expanding when in. Where a wood stop finished to match the doors is desirable, this check will prove advantageous.

## New Catalogs of Interest to the Trade

29. **Alpha Aids No. 15.** Alpha Portland Cement Co., Easton, Pa.—This issue describes the Ingersoll thousand dollar concrete house, giving floor plans. There is a good article on houses to cover spring, together with details of construction. An article, "Building a Concrete Garage," contains blue prints and building material for concrete work of one and two-car garages, also illustrations of various types of small garages.

30. **The Post Everlasting.** Long Bell Lumber Co., Kansas City, Mo.—Illustrated booklet describing fence posts made of yellow pine, pointing out advantages of this wood for the purpose. Numerous illustrations showing farms where these fence posts are used.

31. **The Story of Kellastone.** National Kellastone Co., 1317 Mallers Building, Chicago, Ill.—Illustrated booklet describing construction with Kellastone stucco. Colored plates showing finishes obtainable by using colored aggregates. Numerous residences on which Kellastone has been used.

32. **Fli-Bac Screen.** Fli-Bac Screen Corp., Rochester, N. Y.—Folder describing these screens, which can be rolled up automatically to any desired height. Describes construction necessary.

33. **The Ja-Nar.** The Fulton Co., Knoxville, Tenn.—Booklet describing the operation of this device which automatically regulates room temperature. Colored plates show actual appearance when installed. Describes economies effected.

34. **Wood Bottom and Iron Planes.** Sargent & Co., 53 Water Street, New Haven, Conn.—Booklet describing various types of planes, accompanied by sizes and prices.

35. **Porch Profits.** Gilbert & Bennett Mfg. Co., Department C, New York City. —Folder containing blue prints of plan for screening porch, showing moldings and installation necessary.

36. **Van Guilder Double Wall Concrete Silos.** Van Guilder Double Wall Co., Inc., the Wagner Building, Rochester, N. Y.—Leaflet giving labor and materials required for figuring double wall silo 12 ft. in diameter by 25 ft. high.

37. **Knives.** The L. & I. J. White Co., 100 Perry Street, Buffalo, N. Y.—Booklet illustrating and describing various types of woodworking knives, cooperage knives, shear blades, etc.

38. **Morton's Copper and Steel Sash Chains.** Thomas Morton, 245 Center Street, New York City.—Booklet illustrating and describing types of sash chains manufactured by this company, also various styles of pulleys and special chains. Prices are given.

39. **Building Specialties.** F. D. Kees Mfg. Co., Beatrice, Neb.—Booklet illustrating and describing application of metal building corners for different kinds of siding, siding clips, batten strips, hip shingles, pipe hangers, etc.

40. **C. H. & E. Bulletin 3.** C. H. & E. Mfg. Co., 330 Mineral Street, Milwaukee, Wis.—Bulletin No. 2 describing hoists, elevators, water mixers, engines, etc. Bulletin No. 3 describes power pumps.

41. **Paints and Varnishes.** Wadsworth-Howland & Co., Inc., Boston, Mass.—Catalog No. 73. Booklet describing various kinds of paints and varnishes manufactured by this company, putty knives, scraping knives, paper hangers knives, etc.

42. **Standardized Concrete.** Koehring Machine Co., Milwaukee, Wis.—Booklet describing proper methods for obtaining uniform mixes of concrete.

43. **Winthrop Thatched Asphalt Shingles.** Beckman-Dawson Roofing Co., 1400 Association Building, Chicago, Ill.—Folder giving specifications of these asphalt shingles.

44. **Masterpieces of Doorcraft.** Morgan Sash & Door Co., Dept. 84, Chicago, Ill.—Booklet illustrating homes in which Morgan doors have been installed, the doors being illustrated in colors.

45. **Specifications for Stucco Work.** National Kellastone Co., 1317 Mallers Building, Chicago, Ill.—Gives standard specifications for applying Kellastone stucco, also manner of application over various bases. Shows how to apply it over old houses.

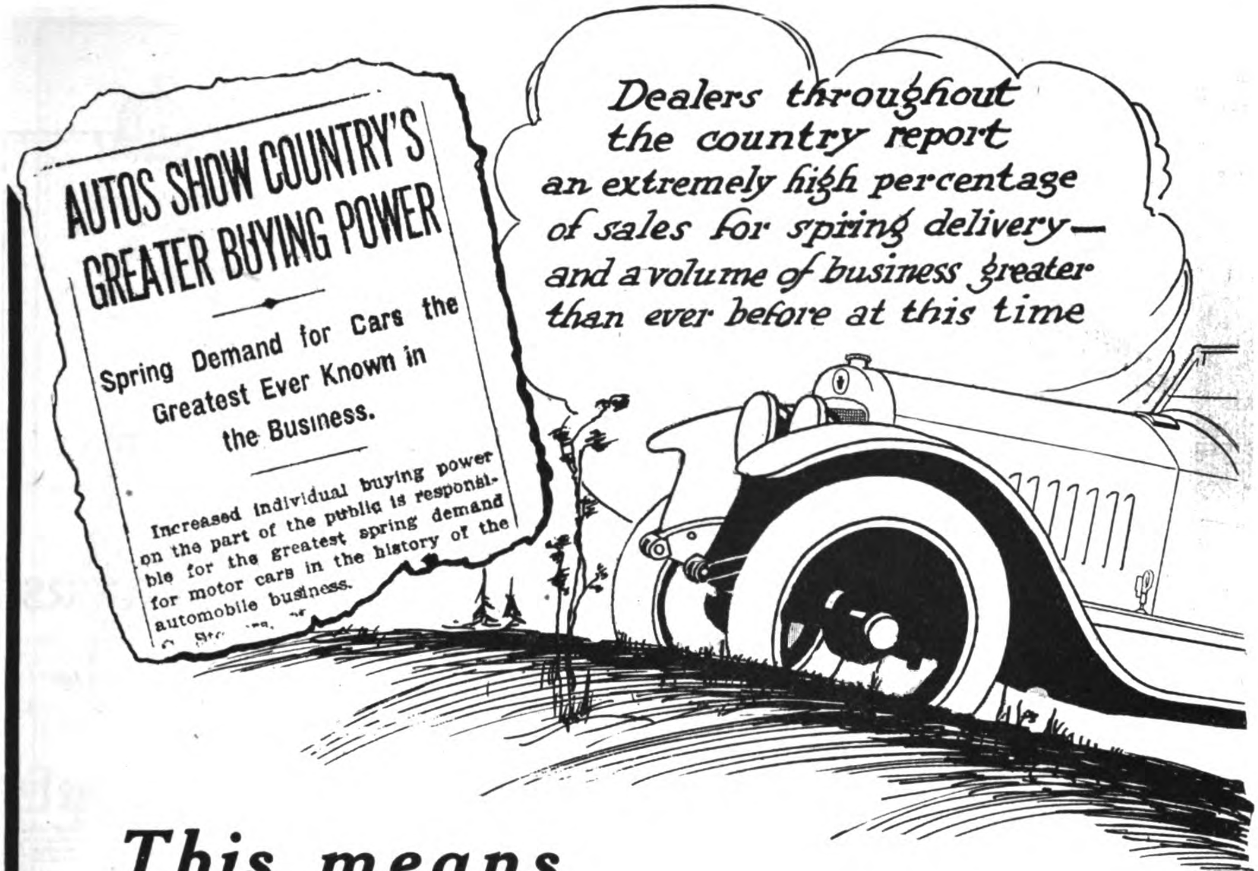
46. **Shingles That Last.** National Sheet Metal Roofing Co., 339-345 Grand Street, Jersey City, N. J.—Booklet illustrating manufacture of the shingles, together with numerous buildings on which they have been used. Shows the various styles manufactured by this company together with special shingles used for hips, etc.

47. **Bay State Waterproofings.** Wadsworth Howland & Co., Inc., Boston, Mass. —Illustrated booklet giving specifications for these water proofings for various purposes.

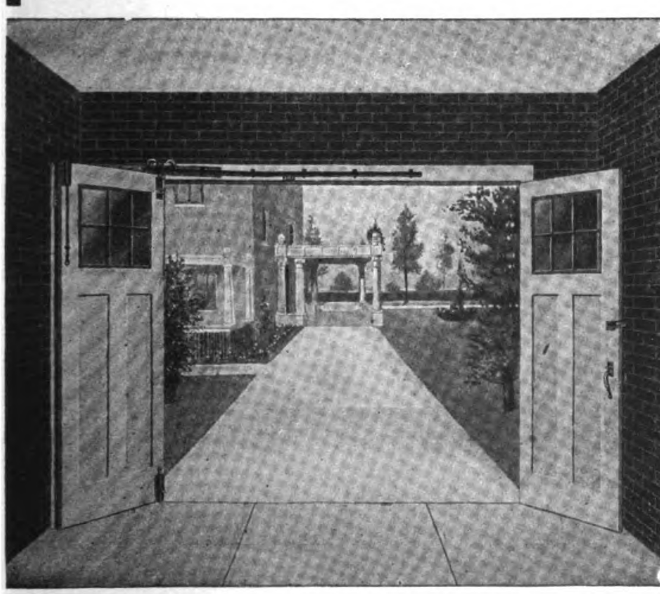
48. **Blue Print Suggestions on Haulage, Loading Stations and Mixer Equipment for Road Work.** Koehring Machine Co., Milwaukee, Wis. — Booklet containing in blue print form methods of doing various kinds of road work where different materials are used.

49. **Rocbond Exterior Stucco.** Van Wert, Wren, Ohio.—Booklet describing this stucco, together with testimonials and pictures of houses on which it has been used.

**If you desire any of these catalogs, write the date of this issue and the number of the catalog on a postal and mail it to Building Age, 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.**




# This means DOLLARS for the Garage Builder



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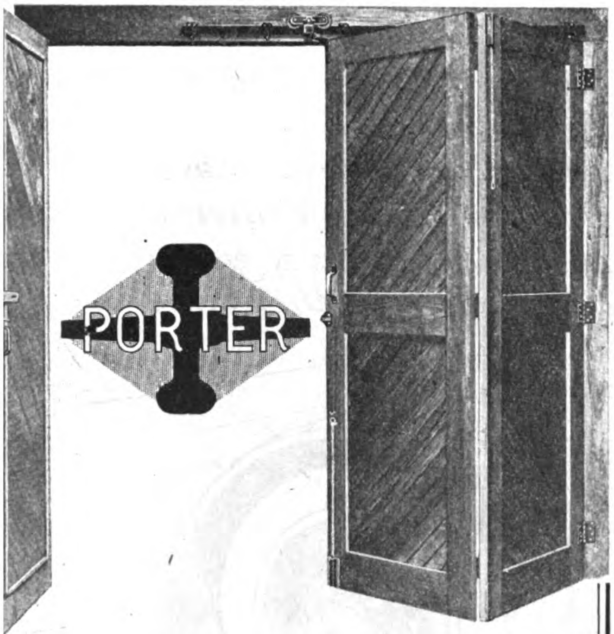


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## No Sag Garage Door Track & Hanger

HERE'S a new device—a J. E. Porter product—handily installed, complete in itself without extra fixtures, absolutely satisfactory in its working, with a half-dozen exclusive advantages, each one solving a problem for every man with a garage on his place.

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### Straight-Away Set Complete

With 6 feet of Porter flat track are supplied all the needed attachments, packed in a carton—the Porter **tandem truck** that can't jump the track and that reduces friction to zero; **chain latches** and hooks for top and bottom; door latch that makes absolute sealing against jamb and all hinges and screws.

Specify the **STRAIGHT-AWAY** and you've named the satisfactory hanger. Write for illustrated information and name of your local dealer.

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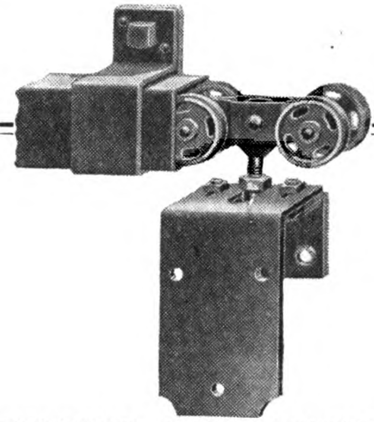

### BUILDING A REPUTATION

When you put up a door hanger be sure it is going to build high reputation and good will for you.

## RICHARDS-WILCOX SLIDING DOOR HANGERS

build good will for you because they please your patrons; they embody sincerity and service.

Wherever you put one set of R-W hangers in a community, other installations invariably follow.

If you build your door hanger reputation on the R-W trade-mark, you are safe.

*Write for catalog No. 16.*

**Richards-Wilcox Manufacturing Co**

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*"A hanger for any door that slides"*

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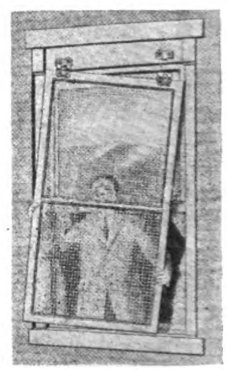

will be appreciated by the owner every time he hangs or removes his screens or storm windows.

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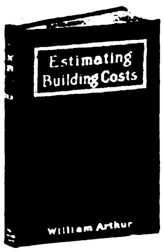
# A List of "Guaranteed" Books on Building

## Money Back If They Are Not Satisfactory

### Arthur's Estimating Building Costs

This book contains unquestionably the biggest dollar's worth of information ever put on the market. The builder who starts contracting does not treat himself squarely if he fails to purchase the experience of many contractors in all lines of building work. It is all well enough and necessary to get experience of our own; but to fail to get that of others, when it may be had at a low price, is unwise.




In modern engineering, architectural, and contracting offices there is not time to teach estimating to young workers. They are supposed to know something about the fundamentals, just as they know that there are 27 cubic feet in a cubic yard. If they do not know they must, at least, be able easily to find the information. The Index of this book is arranged to serve them. Why get "stuck" when an investment of $1 will save you and probably your job? You may not know how much material you actually need to send per cubic yard of concrete at various proportions, but if you can turn to the table that gives the quantities you are not apt to be hindered. It is almost as important in our day to know where to find information as to know it without the book.

Quite frequently people come into a lumber office and ask what amount of material is required for certain parts of a building. The lumberman often knows, but sometimes forgets. This book, Estimating Building Costs, gives quantities for all purposes. If a customer has received the wrong kind of information and has taken home too much material he is displeased, because he has spent more than he needed to, while if he did not get enough material and has to return for more, he feels just as sore about it. Is it worth while to run the risk when a dollar will give certainty?

It should be remembered that this book is based on work actually done, and time taken. Different conditions change the necessary labor time, as excavating in frost compared with the work in summer; but a fair average can always be made out if we know what others have actually done.

This book is arranged to be of great service to builders, contractors, students and instructors. Each chapter has a series of questions for a test of progress. The Key is printed at the end of the book. In technical classes of colleges and Y. M. C. A.'s this feature will be appreciated. For certain requirements Estimating Building Costs is a superior book to even The New Building Estimator. It is written on simpler lines, and is new from title page to the end.

The book begins with the excavation, and ends when the house is finished. The chapters are: Excavations and Piling, 7; Concrete, 18 pages; Brickwork, 24; Stonework, 7; Plastering, 5; Metal, 9; Roofing; Painting, 9; Plumbing and Heating, 7; Miscellaneous includes Hardware, Electric Wiring, Tiling, Bonds, Tables, Rafters, Cisterns, Weights, Comparisons of Cost between Brick and Frame Buildings, 18; and a final chapter entitled, Hints on Drawing, taking up 41 pages.

**218 Pages. 4½ x 7 in. 29 Figs. 91 Tables. Leather $1.50**

### Hicks' Specification Blanks for Frame or Brick Buildings

It pays to have definite specifications covering all details of the work when preparing your estimates. These new blanks are arranged to cover all the work apt to be called for in erecting residences, churches, schools, and other small public buildings in various sections of the country. All the user has to do is insert his sizes, quantities, etc., and cross out what he does not want. Plenty of space is left at the end of each specification for extra data.

The Carpenter's Specifications cover: Framing Lumber; Joist Spacing; Doubling; Bridging; Rough Floors; Sheathing; Roof Sheathing; Shingles; Tin Roof; Slate Roof; Other Roofs; Paper; Siding Outside Finish; Porch Finish; Frames; Windows; Special Glass; Doors; Finish Floors; Interior Finish; Thresholds; Front Stairs; Rear and Attic Stairs; Cellar Stairs; Medicine Cabinet; Pantry; Closets; Mill Work.

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### Hicks' Estimator's Price Book and Pocket Companion

This, as its name indicates, is a guide to prices of all kinds of building materials, together with handy rules, tables and general information for the architect and builder. Almost everything required in the construction of the ordinary building has been considered together with average market prices. The items have been arranged in such a way as to enable the estimator to readily find what is wanted both in regard to size, weight and prices. The work is designed to supplement that section of "Hicks' Builders' Guide" which relates to estimating with a more comprehensive reference to prices and material and labor. Ample spaces have been left throughout the work for the insertion of local prices, memoranda, etc. It may, therefore, be used with equal advantage in any section of the country. The entire matter has been classified according to the nature of the work and it will be found of unusual interest and value to the practical estimator, contractor and builder.

The work is of a size to be readily carried in the pocket, and the 14 pages of cross reference index will be found a most convenient feature for the man in a hurry to find a specific matter.

The chapter on Carpentry gives the number of board feet and cost of framing lumber per square of 100 sq. ft., and many valuable tables, including timber measure, common and hip rafters for roofs of various pitches and with from one to eighteen feet run, the safe bearing loads of timber and yellow pine posts. Reliable data on figuring the strength and weight of materials is also given.

**Contents.**—Introductory; Preparing Estimates; Excavating; Stone Work; Plain Concrete; Reinforced Concrete; Concrete Cement Stone; Cellar Bottoms and Walks; Brick Work; Hollow Building Tile; Masonry Tables; Estimators' Guide; Plastering; Carpentry; Iron Work; Sheet Metal and Roofing; Plumbing; Heating and Ventilation; Electrical Work; Tile Work.

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### Hodgson's Estimating Frame and Brick Houses, Barns, Factories, Stables and Outbuildings

It tells how to estimate, step by step, the cost of labor and materials, from the work of excavation for the foundation to the finishing of the building. It gives a careful analysis of each item of cost in construction, all being demonstrated in progressive order, and by means of figures and rules.

These methods of figuring costs are brought out in the clearest and simplest manner, and may be applied in estimating the cost of constructing any dwelling, stable, barn or outbuilding.

The author has endeavored to make this book so general in its scope that the builder living in any part of the United States will find it of great service in getting the actual cost of the different items in builders' work.

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### Maginnis' How to Measure up Woodwork

This book was written so as to place in handy and concise form reliable directions to enable builders and mechanics to measure up the quantities of woodwork for brick and frame houses accurately and without hesitation.

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BUILDING AGE

NEW YORK, JUNE, 1919

# Good Design in a Colonial Cottage

*Maid's Quarters Entirely Separated from the Rest of the House—Unusual Kitchen Layout*

IN designing small country houses, the general proportion and proper scaling of the various details are the main reasons why a design is attractive. Windows must be scaled so as to be in exact proportion to the rest of the house, not being too wide as is the customary fault. This matter of proper scaling of windows is perhaps the most important detail in the small house, for an effect of spaciousness can be gained by using windows which are of a proper height and width.

**The typical colonial fence adds much to the attractive appearance of this house, as does the graceful sweep of the roof.**

The back of the house is simple in design.

Treatment of dormers is another important feature. These must be carefully proportioned and reflect most of the character of the design.

Much of the beauty of the house illustrated lies in the proper proportioning of these details, details which are so often overlooked. Another feature which contributes much to the success of the design is the curve at the eaves over the front porch. The graceful sweep of the verge boards is in excellent harmony with the roof scheme. The brick chimneys at either end of the main section of the house are spaced so as to effectively balance. The interesting coping lends an interesting touch to the latter features.

To the left of the house is a porch whose roof is pitched well in harmony with that of the main roof. This porch is screened in summer and enclosed in winter. At the right of the house is the garage, economy being gained through such placing of this feature. This part of the house is set back, as is also the entrance to the kitchen.

One enters the house from a terrace into a small hall, at the left of which is the living room. The feature of this room is an attractive fireplace designed in accordance with the colonial feeling that characterizes the house. A closet is placed at the rear.

To the right of the hall is the dining room. This room communicates with the kitchen through a pantry, which is well provided with cupboard space. It also contains a sink.

The kitchen departs from the usual approximate square, being long and narrow. Such an arrangement reduces wasted central space to a minimum, as everything can be reached very handily. The sink is placed under a window so that it receives plenty of light. At the left of the sink is a china closet, so that directly the dishes are dried, they may be placed in this closet without the necessity for extra steps being taken.

The maid's portion of the house is entirely shut off from the main building. The apartment is placed over the garage and part of the kitchen, the stairway leading directly from the kitchen to the second floor. The maid's room is 10 x 10 in dimensions. A private bath is at the left of the stairway. A large closet furnishes ample space.

Stair space is economical. The main flight leads straight up to a second story hall from which open two bedrooms and a bathroom. The main bathroom, as is also the maid's bathroom, is placed over the kitchen so that plumbing economy is obtained.

The master's bedroom is provided with a fireplace and an alcove.

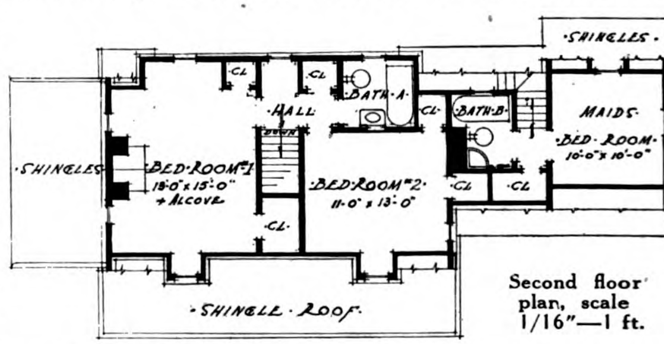
This house was built at Sparkskill, N. Y., for W. H. Fallon in accordance with plans and specifications prepared by Aymar Embury, II, architect, 132 Madison Avenue, New York City.

# Selecting and Finishing Interior Trim

## *Cheaper Woods That Will Give Good Results When Properly Finished*

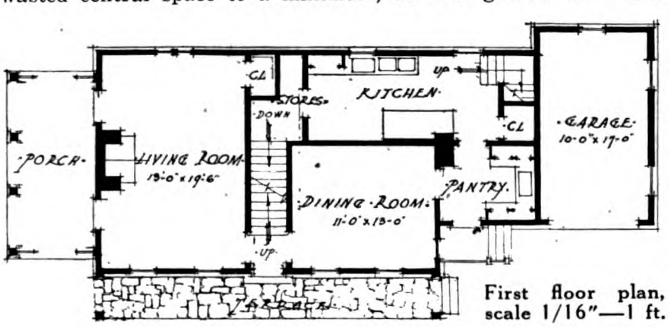
By B. V. LEONARD

Of even more importance than the selection of beautiful woods for interior trim is the knowledge of how to finish them so as to bring out their real beauty in the most effective way. Many Americans do not appreciate the merits and charms of our native woods. They consider the rare imported varieties the only ones befitting the finish of a really elegant building, and deem some kind of hard wood necessary for all but the cheaper class of work. Our own forests, however, abound in woods which are used in fine cabinet work, and which are finished to closely resemble the rarest and most aged of imported varieties. In fact, some of the genuine antiques when taken apart and carefully studied are found to be not of imported mahogany but of a tree indigenous to the locality in which the furniture was made.




Second floor plan, scale 1/16"—1 ft.

Walnut and mahogany practically disappeared from the market during the war on account of the demand for them for gun stocks. This fact should go far toward creating a demand for many of the hitherto unappreciated woods. Americans would do well to follow the examples of foreign countries and patriotically make use of the resources of our own country, thereby saving much of the cost of shipping, and obtaining results equally satisfactory. The utilization of building materials right at hand, besides being based on sound practical reason, seldom fails to secure harmony by making the building a part of its surroundings. Hard woods, long considered a necessity in all but the cheaper and coarser work, need not be used. Pine when stained properly to bring out the beauty of its grain and to subdue or obliterate the strong yellow tones, is frequently substituted for oak in some very high grade work.




First floor plan, scale 1/16"—1 ft.

Elm, ash, butternut and chestnut are frequently used in place of oak and are finished in much the same way when properly stained, varnished and rubbed give very pleasing results. Ash has a tendency to splinter and should be used advisedly. The extremely dark Mission effects are no longer used unless it is to carry out a certain scheme, but the rich nut-brown, weathered and fumed oak shades are very popular and do not form so sharp a contrast with the walls. The delicate silver gray stains are especially pleasing. They are only for use on very carefully selected white oak, or on wood which has been bleached, as is sometimes done with picric acid. Where unusual effects are desired, the wood may be stained, not too dark, given a coat of shellac or first coater, and when dried a flat drying paint in white, light green or other contrasting color may be applied and wiped off across the grain, using the paint as a filler. This finish is effective in the dining room or den, and in the public tea room or billiard hall. It is not as lasting a finish, of course, as three coats of a good quality of varnish, but is a handsome finish and stands all but very hard wear.

The hard woods are, of course, not easily worked, but with careful workmanship, when finished, amply repay in beauty and durability the labor expended upon them. It does not pay to use hard woods of the poorer quality, as they will be found even harder to manipulate and will not compare with the better soft woods for beauty. Birch is most commonly used in imitation of mahogany and in fact many times can scarcely be distinguished from it. It is one of the most satisfactory woods for enameling. Both birch and maple may be finished natural and the more colorless specimens of both may be stained silver gray. The burl wood is especially pleasing for many purposes, but should not be used too freely for woodwork. A whole room in this finish would not be conducive to repose. It is suited better to furniture making.

Pine is a wood which deserves better treatment than it usually receives and a higher place in the scale of decorative woods. It is too frequently left in its natural color and finished with a cheap high-gloss varnish. Its color is not a beautiful one, especially the yellow variety. It seldom tones in well in a scheme of decoration, but a rich brown stain will bring out its beauty of grain and subdue its flamboyant coloring. A good spirit stain which will not require wiping and will not raise the grain will be found most effective. Fir, especially the slash-grain fir, is very beautiful and is quite plentiful in many sections of the country, especially the Northwest. It is to be finished much the same as pine. While these woods and their near kin, spruce and tamarack will take mahogany stain, the effect is not good. The strong, rather bold grain does not in any way resemble mahogany and the effect is at best crude.

While walnut is one of the most prized woods for cabinet making, much of it has been considered too dark for woodwork, especially the purple shades. It is tough and heavy and a moderately open grained wood. It darkens and becomes very rich with age, and takes on a quality suggesting sunshine. A soft rubbed polish is most effective for its finishing. Even the darkest purple kinds of walnut may be used now by bleaching to just the desired shade before finishing. Modern skill and scientific treatment has done much to make more usable many woods which were formerly discarded on account of some serious drawback.

# How to Find the Proper Size Steel Beams for Various Spans

## *Set of Handy Tables Showing at a Glance Steel Beams Required for Given Span*

By GEORGE E. THACKARY, C. E., and W. A. GIESEN, architect

These tables of safe loads for I-beams give the safe loads in pounds, uniformly distributed, for the spans usually encountered, and are based upon an extreme fiber stress of 16,000 lb. per sq. in. This is the stress usually figured, and is that prescribed by the New York City Building Regulations.

The loads given in the tables include the weight of the beam, which should be deducted from the weights given, to obtain the net dead and live load the beam will carry.

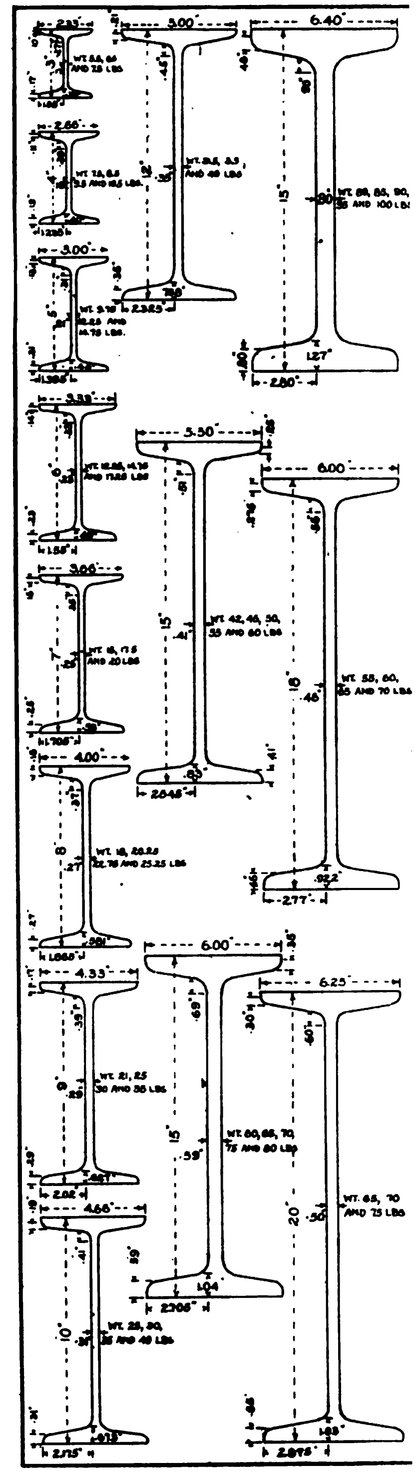
Under the horizontal column of the size of beams will be noted the weights in pounds which they weigh per running foot. For example, a 10-in. beam at 25 lb. per running ft. on a 10-ft. span would weigh 250 lb., which would have to be deducted from 2650 lb., which will give a net dead and live load the beam would carry, uniformly distributed, of 25,800 lb.

The safe loads given in the tables should not be used unless the beams are laterally braced by means of tie rods, or lateral braces, not exceeding 20 times the flange width apart. When beams are not braced laterally they should be calculated as hereinafter described to obtain proper reduction of loads which they will sustain.

For a concentrated load in the center of span use one-half the values given in the tables.

To find the proper size beam to use for a specified condition, let us assume the following example:

Example—A beam on a 10′ 0″ spa laterally braced, is to be uniforml loaded with 22,500 lb. What size bea should be used to sustain the weight Referring to tables, we glance at th figure 10, the span in feet under th heading of "Distance between Supports. Looking horizontally across the sheet, w



Flange Widths of I-Beams of Vario Depths, Useful in Calculating Late Strength, Etc.

## SAFE LOADS IN POUNDS UNIFORMLY

Safe loads are figured for fibre stress of 16,000

| Distance Between Supports in Feet | 3-INCH | | | 4-INCH | | | | 5-INCH | | | 6-INCH | | | 7-INCH | | | 8-INCH | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5.5 Lbs. | 6.5 Lbs. | 7.5 Lbs. | 7.5 Lbs. | 8.5 Lbs. | 9.5 Lbs. | 10.5 Lbs. | 9.75 Lbs. | 12.25 Lbs. | 14.75 Lbs. | 12.25 Lbs. | 14.75 Lbs. | 17.25 Lbs. | 15 Lbs. | 17.5 Lbs. | 20 Lbs. | 18.00 Lbs. | 20.25 Lbs. | 22.75 Lbs. | 25.25 Lbs. |
| 4 | 4,410 | 4,780 | 5,180 | 7,950 | 8,470 | 9,000 | 9,520 | 12,900 | 14,520 | 16,160 | 19,370 | 21,320 | 23,280 | 27,600 | 29,850 | 32,140 | .... | 40,130 | 42,740 | 45,360 |
| 5 | 3,530 | 3,830 | 4,140 | 6,360 | 6,780 | 7,200 | 7,610 | 10,320 | 11,620 | 12,930 | 15,490 | 17,050 | 18,620 | 22,080 | 23,880 | 25,710 | 30,330 | 32,100 | 34,190 | 36,290 |
| 6 | 2,940 | 3,190 | 3,450 | 5,300 | 5,650 | 6,000 | 6,350 | 8,600 | 9,680 | 10,770 | 12,910 | 14,210 | 15,520 | 18,400 | 19,900 | 21,430 | 25,280 | 26,750 | 28,500 | 30,240 |
| 7 | 2,520 | 2,730 | 2,960 | 4,540 | 4,840 | 5,140 | 5,440 | 7,370 | 8,300 | 9,230 | 11,070 | 12,180 | 13,300 | 15,770 | 17,060 | 18,370 | 21,670 | 22,930 | 24,420 | 25,920 |
| 8 | 2,210 | 2,390 | 2,590 | 3,980 | 4,240 | 4,500 | 4,760 | 6,450 | 7,260 | 8,080 | 9,680 | 10,660 | 11,640 | 13,800 | 14,930 | 16,070 | 18,960 | 20,060 | 21,370 | 22,680 |
| 9 | 1,960 | 2,130 | 2,300 | 3,530 | 3,770 | 4,000 | 4,230 | 5,730 | 6,460 | 7,180 | 8,610 | 9,470 | 10,350 | 12,270 | 13,270 | 14,280 | 16,850 | 17,830 | 19,000 | 20,160 |
| 10 | 1,770 | 1,910 | 2,070 | 3,180 | 3,390 | 3,600 | 3,810 | 5,160 | 5,810 | 6,460 | 7,750 | 8,530 | 9,310 | 11,040 | 11,940 | 12,860 | 15,170 | 16,050 | 17,100 | 18,140 |
| 11 | 1,600 | 1,740 | 1,880 | 2,890 | 3,080 | 3,270 | 3,460 | 4,690 | 5,280 | 5,880 | 7,040 | 7,750 | 8,460 | 10,040 | 10,860 | 11,690 | 13,790 | 14,590 | 15,540 | 16,490 |
| 12 | 1,470 | 1,590 | 1,730 | 2,650 | 2,820 | 3,000 | 3,170 | 4,300 | 4,840 | 5,390 | 6,460 | 7,110 | 7,760 | 9,200 | 9,950 | 10,710 | 12,640 | 13,380 | 14,250 | 15,120 |
| 13 | 1,360 | 1,470 | 1,590 | 2,450 | 2,610 | 2,770 | 2,930 | 3,970 | 4,470 | 4,970 | 5,960 | 6,560 | 7,160 | 8,490 | 9,190 | 9,890 | 11,670 | 12,350 | 13,150 | 13,960 |
| 14 | 1,260 | 1,370 | 1,480 | 2,270 | 2,420 | 2,570 | 2,720 | 3,680 | 4,150 | 4,620 | 5,530 | 6,090 | 6,650 | 7,890 | 8,530 | 9,180 | 10,830 | 11,470 | 12,210 | 12,960 |
| 15 | 1,180 | 1,280 | 1,380 | 2,120 | 2,260 | 2,400 | 2,540 | 3,440 | 3,870 | 4,310 | 5,160 | 5,680 | 6,210 | 7,360 | 7,960 | 8,570 | 10,110 | 10,700 | 11,400 | 12,100 |
| 16 | 1,100 | 1,200 | 1,290 | 1,919 | 2,120 | 2,250 | 2,380 | 3,220 | 3,630 | 4,040 | 4,840 | 5,330 | 5,820 | 6,900 | 7,460 | 8,030 | 9,480 | 10,030 | 10,690 | 11,340 |
| 17 | 1,040 | 1,130 | 1,220 | 1,870 | 1,990 | 2,120 | 2,240 | 3,030 | 3,420 | 3,800 | 4,560 | 5,020 | 5,480 | 6,490 | 7,020 | 7,560 | 8,920 | 9,440 | 10,060 | 10,670 |
| 18 | 980 | 1,060 | 1,150 | 1,770 | 1,880 | 2,000 | 2,120 | 2,870 | 3,230 | 3,590 | 4,300 | 4,740 | 5,170 | 6,130 | 6,630 | 7,140 | 8,430 | 8,920 | 9,500 | 10,080 |
| 19 | 930 | 1,010 | 1,090 | 1,670 | 1,780 | 1,890 | 2,000 | 2,720 | 3,060 | 3,400 | 4,080 | 4,490 | 4,900 | 5,810 | 6,280 | 6,770 | 7,980 | 8,450 | 9,000 | 9,550 |
| 20 | 880 | 960 | 1,040 | 1,590 | 1,690 | 1,800 | 1,900 | 2,580 | 2,900 | 3,230 | 3,870 | 4,260 | 4,660 | 5,520 | 5,970 | 6,430 | 7,580 | 8,030 | 8,550 | 9,070 |
| 21 | 840 | 910 | 990 | 1,510 | 1,610 | 1,710 | 1,810 | 2,460 | 2,770 | 3,080 | 3,690 | 4,060 | 4,430 | 5,260 | 5,690 | 6,120 | 7,220 | 7,640 | 8,140 | 8,640 |
| 22 | .... | .... | .... | .... | .... | .... | .... | 2,340 | 2,640 | 2,940 | 3,520 | 3,880 | 4,230 | 5,020 | 5,430 | 5,840 | 6,890 | 7,300 | 7,770 | 8,250 |
| 23 | .... | .... | .... | .... | .... | .... | .... | 2,240 | 2,530 | 2,810 | 3,370 | 3,710 | 4,050 | 4,800 | 5,190 | 5,590 | 6,590 | 6,980 | 7,430 | 7,890 |
| 24 | .... | .... | .... | .... | .... | .... | .... | 2,150 | 2,420 | 2,690 | 3,230 | 3,550 | 3,880 | 4,600 | 4,980 | 5,360 | 6,320 | 6,690 | 7,120 | 7,560 |
| 25 | .... | .... | .... | .... | .... | .... | .... | 2,060 | 2,320 | 2,590 | 3,100 | 3,410 | 3,720 | 4,200 | 4,780 | 5,140 | 6,070 | 6,420 | 6,840 | 7,260 |
| 26 | .... | .... | .... | .... | .... | .... | .... | 1,980 | 2,230 | 2,490 | 2,980 | 3,280 | 3,580 | 4,250 | 4,590 | 4,940 | 5,830 | 6,170 | 6,580 | 6,980 |
| 27 | .... | .... | .... | .... | .... | .... | .... | 1,910 | 2,150 | 2,390 | 2,870 | 3,160 | 3,450 | 4,090 | 4,420 | 4,760 | 5,620 | 5,940 | 6,330 | 6,720 |
| 28 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2,770 | 3,050 | 3,330 | 3,940 | 4,260 | 4,590 | 5,420 | 5,730 | 6,110 | 6,480 |
| 29 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2,670 | 2,940 | 3,210 | 3,810 | 4,120 | 4,430 | 5,230 | 5,530 | 5,900 | 6,260 |
| 30 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 31 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 32 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 33 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 34 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 35 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 36 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |

*Published through courtesy of the Cambria Steel Co.
NOTE.—For safe loads below the heavy lines, deflection will be greater than allowable limit for plastered ceiling, which is 1-360 span.

find the figure 24,150 lb. to be under the heading of a 9" beam weighing 30 lb per ft. Deducting 300 lb. for the weight of beam itself leaves 23,850 lb., which would be the right size beam to use for that condition. Now suppose we wanted to support a wall and require two beams. The original load of 22,500 lb. would be divided in half, 11,250—this being the weight each beam would have to carry. Referring to the table again, we find that a 7" beam at 17.5 lb. will carry 11,940 lb. Deducting 175 lb. from this for the weight of the beam, we find that this beam will carry 11,765 lb., which will do very nicely. And so any similar condition can be easily worked out.

At times it is more economical to use a deeper section of a lighter beam than a heavier section having less depth. For example, referring to tables, we find that for a 10-ft. span a 9" beam weighing 21 lb. per ft. will carry more weight and cost less than an 8" beam weighing 25¼ lb. per ft. Therefore, in that case it is always good judgment to use the deeper section unless the space in which it is to be placed it limited to the use of the shallow section.

The tables of safe loads for I-beams are calculated on the assumption that proper provision is made for preventing lateral deflection by means of tie rods or other braces, as before mentioned. In order to prevent undue strains in the compression flange, considered as a column, the beams should be supported laterally at distances not exceeding twenty times the flange width, this ratio being determined by the following formula, which gives the safe load for solid columns of soft steel:

$$p = \frac{18{,}000}{1 + \dfrac{l^2}{3000\, b^2}}$$

in which

$p$ = allowable stress in lb. per sq. in.
$l$ = length between lateral supports in in.
$b$ = width of flange in in.

Substituting 16,000 for $p$ in the above formula, which is the allowable unit stress of the safe load tables, it is found that the ratio $\frac{l}{b}$ equals19.37, from which it may be seen that the compression flange should be supported laterally at distances not exceeding twenty times the flange width, as stated above.

Beams which are not thus supported laterally should not be loaded to their full transverse capacity. The allowable fiber stresses and proportions of their full loads which they can safely carry when laterally supported at various distances is given in the following table:

TABLE OF FIBRE STRESSES AND PROPORTIONS OF SAFE LOAD

| Ratio of Span or Distance Between Lateral Supports to Flange Width $\frac{l}{b}$ | Allowable Unit Stress for Direct Flexure in Extreme Fibre $p$ | Proportion of Tabular Safe Load to be Used | Ratio of Span or Distance Between Lateral Supports to Flange Width $\frac{l}{b}$ | Allowable Unit Stress for Direct Flexure in Extreme Fibre $p$ | Proportion of Tabular Safe Load to be Used |
|---|---|---|---|---|---|
| 19.37 | 16,000 | 1.00 | 65 | 7474 | 0.47 |
| 20.00 | 15,882 | 0.99 | 70 | 6835 | 0.43 |
| 25.00 | 14,897 | 0.93 | 75 | 6261 | 0.39 |
| 30.00 | 13,846 | 0.87 | 80 | 5745 | 0.36 |
| 35.00 | 12,781 | 0.80 | 85 | 5281 | 0.33 |
| 40.00 | 11,739 | 0.73 | 90 | 4865 | 0.30 |
| 45.00 | 10,746 | 0.67 | 95 | 4491 | 0.28 |
| 50.00 | 9,818 | 0.61 | 100 | 4154 | 0.26 |
| 55.00 | 8,963 | 0.56 | 105 | 3850 | 0.24 |
| 60.00 | 8,182 | 0.51 | 110 | 3576 | 0.22 |

DISTRIBUTED FOR STANDARD I-BEAMS*

pounds per square inch and include weight of beam.

| 9-INCH | | | | 10-INCH | | | | 12-INCH | | | 15-INCH | | | | | 18-INCH | | | | 20-INCH | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 Lbs. | 25 Lbs. | 30 Lbs. | 35 Lbs. | 25 Lbs. | 30 Lbs. | 35 Lbs. | 40 Lbs. | 31.5 Lbs. | 35 Lbs. | 40 Lbs. | 42 Lbs. | 45 Lbs. | 50 Lbs. | 55 Lbs. | 60 Lbs. | 55 Lbs. | 60 Lbs. | 65 Lbs. | 70 Lbs. | 65 Lbs. | 70 Lbs. | 75 Lbs. |
| .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 25,160 | 27,240 | 30,180 | 33,120 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 22,370 | 24,210 | 26,830 | 29,440 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| 20,130 | 21,790 | 24,150 | 26,500 | 26,050 | 28,620 | 31,240 | 33,850 | 38,370 | 40,580 | 43,720 | 62,830 | 64,830 | 68,750 | 72,670 | 76,600 | 94,290 | 99,770 | 104,470 | 109,180 | 12,475 | 130,110 | 135,340 |
| 18,300 | 19,810 | 21,950 | 24,090 | 23,680 | 26,020 | 28,400 | 30,780 | 34,880 | 36,890 | 39,740 | 57,120 | 58,940 | 62,750 | 66,070 | 69,630 | 85,720 | 90,700 | 94,980 | 99,250 | 113,410 | 118,280 | 123,040 |
| 16,770 | 18,160 | 20,120 | 22,080 | 21,710 | 23,850 | 26,030 | 28,210 | 31,970 | 33,820 | 36,430 | 52,360 | 54,030 | 57,290 | 60,560 | 63,830 | 78,570 | 83,140 | 87,060 | 90,980 | 103,960 | 108,480 | 112,780 |
| 15,480 | 16,760 | 18,570 | 20,380 | 20,040 | 22,020 | 24,030 | 26,040 | 29,510 | 31,220 | 33,630 | 48,330 | 49,870 | 52,890 | 55,900 | 58,920 | 72,530 | 76,740 | 80,360 | 83,980 | 95,960 | 100,090 | 104,110 |
| 14,380 | 15,570 | 17,250 | 18,930 | 18,610 | 20,450 | 22,310 | 24,180 | 27,400 | 28,990 | 31,230 | 44,830 | 46,310 | 49,110 | 51,910 | 54,710 | 67,350 | 71,260 | 74,620 | 77,990 | 89,110 | 92,940 | 96,670 |
| 14,420 | 14,530 | 16,100 | 17,670 | 17,360 | 19,080 | 20,830 | 22,570 | 25,580 | 27,050 | 29,140 | 41,880 | 43,220 | 45,840 | 48,450 | 51,060 | 62,860 | 66,510 | 69,650 | 72,790 | 83,170 | 86,740 | 90,230 |
| 12,580 | 13,620 | 15,090 | 16,560 | 16,280 | 17,890 | 19,520 | 21,160 | 23,980 | 25,360 | 27,320 | 39,270 | 40,520 | 42,970 | 45,420 | 47,870 | 58,930 | 62,360 | 65,300 | 68,240 | 77,970 | 81,320 | 84,590 |
| 11,840 | 12,820 | 14,200 | 15,590 | 15,320 | 16,840 | 18,380 | 19,910 | 22,570 | 23,870 | 25,720 | 36,960 | 38,140 | 40,440 | 42,750 | 45,060 | 55,460 | 58,650 | 61,460 | 64,220 | 73,380 | 76,540 | 79,610 |
| 11,180 | 12,110 | 13,410 | 14,720 | 14,470 | 15,900 | 17,350 | 18,810 | 21,310 | 22,540 | 24,290 | 34,900 | 36,020 | 38,200 | 40,370 | 42,550 | 52,380 | 55,430 | 58,040 | 60,660 | 69,310 | 72,280 | 75,190 |
| 10,590 | 11,470 | 12,710 | 13,950 | 13,710 | 15,070 | 16,440 | 17,820 | 20,190 | 21,360 | 23,010 | 33,070 | 34,120 | 36,190 | 38,250 | 40,310 | 49,630 | 52,510 | 54,990 | 57,460 | 65,660 | 68,480 | 71,230 |
| 10,064 | 10,900 | 12,070 | 13,250 | 13,020 | 14,310 | 15,620 | 16,930 | 19,180 | 20,290 | 21,860 | 31,410 | 32,420 | 34,380 | 36,340 | 38,300 | 47,140 | 49,880 | 52,240 | 54,590 | 62,370 | 65,060 | 67,670 |
| 9,590 | 10,380 | 11,500 | 12,620 | 12,400 | 13,630 | 14,880 | 16,120 | 18,270 | 19,320 | 20,820 | 29,920 | 30,870 | 32,740 | 34,610 | 36,470 | 44,900 | 47,510 | 49,750 | 51,990 | 59,400 | 61,960 | 64,450 |
| 9,150 | 9,910 | 10,980 | 12,050 | 11,840 | 13,010 | 14,200 | 15,390 | 17,440 | 18,450 | 19,870 | 28,560 | 29,470 | 31,250 | 33,030 | 34,820 | 42,860 | 45,350 | 47,490 | 49,630 | 56,700 | 59,140 | 61,520 |
| 8,750 | 9,480 | 10,500 | 11,520 | 11,320 | 12,450 | 13,580 | 14,720 | 16,680 | 17,640 | 19,010 | 27,320 | 28,190 | 29,890 | 31,600 | 33,300 | 40,990 | 43,380 | 45,420 | 47,470 | 54,240 | 56,570 | 58,840 |
| 8,390 | 9,080 | 10,060 | 11,040 | 10,850 | 11,930 | 13,020 | 14,110 | 15,990 | 16,910 | 18,220 | 26,180 | 27,010 | 28,650 | 30,280 | 31,910 | 39,290 | 41,570 | 43,530 | 45,490 | 51,980 | 54,210 | 56,390 |
| 8,050 | 8,720 | 9,660 | 10,600 | 10,420 | 11,450 | 12,500 | 13,540 | 15,350 | 16,230 | 17,490 | 25,130 | 25,930 | 27,500 | 29,070 | 30,640 | 37,720 | 39,910 | 41,790 | 43,670 | 49,900 | 52,040 | 54,140 |
| 7,740 | 8,380 | 9,290 | 10,190 | 10,020 | 11,010 | 12,020 | 13,020 | 14,760 | 15,610 | 16,810 | 24,160 | 24,940 | 26,440 | 27,950 | 29,460 | 36,260 | 38,370 | 40,180 | 41,990 | 47,980 | 50,040 | 52,050 |
| 7,460 | 8,070 | 8,940 | 9,810 | 9,650 | 10,600 | 11,570 | 12,540 | 14,210 | 15,030 | 16,190 | 23,270 | 24,010 | 25,460 | 26,920 | 28,370 | 34,920 | 36,950 | 38,690 | 40,440 | 46,200 | 48,190 | 50,130 |
| 7,190 | 7,780 | 8,620 | 9,460 | 9,300 | 10,220 | 11,160 | 12,090 | 13,700 | 14,490 | 15,610 | 22,440 | 23,150 | 24,550 | 25,960 | 27,360 | 33,670 | 35,630 | 37,310 | 38,990 | 44,550 | 46,470 | 48,340 |
| 6,940 | 7,510 | 8,330 | 9,140 | 8,980 | 9,870 | 10,770 | 11,670 | 13,230 | 13,990 | 15,070 | 21,660 | 22,360 | 23,710 | 25,060 | 26,410 | 32,510 | 34,400 | 36,030 | 37,650 | 43,020 | 44,870 | 46,670 |
| 6,710 | 7,260 | 8,050 | 8,830 | 8,680 | 9,540 | 10,410 | 11,280 | 12,790 | 13,530 | 14,570 | 20,910 | 21,610 | 22,920 | 24,220 | 25,530 | 31,430 | 33,260 | 34,820 | 36,390 | 41,580 | 43,370 | 45,110 |
| 6,490 | 7,030 | 7,790 | 8,550 | 8,400 | 9,230 | 10,080 | 10,920 | 12,380 | 13,090 | 14,100 | 20,270 | 20,910 | 22,180 | 23,440 | 24,710 | 30,420 | 32,180 | 33,700 | 35,220 | 40,240 | 41,970 | 43,660 |
| .... | .... | .... | .... | 8,140 | 8,950 | 9,760 | 10,580 | 11,990 | 12,680 | 13,660 | 19,630 | 20,260 | 21,490 | 22,710 | 23,940 | 29,460 | 31,200 | 32,650 | 34,120 | 38,980 | 40,660 | 42,290 |
| .... | .... | .... | .... | 7,890 | 8,670 | 9,470 | 10,260 | 11,630 | 12,300 | 13,500 | 19,040 | 19,650 | 20,830 | 22,020 | 23,210 | 28,870 | 20,230 | 31,660 | 33,080 | 37,800 | 39,430 | 41,010 |
| .... | .... | .... | .... | .... | .... | .... | .... | 11,230 | 11,940 | 12,860 | 18,480 | 19,070 | 20,220 | 21,370 | 22,530 | 27,730 | 29,340 | 30,730 | 32,110 | 36,690 | 38,270 | 39,810 |
| .... | .... | .... | .... | .... | .... | .... | .... | 10,960 | 11,590 | 12,490 | 17,950 | 18,520 | 19,640 | 20,760 | 21,880 | 26,940 | 28,510 | 29,850 | 31,190 | 35,640 | 37,170 | 38,670 |
| .... | .... | .... | .... | .... | .... | .... | .... | 10,660 | 11,270 | 12,140 | 17,450 | 18,010 | 19,100 | 20,190 | 21,280 | 26,190 | 27,710 | 29,020 | 30,330 | 34,650 | 36,140 | 37,590 |

The above table should be used in connection with the tables of safe loads uniformly distributed for I-beams published herewith, and limits the values found therein under the conditions given above.

Example—Required the safe load for a 15" standard I-beam weighing 42 lb. per ft. for a span of 30 ft., without lateral supports:

From the data the ratio $\frac{l}{b}$ equals $\frac{30\times12}{5.5}$ equals 65.

From the above table the proportion of the safe load which the beam can carry safely support under these conditions is .47. From the table of safe loads for I-beams, the safe load for this beam when properly supported laterally is 20,940 lb., which multiplied by .47 gives 9842 lb. as the safe load uniformly distributed under the conditions given, including the weight of the beam, or 8582 lb. superimposed load.

# Box Sills and Siding

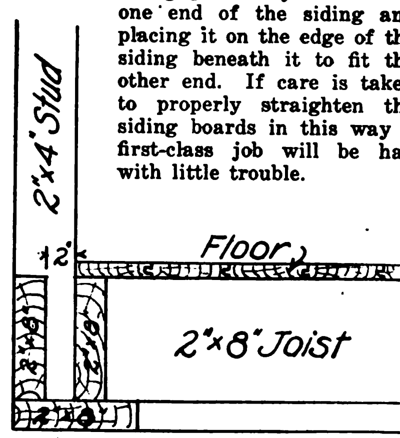
## *Practical Hints on Spacing and Lining Up*

By J. N. SARTAIN

The illustration shows a detail of a box sill for a frame building. It is one which I have used to some extent, and one that is very satisfactory. If properly constructed it will keep out mice and rats. As will be seen from the detail, the floor will have a solid bearing of 2 in. at all points around the building.

There have been quite lengthy articles written on the proper application of shingles, on roof framing, hanging doors, stair work and various other subjects, but I have not seen anything on the subject of the proper application of siding to frame buildings. Hence I want to say a few words on this subject, for to properly set the window frames, and door frames, and side the outside of a building requires more skill and experience than most any other one thing in the construction of a frame building.

Siding should be spaced to show not more than 4½ in. to the weather, and so that it will line with the bottom of the window sills, and the top of window and door heads. The most satisfactory way to get the best results, I find, is to use a rod long enough to reach from the bottom of the sill to the top of the window head. With the dividers, divide the space between the bottom of the sill and the window sill equally, showing not over 4½ in. to the weather. And transfer these spaces to the rod referred to. Then in like manner divide up the space between the bottom of the window sill and the top of same, and transfer these spaces to the rod as before. Use this rod to space all the corner boards and casing against which siding is to be fitted around the entire building. If the building is more than a single story, the additional stories should be treated in the same manner. To avoid nail holes appearing, where gage nails are usually set, discard the gage nail by first fitting one end of the siding and placing it on the edge of the siding beneath it to fit the other end. If care is taken to properly straighten the siding boards in this way a first-class job will be had with little trouble.




Detail of Box Sill

# Fireplaces That Add Beauty to the Home

## *When Combined with Bookcases, They Make Attractive and Convenient Feature*

By CHARLES ALMA BYERS

A crackling fire on the open hearth and a good book to read comprise enjoyments for the winter evening that unquestionably are closely related. Reasoning, perhaps, from such a realization, architects have for a long time, and especially during recent years, been striving to gradually bring about a closer association, structurally, between the fireplace and the bookcase, and with many admirable results. A fireplace with a built-in bookcase at one or both sides has, in fact, become quite common; and now, as a step farther in this direction, comes the attempt to really make the bookcase practically a feature of the fireplace mantel itself. The accompanying photographs illustrate some of the results.

It will also be observed that the idea has been worked out in brick exclusively, which is as it should be. No other material can be used to better advantage to create an attractive fireplace mantel, and this is especially true where the feature must be so massive as is necessitated by combining the bookcase with it. Brick can be so handled as to make the combination as prominent or as inconspicuous as may be desired, and yet the usual artistic structural lines may be maintained. In short, no other building material can be wrought into so many attractive designs, and the possible colors and textures make the brick doubly adaptable for interior work of this kind.

The mantels here shown, which show some truly novel ideas, represent the work of Western architects. They have been designed and built, in most cases, for use in the living room of the comparatively small and inexpensive house, where the plan provides for no library, but where the living room constitutes the chief or only assembling place for the entire family. In a few instances, however, the mantels are used in dens, which is a room of many purposes, serving principally as a cozy reading, writing and study place, where privacy may be enjoyed at all times.

The three mantels first shown (Figs. 1, 2 and 3) are, to a certain extent, similar in general design, and yet there seems sufficient excuse for presenting all of

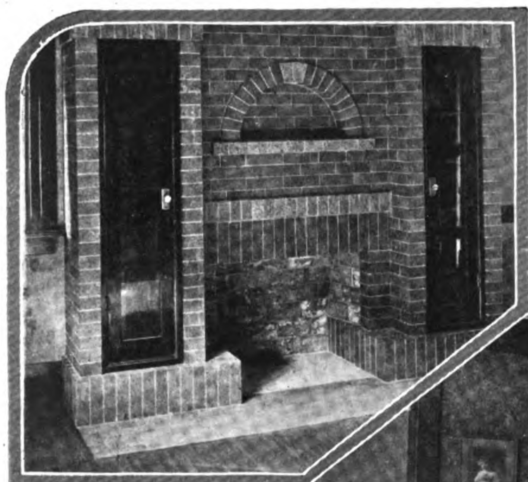


Fig. 1—Tall narrow bookcases create a pillar effect at the side.

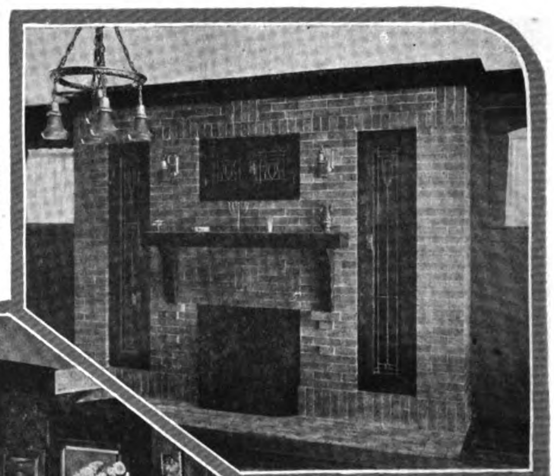


Fig. 2—Another pillar effect, which is well handled through the proportioning of the projecting bookcases.

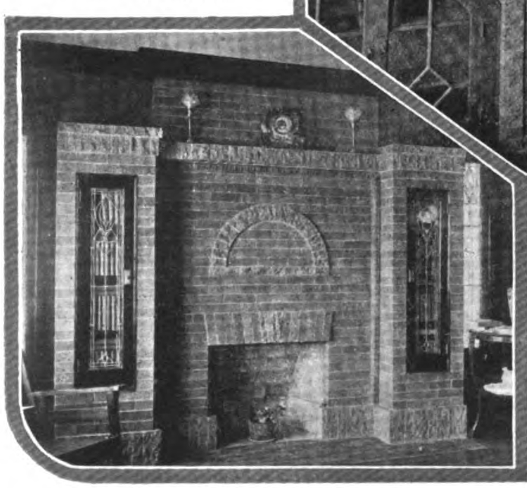


Fig. 3—The straight vertical lines give this bookcase and fireplace a look of dignity

Fig. 4—Breadth and strength are suggested by the arched openings and long mantel

Fig. 5—Here the combination feature extends the full length of the wall

them. The first (Fig. 1) shows the bookcase on each side of the fireplace extended out into the room and made particularly prominent. Including the bottom, each case possesses five book shelves and is equipped with a single mahogany-framed door, containing a single plate-glass panel. The cases form a sort of pillar effect, and between them, above the fireplace opening is a small mantel shelf, with a perfect arch above. Excepting the doors and door frames of the bookcases, the whole feature is constructed of brick, and is of especially artistic lines. The tops of the pillar-like bookcases form excellent shelves for bric-a-brac.

*Extra Wide Books Flank This Fireplace*

The second mantel arrangement (Fig. 2) differs quite a little in appearance, and yet in style of design there is a marked similarity. In this case the outward-extending bookcases are not so high, and each possesses only four shelves for books, instead of five. There is, however, the same shelf space provided by the top of each case, but here the mantel shelf itself extends nearly on a line therewith—in truth, just the thickness of a brick lower. Into the center of the facing of the fireplace is worked a sort of dummy shelf-and-arch effect, emphasized by the use of chipped brick and which corresponds in this respect with the edgings at the top and bottom of the feature in its entirety. Here the doors of the cases are of leaded glass, to match the design of the windows at each side. The whole arrangement is artistic and decidedly attractive.

The third combination (Fig. 3) differs from the first two mainly in that it is of simpler construction and that the facings of both fireplace proper and bookcase sections present a flush surface: The leaded-glass doors of the cases create a sort of panel effect at each side of the fireplace opening, and each of the cases possesses six book shelves, as in the case of the first combination shown. Above the opening is a simple little mantel shelf, constructed of wood, and above it is a small cabinet, with two leaded-glass doors, which may be used either for books or for any one of a number of other purposes. The arrangement is very dignified in design and truly enhancing to the appearance of the room in which it is used.

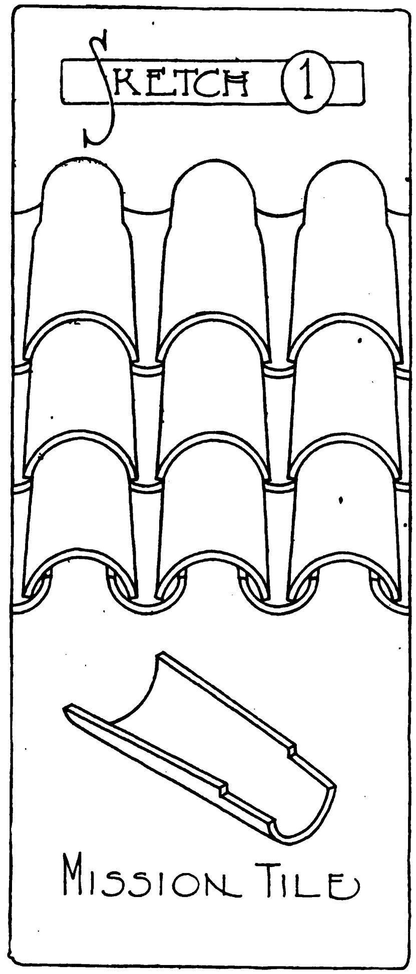
*An Elaborate Arrangement That Extends the Full Length of Room*

The fourth illustration (Fig 4) shows a particularly elaborate fireplace and bookcase arrangement. The feature extends the full length of a long living-room wall, and the mantel shelf, which is of wood, reaches from one end to the other, proving an especially charming living-room accessory. The fireplace opening is of arch design, and the tops of the two bookcases, one at each side, are similarly arched. Into the over-mantel—that is, directly over the fireplace opening, and above the center of the long mantel shelf—is created a tiny brick shelf, to offer relief, and at either side of this over-mantel is a small window of the casement type. The bookcases are equipped with double doors of glass, and each contains two shelves, not counting the bottom. The lines of the whole are graceful, and for many interiors an arrangement of this kind can be made very effective indeed.

The last illustration (Fig. 5) shows a somewhat similarly planned combination, but in this case it occupies less wall space, being located in one end of a living room. It also differs from the other in the matter of structural lines, these being straight and more regular. The mantel shelf extends the full width of the feature, and at either side of the over-mantel is the same type of window. The bookcases are comparatively small, but, as in the case of the preceding arrangement, they contain two shelves, besides the bottom. They also have glass doors, of simple leaded design. The over-mantel is decorated with a slightly extended shelf and arch, and at each side of these is an electric lighting fixture. The whole has a very massive appearance, but is dignified and attractive.

Brick work for the interior is becoming very popular, and there are so many ways in which it may be used to good effect that one wonders why it is not used even more extensively than it is.

These pictures show some truly novel ideas in the way of fireplace designing, and certainly the features could not be made so effective with any other kind of material as they are with brick. The handling of the brick is also exceptionally good, and the photographs would be well worth studying from this standpoint alone.




# Clay Tile Makes a Picturesque Roof

## *Use of Mission, Italian, and Spanish Tile Is Explained*

By ERNEST IRVING FREESE

The chief characteristic of clay is its plasticity; and this characteristic of the raw material is manifested in the finished product by an almost interminable number of patterns. So great is this variety that it is impossible, as well as useless, to here enumerate each individual shape of roofing tile. There are, however, two general types: shingle-tile and trough-and-cover tile. Some depend for their weather-tightness upon various complicated interlocking devices; others are devoid of such lugs and channels. Some are laid precisely after the manner of slate; others are of such shape as to overlap one another both sidewise and lengthwise. The accompanying sketches illustrate three simple and satisfactory forms of trough-and-cover tiles as well as the manner in which each is laid.

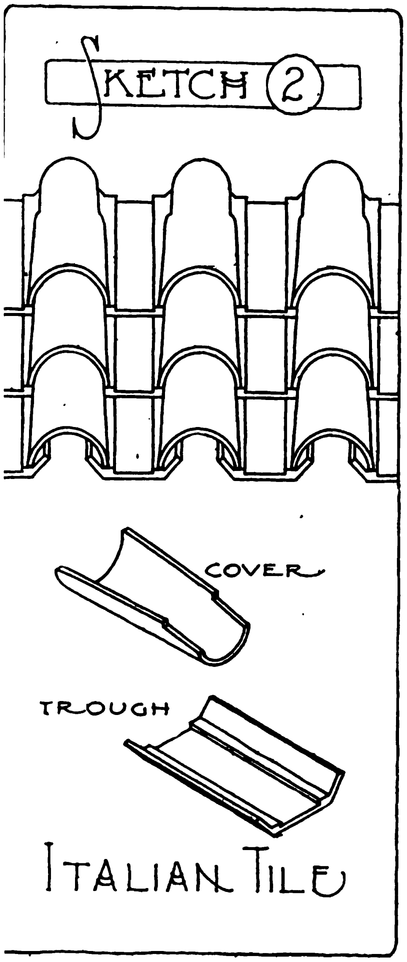
Sketch No. 1 shows the true California mission tile. In the by-gone days of the Spanish pioneers these tiles were molded over a man's thigh; thus giving them just the rotundity and taper to fit snugly together upon the roof. To-day, in spite of all our machinery and inventive propensities, these simple telescoping half-cylinders remain unimproved upon. Their shape is eminently in keeping both with the limitations of the material from which they are molded and with the duty which they are called upon to perform. Note that the "troughs" and "covers" are identical in shape and size: the one is the other inverted and reversed.

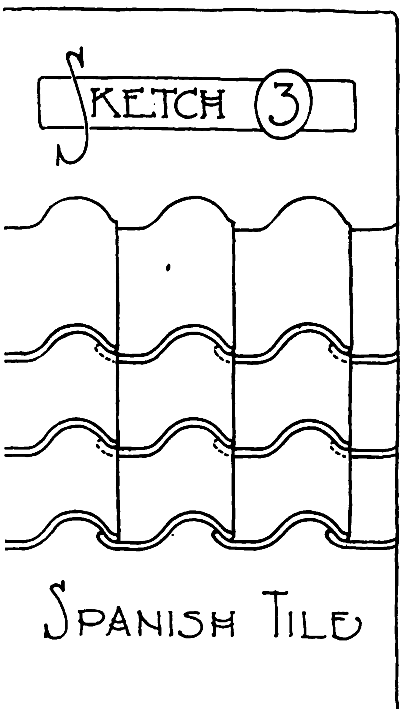
Sketch No. 2 illustrates the Italian tile. Here the troughs and covers are of differing shape: the one is pan-like, the other similar to the mission tile.

In sketch No. 3 is depicted the Spanish tile. In this the troughs and covers are no longer individual pieces: the two are here merged into one, thus forming the characteristic S-shape of this tile.

During the process of its manufacture

nto roofing tile, clay is acted upon by hose very agents which the finished roduct successfully resists: weather and fire. The raw material is first "weathered" by being exposed for a prescribed period to frost or sun. Then, after numerous other operations, it is finally molded into shape, kiln-burned, glazed and fired.




Burned clay, however, is inherently susceptible to moisture. Therefore, for roofing purposes, it is essential that the weather surface of the tiles be rendered impervious. This necessity has given rise to two glazing processes of which the respective products are termed "salt-glazed" and "slip-glazed" tile.

Salt-glazed tile, sometimes termed "vitrified," is subjected to intense heat while the glazing is meanwhile accomplished by throwing salt onto the tile and thus creating a vapor that combines chemically with the clay. In this manner a durable glaze is formed that remains unaffected by gases, fire, acids or moisture: it is nearly indestructible.

On the other hand, slip-glazed tile—also known in some localities as "fire-brick-clay" tile—is very porous. The glaze is produced with another kind of clay, termed "slip," which is applied under heat; the slip, however, being a foreign body, is liable to chip and scale. It is therefore evident that salt-glazed tile is far preferable to that which is slip-glazed.

Finally, whatever be the pattern or process of manufacture, tile must be laid upon a water-tight sub-roofing of solid boarding and roofing felt, for the tiles themselves will not fit together snugly enough to entirely bar the entrance of wind-driven rain or snow.

# Ads That Pull More Business

## *Writing and Displaying Your Message So That It Will Attract Maximum Attention*

By RAY WATSON

ONE builder finds that newspaper advertising brings big returns. Another decides that it is a useless expense. Which is right?

Both are. The one has prepared the right kind of ads. The other hasn't.

An advertisement must be seen, be brief and interesting enough to be read,

JOHN WILLIAMS
Carpenter and Builder
16 So. 9th St.

Fig. 1—The kind of ad used by the average builder. Note how unattractive the type arrangement is compared with the other ads illustrated

and have a "kick" that will make the main point stick like a burr in the reader's mind. Successful ads do this.

An ad that merely gives name, address and occupation belongs to the stone age of advertising. It will bring returns only when the reader is in the market for such services, looking through the newspaper columns for the name and address of the advertiser.

Even then, the reader will pick out the ad that sounds best, as you yourself have probably done when in search of someone.

Most builders advertise in the fashion shown in Fig. 1.

Such an ad is just as likely to bring returns as is your name listed in the classified telephone directory. In other words, it is useless until some one wants your services badly enough to look you up. Of course, constant repetition may very likely impress your name on people sufficiently to have them look you up when wanted.

But suppose you try to design your ad so that it will stand out from others on the same page, and carrying some slogan tending to sell your abilities. Something like that shown in Fig. 2.

The arrows and the style of type will cause such an ad to stand out clearly. Imagine how it will look in the crowded columns of your newspaper, and you will see how quickly it will attract the eye.

Furthermore, it gives a slogan that is easily remembered, "Yours for better work." This will tend to associate your name in people's minds with good work. Such an ad will "pull" better than that shown in Fig. 1.

Advertising men agree that a selling slogan should carry the advertiser's name, if possible. Thus if the phrase sticks in a person's mind, the name will be remembered along with the kind of work done. This is illustrated in Fig. 3.

Furthermore, this particular ad sells a certain kind of work. It suggests that the reader have Williams build a garage, and that if he does it the garage will

***YOURS FOR BETTER WORK***
**JOHN WILLIAMS**
*Carpenter & Builder*
16 So. 9th St. Phone 370 City

Fig. 2—The same size ad as Fig. 1, but arranged to attract attention. The arrows help to draw the eye

be built right. The man thinking of building a garage will be strongly attracted by such an ad, and very likely will have Williams do the work. Specific reference to a particular class of work such as this is always good. For attention-getting value, notice the style of

*Have Williams Build*
*A Garage on Your Property*

**IT WILL BE BUILT RIGHT!**

John Williams
*Carpenter & Builder*
16 So. 9th St. Phone 370 City

Fig. 3—This ad is better than those on Figs. 1 and 2 because it sells a specific service

type and the liberal use of white space.

Another style of ad is shown in Fig. 4. The type arrangement, center rule, and white space will attract attention. This ad is a good typographical arrangement of the information often given by builders. In addition, it carries the selling slogan, "Yours for better work." By repeating the name, it is better fixed in the reader's mind.

Instead of the name at the top, some specific reference could be made, such as, "Have Williams Build Your Garage." At the side of the two center lines could be placed, "It will be built right."

Another concise ad, possessing attention-getting value by reason of the liberal use of white space is shown in Fig. 5. Such an ad will stand out from others on the same page most strikingly.

Each one of these ads, it will be noted, has a distinctive kind of type. Attractive and out of the ordinary type faces do much to better the returns of an ad, and are worthy of careful selection.

Frequently it is advisable to use the same kind of type in every ad used, thus forming a link that connects all your ads together.

The average country newspaper has very few styles of type on hand, and selection must be made from the best available. Have the newspaper printer pull proofs of the styles he has, and select the one that best suits your fancy. By doing this, you will likely get a more distinctive ad than if you leave the entire matter in the printer's hands. Furthermore, you can specify about the size and blackness of type desired, leaving the printer free to come as near to your idea as his facilities permit.

Where the newspaper is unable to give you good service, you can hand-letter your ads, have a line cut made, and use that. In this way, you can get a very distinctive looking ad. Such lettering can either be done by yourself or by a commercial artist, with whom the newspaper can probably put you in touch. The newspaper can also have your cut made for you.

Of course, preparing your ads like this will prove more difficult and expensive than by trusting the printer with all the mechanical details, but the results are well worth it. You are paying good money for the space used in the newspaper and might as well spend slightly more in order to have the ad bring good returns rather than to have it almost a dead loss.

Ads should be changed frequently in order that they may be read each time that they appear. After you yourself have read the same ad several times, you pay no more attention to it. Why allow other people to treat your ads the same way?

**John Williams**
*Carpenter and Builder*

***Yours for Better Work***

**No job too small or too large for us to handle the way you want it done**

*Estimates furnished free*

**John Williams**
*Carpenter & Builder*
16 So. 9th St.
Phone 370 City

Fig. 4—A good typographical arrangement of the information given many builders' ads. The ad might be improved by making the top "John Williams" a specific reference to some service

***Let Williams Screen Your Porch for Summer Comfort***

**JOHN WILLIAMS**
*Carpenter and Builder*
16 So. 9th St. Phone 370 City

Fig. 5—Effective use of white space characterizes this ad. White space well used will do much to make an ad stand out

# Paints That Lower Cost

## *Tested Formulas of Cheap Paints That Have Proved Good for Inexpensive Buildings*

By A. ASHMUN KELLY

There are many buildings the painting of which involves a great amount of material, comparatively speaking, for I have no reference to large public or commercial buildings, but to such as farm buildings, for instance. Where the building is constructed mainly of stone or brick there is relatively little surface requiring the protection of paint. In this case ordinary oil paint may profitably be used, though that is not entirely necessary, for cheap special paints, too, may prove quite satisfactory. There is little popular understanding of the matter of good cheap paint. Many formulas offered through the family paper prove quite inadequate, some being unsuited to almost any form of painting, though perhaps all right when it concerns a mere coating, such as a lime base gives, and in which case we have a whitewash, not a paint.

I shall take old farm buildings for my subject, as these are fairly representative of all cheap or not high-cost buildings that demand paint in fairly large amount, while the cost must be kept low enough to make the painting possible.

Does it pay to paint such buildings when they are old and weather beaten? Does it pay to keep the building, new or old, painted once it has been painted? What paint may be used, one not costing much and yet affording efficient protection against the weather? How should a new, also an old, building be painted, and what with? With such questions aimed at him the contractor should be prepared to give full and convincing answers.

I have never heard anybody seriously argue against the value of paint in protecting exposed surfaces of wood or other building material usually coated with paint. It is only necessary to compare two buildings, one that has been kept painted and the other that has not. It is not the rain that damages the woodwork so much as the sun. This dries out the wood and warps it, causing great cracks and an open surface through which the water gets at the heart of the wood. A rough boarded structure might stand for years without paint, and remain more or less intact, but still it would stand better and longer if painted. The main question in these cases is, how can such buildings be kept painted at a moderate cost?

And it is economy to repaint at proper intervals of time. If the work is left too long, then it requires ever so much more paint and more time for its application. One coat every five years, say, would be better than two coats every ten years. Then when the old paint is not seriously impaired by the weather, having lost only its oil, a simple coat of linseed oil will often suffice. This restores to the paint the lost oil, and makes a very nice looking finish. But if the paint has been damaged so that the pigment is no longer solid, hence unable to hold together even with the addition of the suggested coat of oil, then pigment must be added to the oil, forming a rather thin coating. Another light coat upon this will give a good surface. And will not take very much paint.

When you build a barn or other farm building, saying nothing about a house, you naturally like to see it painted. That really puts the finish on your work. It seals up the putty holes you left, and in some rare cases fills up the bad joints you made, but you know all about this.

The very high cost of paint materials now necessarily causes building owners to postpone repainting, and they do not know that the buildings might be coated with efficient paints that cost comparatively little. As in all cases of painting, the labor cost is the greater. Just now it is very much greater than paint cost. Having experiences of my own in these matters makes the subject especially interesting to me. I have rough buildings to paint, and I must use a paint that will not cost much and yet do its work. What shall I use?

I don't want whitewash, not even the oft-printed Government whitewash. In its place whitewash is good; it will stick to certain surfaces tenaciously, and for a considerable time, but it will not keep out the weather, and that is what I want a coating to do. So I propose in this connection to give a few working formulas, some of which meet my, and possibly your, needs. Let me say at the outset that there is no paint so efficient as lead and oil paint; or lead, zinc and oil; or, still further, lead, zinc, a neutral pigment, and oil paint. But there are some good substitutes, good for special purpurposes, or even good where ordinarily lead and oil are employed.

Any paint that will give a protection against the weather for a reasonable length of time is good. Water paint will not do. As a paint base we have whiting (a form of lime), much employed in making water paint or calcimine. It is equally good when mixed with oil, though it has much less body than white lead or zinc white.

You have noted how hard window-glass putty becomes in process of time, and if it does this why won't it make a good paint covering? But alone, with oil, it does not make a satisfactory paint, owing to lack of body. But used in connection with some white lead it gives a very useful paint, and years ago, when steamboats were many on the western rivers, painters used to add some whiting to the lead paint, for they, as well as the vessel owners and captains said such a paint wore better and stood smoke and sulphur and weather better than lead and oil alone.

If we take say 150 lb. of best bolted whiting and 60 lb. of white lead that has been ground in oil (technically known as keg lead), with some boiled oil and water, we shall get a very good cheap paint for farm and similar buildings. Take the whiting and put it in a suitable vessel and pour clear water on it until it comes to the top of the whiting; let this stand say over night and then pour off the surplus water, the residue being a fine pulp. This is better than stirring the two together, though this, too, may be done, if you are in a hurry. Into this whiting pulp stir 6 gal. of hot, soft soap, stirring it well. Then mix it with 3 gal. of boiled linseed oil, forming a paste; now add by stirring 3 gal. more of the oil; then mix the two masses together, the lead and whiting mixture and the other. Now stir the whole mass to form a perfectly homogeneous mixture; strain through double cheesecloth or fine wire sieve. If color is desired it must be added when you are breaking up and mixing together the white lead and oil. Thin the mixture if too thick, a creamlike consistency being best.

Here is another and somewhat similar paint formula: Mix together 40 lb. of gilders' best whiting, 10 lb. dry zinc white, 10 lb. white lead ground in oil, 8 lb. raw linseed oil, 6 lb. potash soap, and 26 lb. soft water. This will yield about 100 lb. of mixed paint of good quality. A little varnish in it will tend to toughen and harden the paint.

A good compound paint may also be made upon this formula: White lead, 50 lb.; dry zinc white, 25 lb.; best whiting, 25 lb. Mix zinc and whiting together and thin out with raw linseed oil; strain when perfectly mixed. Mix the white lead by itself and with raw oil, mixing to a stiff paste. When ready to apply the paint it may be further reduced with raw linseed oil. This is not exactly a low price paint, but the use of the whiting tends to lower the cost by that much, and the formula is useful where a better paint than the preceding is required.

If you have a lot of new window sash to prime and do not care to use lead and oil primer, try this: Mix together 8 gal. rosin oil, 1 gal. raw linseed oil, and 1 gal. pale japan drier. With this liquid mix up 25 lb. gilders' whiting, stir it in well and then strain. Thin for use with 2 gal. benzine. The proportions given may of course be reduced for smaller quantities. Such a primer does not yield a very excellent result, and is not advised excepting for the very cheapest contract work. The sash are to be dipped into it.

Old work may be classed according to the condition of the surface. If very bad, spongy and full of cracks, better mix up a paste filler with whiting and raw oil, with some driers, and this may be thinned down for a second coating. Equal parts of iron oxide dry paint and whiting, or venetian red and whiting, or yellow ochre and whiting, according to the color desired, or what the finish color is to be. For an open surface this paint may be made quite heavy and be well rubbed in with the brush. This filler coat, with maybe a thinned coat of the filler, will lay a good foundation for the next coat, which should be of a better grade than the filler; and one coat may make a good enough finish.

Iron paint, a rich dark brown, is a popular barn color, and some prefer the ochre color, while perhaps a few will choose venetian red, a rather bright red, though not a glaring color. Yellow ochre, is a poor primer, as paint does not seem to last long upon it; the pain cracks and peels, because ochre is a very hard pigment, and presents a correspondingly hard surface, allowing little foothold for the paint. Iron oxide paint covers well, spreads well and gives a good surface for other kinds of paint, the same being true of venetian red. In fact, venetian red, some of it at least, is simply a gypsum base colored with a very strong iron oxide. Now this red is a by-product of furnaces engaged in other lines of manufacture.

Mineral oil is often used to cheapen paint, taking the place of costly linseed oil. A very little coal oil in paint serves a useful purpose sometimes, but it is not to be used in thinning paint. So with any hydrocarbon oil in paint. It is bad.

You can add an alkali to linseed oil, making an emulsion, and so reduce the cost of the liquid, and get a very fair paint. Lime water, borax or carbonate of soda will do. Such paint works easily under the brush. The first ready mixed paint was made after this manner.

# Practical Hints in Construction

## *Making Strong Corners and Framing Heavy Overhangs*

By I. P. HICKS

One of the best methods of making a solid corner in ordinary house framing is shown in Fig. 1. This method makes use of only three studding and there are no blocks to be nailed in. Set two studding just far enough apart so that the third studding may be spiked into the first and second, as shown. The third studding should lap over onto the second about ¾ in. This forms a solid corner and leaves good nailing for the lath from both ways. It makes a much better corner than nailing in blocks between the first and second studs and then nailing the third stud to the blocks, the way it is frequently done.

Fig. 2 represents one of the best methods of framing up partition corners. Set the studding so that the backing will come flush with the other wall, then the backing will receive the ends of the lath from both ways. After the studs are set and the backing thoroughly nailed in place, 2 x 4 should be cut and nailed in flatways, at least two such pieces to every corner.

*Sill and Wall Construction*

In some cities box sill construction is prohibited by building laws. In a few places this law has been modified so that what is called a T-sill can be used to take the place of the old-style box sill. This kind of framing makes it necessary to use longer studding to get the same height of story secured by the former method. By this method it is not possible to get a two-story house with a 9-ft. and 8-ft. ceiling, using 18-ft. studding. Fig. 3 shows the new T-sill construction and the length of studding to use to obtain approximately a 9-ft. ceiling for the first story and an 8-ft. for the second-floor ceiling. In the sketch the story heights are given from top of floor joists to bottom of the one above, as shown. When the thickness of the rough floor, finish floor and the plaster of the ceilings are figured out the heights of the ceilings will be about 9 ft. 2½ in. and 8 ft. 2½ in. respectively, giving a good height for each ceiling.

For the first story use 10-ft. studding, putting on a double plate at the top for the second-story joists to rest on. This double plate will strengthen the wall of the building at the joist line far better and easier than can be done by the old method of using studding that reach the full two stories with a ribbon board to support the second-floor joists. Long studding are likely to be quite crooked and I have seen much time spent in try-

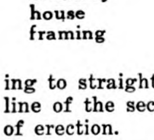



Fig. 1—Method of making a corner, good for ordinary house framing

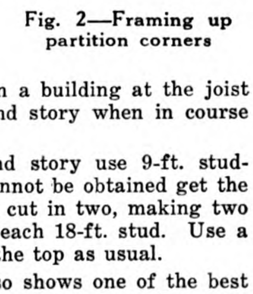



Fig. 2—Framing up partition corners

ing to straighten a building at the joist line of the second story when in course of erection.

For the second story use 9-ft. studding; if these cannot be obtained get the 18-ft length and cut in two, making two studding out of each 18-ft. stud. Use a double plate at the top as usual.

The sketch also shows one of the best forms of constructing a bungalow cornice. Where it is possible to obtain rafters that are long enough to make the cornice, rip off the backs of the rafters the thickness of the ceiling used and put the sheathing on over the top of the ceiling; the sheathing will then come on top of the rafter soon as you get above the cornice line. This is better than

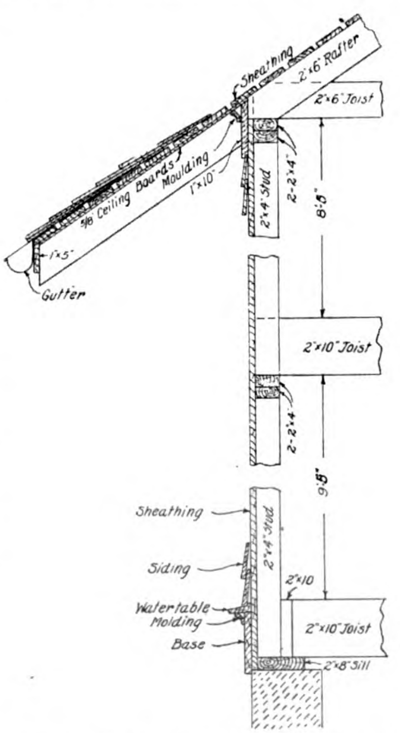



Fig. 3—T-Sill and cornice construction

using ceiling on top of the rafters and shingling on the ceiling. When the ceiling is used to shingle on, very short nails have to be used or the nails will show through; when short pieces of ceiling are used up the gables there is not sufficient strength to properly support the cornice. Thus a very weak job is often the result of laying shingles directly on the cornice ceiling plancer.

If it is difficult to get rafters long enough, lookout rafters can be used. In this case, when nailing on the rafters, drop the lookouts below the back of the other rafters just the thickness of the ceiling used and the result will be the same. When lookouts are used always have them long enough to extend up on the main rafter from two to three feet so that they can be substantially spiked to the main rafters. Short splices at the cornice line make a weak job, for no splice should be less than 2 ft. and then it should be substantially nailed.

There is another advantage in framing up the building the way we have shown. With the double plate at the second-story joist line, it is not necessary to put in the fire stops, as is required by the old method of framing with the ribbon board. The double plate forms the fire stops much better than by the old method of using a ribbon board to support the joists and cutting in short pieces between the studding.

## Should Specifications Be More Definite?

It will probably be admitted that the physician who made a practice of prescribing certain drugs—"or others whose pharmacodynamic properties were similar"—would soon lose the confidence of his patients, and yet that is in effect what the architect is doing who persists in the outworn and discredited practice of writing "or equal" after the specification of a given material or equipment.

Unless he entirely neglects to perform his function and leaves the decision to the builder, he must sooner or later determine what is to be used and, considered both from the standpoint of the client's interest and his own reputation, it would seem to be desirable that he inform himself and make his decision when the specification is written rather than after the contract is let.

The old argument to the effect that a definite specification fosters high prices has been effectually disposed of by leading architects who have for years been specifying the materials and equipment that their experience and investigations have shown were best suited to meet the particular requirements of the occasion, without alternative. It is evident that no manufacturer of standing and responsibility would take advantage of a definite specification to increase his price. To do so as a policy would be business suicide. Without doubt, any attempt that has ever been made to profit unduly by reason of being favored by a definite specification was the result of a mistaken effort of some subordinate in a manufacturer's organization to improve his balance sheet. Such a circumstance needs only to be brought to the attention of the heads of the concern to be corrected.

A definite specification does not necessarily mean that choice is limited to a single article. Where there are two or more of equal merit and suitability the specification is no less definite if both or all are mentioned. If there is a difference in price, the contractor should include a bid on each. In this way, really competitive figures are secured. On the other hand, if there is but one article or material that will, in the opinion of the architect, give better results than any other, he should have the moral courage to specify it outright.

A client who lacked confidence in the architect's competence or integrity in the matter of specifications should obviously bestow his commissions elsewhere. When the indefinite specification containing ambiguous provisions, so called "grandfather" clauses attempting to put all responsibility on the contractor, and the iniquitous "or equal" phrase disappears entirely from architectural practice, the public confidence in architects will unquestionably be greatly increased. Fortunately progress is being made and comparatively few architects worthy of the name are now in practice who cling to the old forms.


**Are you in need of any information as to building law? If you are, just put your problem up to our legal adviser, George F. Kaiser, LL.B., and you will be answered without charge.**

**Address Legal Department, Building Age, 243 West 39th Street, New York City.**

### *Must Non-Resident Architects Be Licensed in Michigan?*

**From J. P., Michigan.**—Is it necessary to have a license to practice architecture in Cleveland, Ohio? Then if not, can an architect having an office in Cleveland build a building in Michigan where a license is necessary?

**Answer.**—I can find no provision in the Ohio law making it mandatory for an architect to be licensed. In Michigan, however, it is necessary to have a license. It is permissible to publish and sell books and magazines pertaining to architecture. In the case of Wilson & Edwards against the City Council of Greenville, 43 S. E. 966, it was decided that where an architect has several contracts in another city and pays occasional visits there to inspect his buildings and to see to the carrying out of the plans and specifications, he is liable for license tax required by an ordinance of such city if he so intends to carry on his business there.

It would seem, therefore, that a Cleveland architect practicing in Michigan would be subject to the Michigan law and would have to be licensed under it.

### *What Is the Architect's Licensing Law in Illinois?*

**From D. D. K., Illinois.**—Have I the right to sell plans without license here in Illinois?

**Answer.**—In Illinois the state board of examiners may license or revoke the licenses of architects. It is provided in the Illinois law that corporations are not to practice architecture. Individuals who practice architecture without being properly licensed are guilty of a misdemeanor and may become subject to a fine of $200. If you are interested enough, you can write to the State Board and procure a copy of its Rules and Regulations.

In Illinois an architect is defined to be, "Any person who shall be engaged in the planning, or supervision of the erection, enlargement, or alteration of buildings, for others, and to be constructed by other persons than himself, shall be regarded as an architect—but nothing shall prevent draftsmen, students, clerks of works, or superintendents and other employees of those lawfully practicing as architects under license as herein provided for, from acting under the instruction, control or supervision of their employers or shall prevent the employment of superintendents of buildings paid for by the owners from acting, if under the control and direction of a licensed architect who has prepared the drawings and specifications for the building."

I do not think that merely selling plans already prepared would be practicing architecture under this law. If they are specially prepared on order, however, and the person preparing them supervises the construction of the building, that is another matter.

### *When Minor Deviation from Specification Is Innocently Made, Is Contractor Liable?*

When by inadvertence or mistake, a minor deviation from the contract specification is made which involves no damage to the owner who takes possession of and continues to use the building without seeking to disturb the work done, the contractor is entitled to prove that he substantially performed the contract and that the owner suffered no damage through the innocent mistake.

Suit was instituted for a balance claimed to be due on a building contract which provided that the contractor would furnish all materials and perform all the labor in erecting a building. "Reading Pipe" was required in the contract. The owner claimed that pipe other than that specified had been installed by a subcontractor.

In November, 1915, the owner's architect condemned the piping and ordered the same done over to his satisfaction. In January, 1916, the architect served a three days' notice (as provided in the contract) requiring that he be advised within three days whether the contractor would undertake to comply with the specifications. The architect notified the contractor that in the case of his negligence or refusal to comply with any of the agreements contained in the contract, the owner was at liberty to provide any labor or material necessary to complete the contract and might terminate the contractor's relations with the work and employ some other person to finish the same and provide the material at the contractor's expense.

The owner never took any further steps under this notice and never attempted to have the piping removed nor to have anything at all done in relation to the work. He used the building in its completed condition with the piping as installed by the contractor.

The court held "This is not an action brought to recover the contract price of the work done where the contractor has deliberately substituted something equally good for what was specifically required under the contract. On the contrary, the contractor claims that he has substantially performed the contract but that through inadvertence and mistake and not willingly, a minor deviation has been made through which the owner suffers no damage."

There is no claim made that any such damage was caused the owner. On the contrary, the contractor offered evidence to show that all the pipe used in completing the contract was well galvanized, lap-welded, wrought iron pipe known as "standard pipe," that it all had the same market value, the same weight per foot, the same thickness of walls, the same interior and exterior diameter, the same quality of galvanization, the same wearing quality and the same exterior appearance. The contractor also sought to show the trade meaning of the words "standard, lap-welded" and "wrought iron."

In other words the contractor sought to prove that every foot of pipe that went into the work was of the same value and quality as that which was called for and that the only departure from the specification was that by inadvertence some pipe was placed in the building which was not manufactured by the maker specified in the contract.

If this had been done deliberately the contractor could not have claimed complete or substantial performance, for he had no right to willfully disregard the provisions of the contract or specifications. When, however, by inadvertence or mistake a minor deviation has been made which involves no damage to the owner, who takes possession of and continues to use the building without seeking to disturb in any respect the work done by the contractor, the latter is entitled to prove that he has substantially performed and that the owner suffered no damage through an innocent mistake, and that what the owner received is what he had a right to expect to get under his contract.—175 N. Y. S., 281, Jacobs and Youngs vs. Kent.

### *Is Contractor Liable for Defective Foundations When Following Architect's Plans?*

The Supreme Court of Appeals of Virginia, in the recently decided case of Adams vs. Tri-City Amusement Company, 98 S. E. 647, holds that a building contractor cannot be held responsible for defects in not having the walls of a building heavy enough to stand in wet ground if the contractor follows the plans and specifications furnished by an architect as the agent of the owner.

The contractor in this case had erected a theater building and after it was completed he instituted an action against the owner to enforce a mechanic's lien of $5,893.

It appeared that the basement walls of the building had fallen down twice and had to be re-erected. The lien claimed by the contractor was for extra work imposed upon him in re-erecting these walls. The court in holding that the contractor was not responsible found that "it appears from the evidence of the architect, who under the written terms of the contract must be held to be the agent of the owner to direct the work in its details, that although he at first was of the opinion that the falling of the walls was due to the fault of the contractor, yet upon learning the facts he changed his mind and in accordance with the agreement of the parties directed the re-erection of the wall at the joint expense of the contractor and the owner.

"It is perfectly manifest that the design of the wall was inadequate. Whether sufficient or not under ordinary circumstances, it appears that by reason of the low, wet character of the ground and the consequent drainage through it, the wall as the architect designed it was not sufficient to stand the strain of the water and the earth which was washed through it.

"For such a defect a contractor cannot be held responsible, for it is his duty to follow the plans and specifications furnished as his guide by the architect as the agent of the owner."

### *Are Rights of Lien Holders Same Under Private as Public Contract?*

That there is no difference between the rights of those holding a lien against contractors on private contracts, and contractors for public improvement and that holders of a lien have no greater rights in one case than in the other was the decision of the New York courts in the late case of Dempsey vs. Mount Sinai Hospital, 186 New York 334.

It seems that in January, 1915, a contractor entered into an agreement with the hospital for certain excavation work and the erection of a new building. Thereafter the contractor sublet the excavation work.

A powder manufacturer then furnished explosives to the sub-contractor for use in making the excavation, and certain other firms performed labor. They all filed liens.

When the liens were filed the contractor owed nothing to the sub-contractor. The sub-contractor, however, had furnished materials and performed labor aggregating more than the gross amount of all the liens. Although the sub-contractor had not been paid, it appeared that his charges were due and payable because under the contract only 85% of the value of the work performed became due and payable and it was provided that the remaining 15% did not become due and payable until forty days after the work was entirely completed.

A short time after the liens were filed the sub-contractor abandoned the work and was adjudicated a bankrupt. He had been paid $59,557.03 at the time he abandoned the work. The balance of the contract price amounted to $4,319.67, which was less than the 15% which the contractor was authorized to reserve.

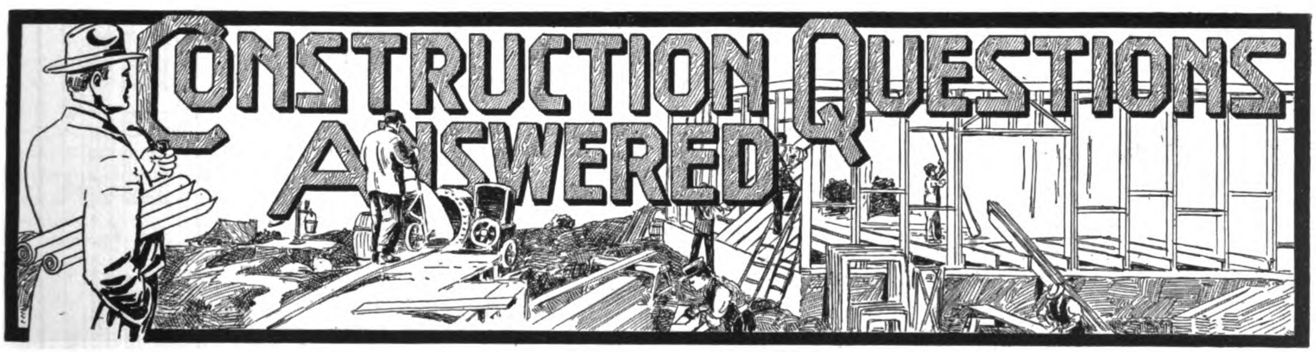
The contractor completed the work at a considerably greater cost than the unpaid balance.

The Court decided that if there had been a surplus after the completion of the work by the contractor the liens would have attached, but as matters were, there was no fund to which they could attach as there was no amount due or owing to the sub-contractor at the time the liens were filed and no amount became due or owing thereafter.

The liens were therefore held not to be binding on the principal contractor.

### *Contractor Must Prove Work Done Before Recovering*

In Texas, where suit was brought under an express contract to lay tile floors in a neat and workmanlike manner, the Court of Civil Appeals recently held that the contractor must give evidence to show that they were actually laid before he could recover for the labor performed and the materials furnished.




### *How to Construct Dutch Doors and Select the Hardware*

**From H. L. M.**—How should "Dutch doors" be prepared that swing inside? The hardware needed, how to apply same, and all the various operations required from start to finish. These doors are 3 ft. x 7 ft.; the styles are whole length, that have not been sawed into yet.

**Answer**—Fig. 4 is an elevation and sectional drawing of a Dutch door swinging in. The dimensions as shown on this drawing vary slightly from the size you mentioned your doors to be, but outside of that the construction is typical of those that swing in and is as weather-tight as they can be designed. Fig. 4 was selected to convey the idea of the construction, as the writer was fortunate enough to have an accompanying photograph of the door as it was built and in use (see Fig. 1).

The section through doorway (see Fig. 4) shows very distinctly how the upper and lower parts of door are rabbited and the arrangement of drip molds.

The hardware required for Dutch doors is as follows, and should preferably be of cast bronze.

Hardware for one door:

Four 4-in. x 4-in. loose pin butts.

One cylinder lock set with thumb latch and handle.

One Dutch door quadrant or bolt for locking two halves together.

One Colonial door knocker.

The hardware before described is illustrated in Fig. 2, which gives an idea of the proper design to use, and, in the case of the locking quadrant, its proper position.

Butts should be placed so that lower end of lower butt is in line with top of bottom rail to bottom part of door and in line with top of cross rail of upper part.

The upper end of upper butt should line with bottom of top rail and the upper butt of lower part of door with bottom of cross rail.

The elevation in Fig. 4 indicates the correct position of knocker and lock, and Fig. 2 that of the quadrant, which should be quite clear without further description. W. G.

Fig. 1.—Photograph of the completed doorway, the dimensioned drawings being given in Fig. 6.

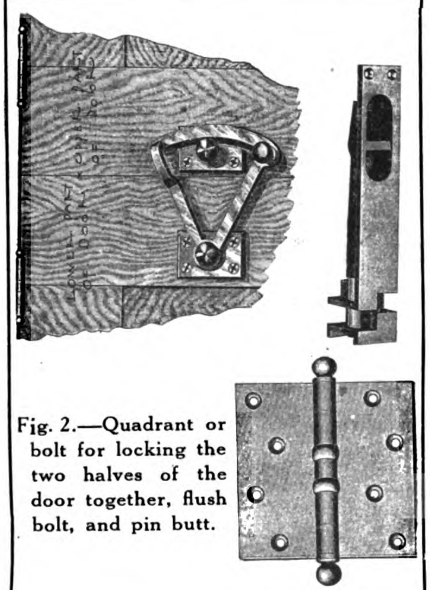


Fig. 2.—Quadrant or bolt for locking the two halves of the door together, flush bolt, and pin butt.

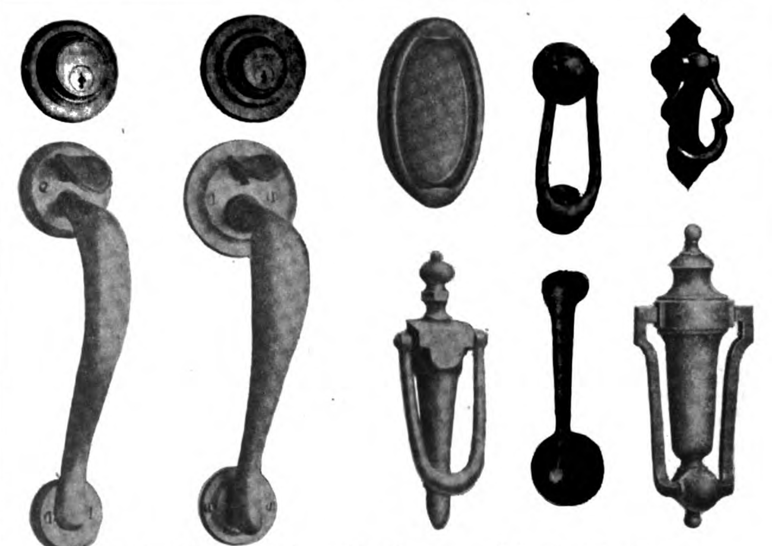


Fig. 3.—Various styles of hardware used for Dutch doors.

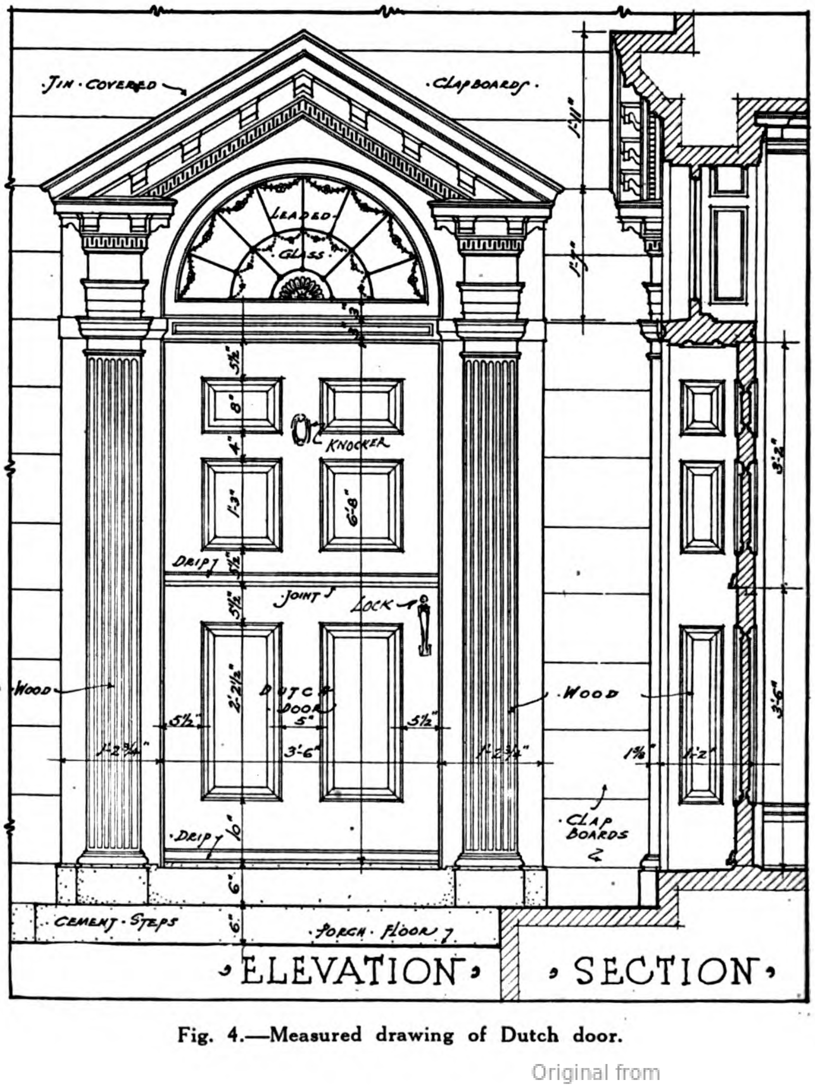



Fig. 4.—Measured drawing of Dutch door.

### *How to Test Strength of Floors*

**From D. B., New York.**—In order to settle an argument, I have been requested to put the question up to you for an answer.

Will you kindly mail me a formula for determining the safe load per square foot for a floor, using the data herewith?

Georgia pine joists, 10″ x 14″ on 10′ 0″ centres, span 22′ 0″.

Flooring tongue and grooved 4⅞″ x 7½″ pine.

The floor in question is 80′ 0″ long x 40′ 0″ wide, second story, used for a machine shop.

**Answer:**—A convenient formula for determining directly the safe strength of rectangular beams, uniformly loaded, may be deduced from the foregoing principles, as follows:

The bending moment—M, in foot-pounds is

$$\frac{W\,L}{8}$$

or in inch-pounds,

$$\frac{12\,W\,L}{8}$$

Placing this equal to the resisting moment M or Q S, there results

$$\frac{12\,W\,L}{8} = Q\,S, \text{ or } 12\,W\,L = 8\,Q\,S;$$

whence

$$W = \frac{8\,Q\,S}{12\,L} = \frac{2\,Q\,S}{3\,L}$$

For a rectangular beam the section modulus $Q = \frac{b\,d^2}{6}$

therefore this formula may be written:

$$W = \frac{2\,S}{3\,L} \times \frac{b\,d^2}{6} = \frac{S\,b\,d^2}{9\,L}$$

b and d are in inches and L in feet. This formula expressed in inches is as follows:

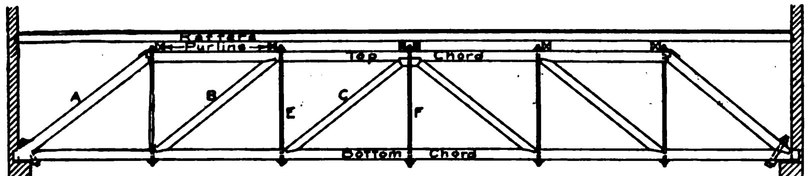
**Rule:** The safe uniformly distributed load, in pounds, for a rectangular beam is equal to the safe unit fibre stress, multiplied by the breadth, in inches, and by the square of the depth in inches, and the product divided by 9 times the span, in feet.

Key to notation used in formulas—

W=total uniform distributed load

L=span in feet

(*Continued on page* 209)



Elevation of Howe truss, which will meet conditions outlined.

### *Design of Wooden Roof Truss*

**From E. W., Middletown, N. Y.**—Enclosed plan shows position of truss. Please show solution of how to put roof on this type of building. Cross lines shown on plan represent trusses above. Truss work to go above plate. Please advise the type of wooden truss sufficient to support roof without having any post underneath. The roof to be covered with rubberoid. There could be supports at work shop. If you have any more practical way of putting on this roof than the one shown on plan will you please send it to me?

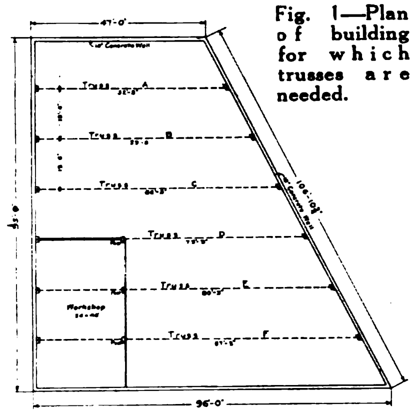


Fig. 1—Plan of building for which trusses are needed.

**Answer.**—The case presented by the correspondent is rather a complex one, due to the fact that the width of the building varies so that no two trusses will be exactly alike.

Probably the best form of truss to use would be the Howe truss. This truss has horizontal top and bottom chords, with the web members consisting of inclined struts and vertical iron bars, as shown in Fig. 2. This form of truss is considered economical for spans up to 100 ft.

The height of the truss, from center of the bottom chord to the center of the top chord, usually varies from one-sixth to one-tenth of the span; a value of one-eight of the span will give good results.

The accompanying tables of sizes lor six-panel Howe trusses is taken from Kidder's Building Construction, Part 3, "Trussed Roofs and Roof Trusses."

This table, while not exactly meeting the requirements as to spacing of trusses and span lengths, will serve as a guide in the design of the trusses. The dimensions are for a flat roof, with a snow load of 16 lb. per square foot, and a plastered ceiling supported on the lower chord. Should the ceiling be omitted the trusses would be good for a roof load of 30 lb. per square foot.

The truss shown in Fig. 2 represents a truss that could be used for Truss "C" of Fig. 1. An analysis of the stresses in this truss by the graphical or analytical method will show that the sizes given in the table are amply safe. Care must be taken in the design of the details at the joints and splices so that they may properly take care of the stresses in the members of the truss.

Should the posts at the workshop be used to act as supports for trusses *D*, *E* and *F*, care should be taken in the design as an intermediate support under a truss will break the truss up into two spans and the truss on each side of the support must be treated as for an independent span.

L. GOODMAN, C.E.

DIMENSIONS FOR SIX-PANEL HOWE TRUSSES—TIMBER, NORWAY PINE, DOUGLASS FIR, OR EASTERN SPRUCE

| Span, Ft. | Distance Apart, C. to C. Ft. | Total Height, Ft.-In. | Top Chord, In. | Bottom Chord, In. | Braces A In. | Braces B In. | Braces C In. | Rods (W. I.) Not Upset D In. | Rods (W. I.) Not Upset E In. | Rods (W. I.) Not Upset F In. |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 12 | 6 7 | 6x 6 | 6x 8 | 6x 6 | 6x4 | 6x3 | 1⅛ | ¾ | ⅝ |
| | | 5 2 | 6x 8 | 6x 8 | 6x 6 | 6x6 | 6x4 | | | |
| | 15 | 6 8 | 6x 8 | 6x 8 | 6x 6 | 6x4 | 6x3 | 1¼ | ⅞ | ⅝ |
| | | 5 2 | 8x 8 | 8x 8 | 8x 6 | 6x6 | 6x4 | | | |
| 42 | 12 | 7 7 | 8x 6 | 8x 8 | 8x 6 | 8x4 | 6x4 | 1¼ | ⅞ | ⅝ |
| | | 5 11 | 8x 8 | 8x 8 | 8x 6 | 8x5 | 8x4 | | | |
| | 15 | 7 8 | 8x 8 | 8x 8 | 8x 6 | 8x5 | 6x4 | 1⅜ | ⅞ | ¾ |
| | | 5 11 | 8x 8 | 8x 8 | 8x 8 | 8x6 | 8x4 | | | |
| 48 | 12 | 8 8 | 8x 8 | 8x 8 | 8x 8 | 8x6 | 8x4 | 1⅜ | ⅞ | ¾ |
| | | 6 8 | 8x 8 | 8x 8 | 8x 8 | 8x6 | 8x4 | | | |
| | 15 | 8 8 | 8x 8 | 8x 8 | 8x 8 | 8x6 | 8x4 | 1⅜ | 1 | ¾ |
| | | 6 10 | 8x10 | 8x10 | 8x 8 | 8x6 | 8x4 | | | |
| 54 | 12 | 9 8 | 8x 8 | 8x 8 | 8x 8 | 8x6 | 8x4 | 1⅜ | ⅞ | ¾ |
| | | 7 6 | 8x 8 | 8x10 | 8x 8 | 8x6 | 8x4 | | | |
| | 15 | 9 8 | 8x 8 | 8x 8 | 8x 8 | 8x6 | 8x4 | 1½ | 1 | ¾ |
| | | 7 7 | 8x10 | 8x10 | 8x 8 | 8x6 | 8x4 | | | |
| 60 | 12 | 10 9 | 8x 8 | 8x10 | 8x 8 | 8x6 | 6x6 | 1⅜ | 1 | ¾ |
| | | 8 4 | 8x10 | 8x10 | 8x10 | 8x6 | 8x4 | | | |
| | 15 | 10 10 | 8x10 | 8x10 | 8x10 | 8x6 | 6x6 | 1½ | 1⅛ | ¾ |
| | | 8 4 | 10x10 | 10x10 | 10x 8 | 10x6 | 8x4 | | | |
| 70 | 12 | 12 6 | 8x10 | 8x10 | 8x10 | 8x6 | 6x6 | 1½ | 1 | ¾ |
| | | 9 7 | 10x10 | 10x10 | 10x 8 | 10x6 | 8x6 | | | |
| | 15 | 12 6 | 10x10 | 10x10 | 10x 8 | 10x6 | 8x6 | 1¾ | 1⅛ | ¾ |
| | | 9 9 | 10x12 | 10x12 | 10x10 | 10x8 | 10x6 | | | |
| 80 | 12 | 14 2 | 10x10 | 10x10 | 10x10 | 10x6 | 8x6 | 1⅝ | 1⅛ | ¾ |
| | | 10 10 | 10x10 | 10x10 | 10x10 | 10x6 | 8x6 | | | |
| | 15 | 14 2 | 10x10 | 10x10 | 10x10 | 10x8 | 8x6 | 1⅞ | 1¼ | ⅞ |
| | | 11 0 | 10x12 | 10x12 | 10x10 | 10x8 | 10x6 | | | |

# Three Bungalows Built on Narrow Lots

## *Cozy Little Homes of Typical California Type—Each House Has Three Porches*

THE influence of the California bungalow has spread throughout the United States and adaptions of it are to be found in almost every locality. When built in the colder climates, the design is naturally influenced by considerations of temperature, as the necessity for an adequate heating plant and better insulated siding requires somewhat different construction. Yet the salient features of the design are easily recognizable.

It cannot be denied that the California bungalow has a certain exotic charm of its own.

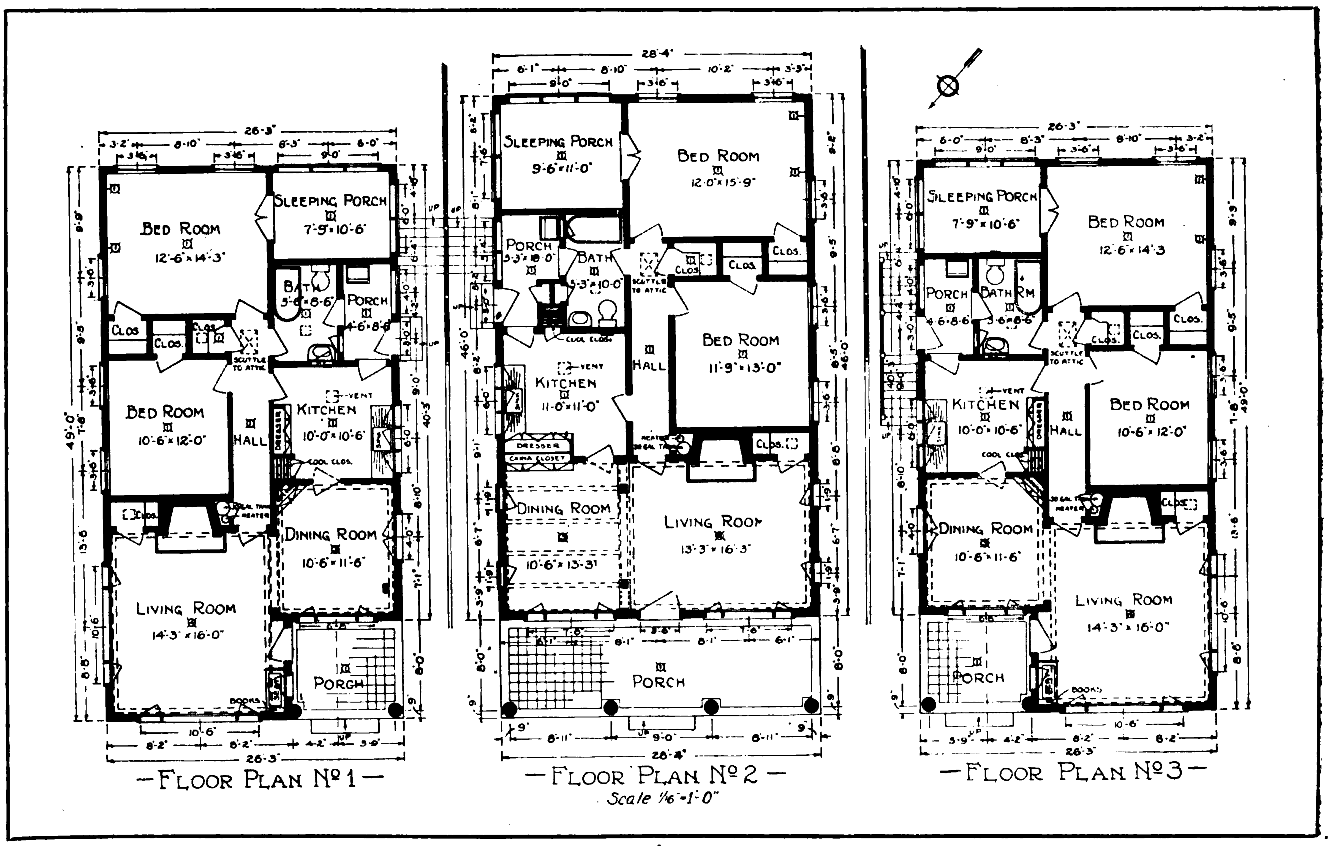
The sweeping roof surface and daintiness of the design make these homes one of the most attractive types for the average builder. One of the characteristics is the necessity for providing adequate ventilation to minimize the effects of the warm temperature, which requires wider windows and plenty of porch space.

This characteristic is noticed when one glances at the three bungalows illustrated. Each has wide windows, which do not make the mistake common in small houses of being out of scale with the dwelling. Each house has three porches. One of the porches is, of course, at the front of the house while a sleeping porch is placed at the rear and another porch opens from the kitchen and bathroom, this being used as a sleeping porch if so desired.

The tendency to build small houses in rows is a good one, as it gives the street a harmonious appearance that is much more attractive than when various styles of architecture are used, one clashing with the other. Although in the three houses illustrated the floor plans are practically alike, yet the handling of the dwellings gives a sense of harmonious variety that is most pleasing. The houses at the ends are merely reversed designs, while that in the center, with its long, sweeping roof pitched the same as the others, gives the appearance of one long building, thus obtaining the instinctive feeling of the long horizontal lines that generally characterize the most attractive houses. Effective grouping like this always adds much to the beauty of each house, as one lends the grace and beauty of its outlines to enhance the others.

The overhangs are well proportioned, there not being the frequent sense of heaviness that is often felt when an unpractised designer tries to handle this style. The chipped roof on the end houses helps to give an especially pleasing touch, since it is not carried out in the center house, which is allowed to run, as it were, into the others. Thus a longer frontage appearance is obtained.

The louvre ventilators in the end houses and the eyebrow window in the center serve merely to ventilate the attic space, as well as to lend a distinctive note to the designs.

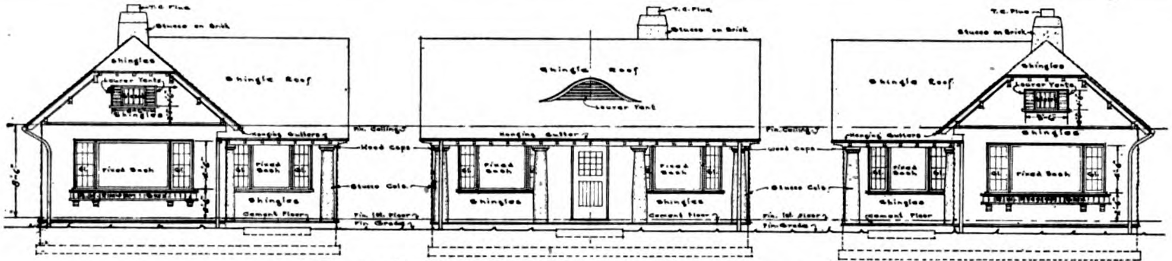



As is usual in California homes of the bungalow type, one enters directly into the living room, which is semi-separated from the dining-room by a cased opening serving to give the sense of spaciousness and openness so characteristic of the California home.

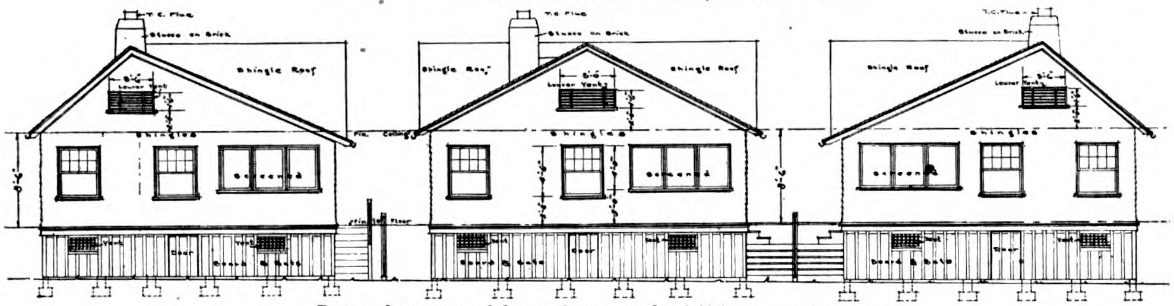
Each of the living rooms is provided with a fireplace used to take the chill off the room on the colder nights. At the side of each fireplace is a 30-gallon tank heater, which serves to supply hot water at all times, the climate making it desirable for there to be no coal

Supplement to Building Age, June, 1919

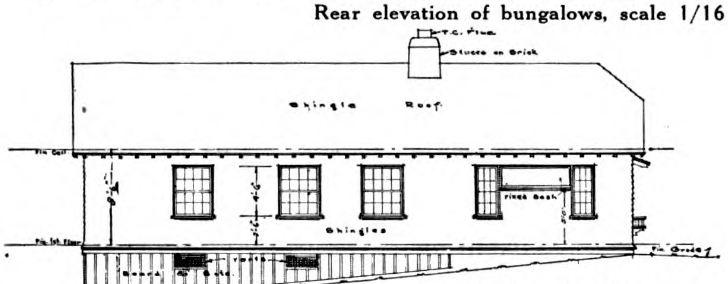
Bungalows at Santa Barbara, Roland F. Sayter, Architect.



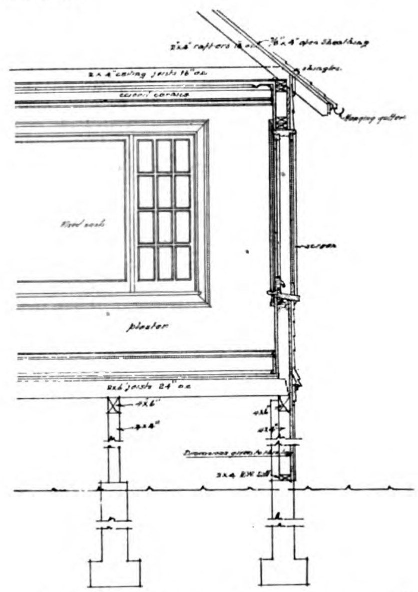
Front elevations of bungalows, scale 1/16 in. = 1 ft.



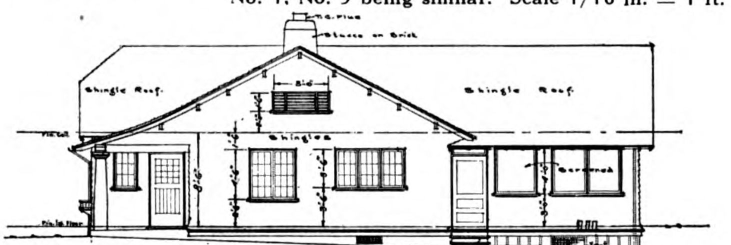
Rear elevation of bungalows, scale 1/16 in. = 1 ft.



Side elevation of bungalow No. 1, No. 3 being similar. Scale 1/16 in. = 1 ft.

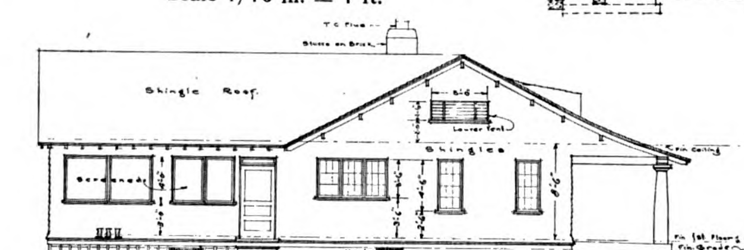


Typical 3/16 in. detail through living room.



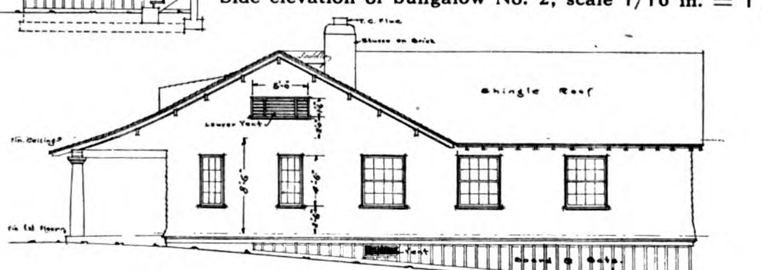
Side elevation of bungalow No. 1, No. 3 being similar. Scale 1/16 in. = 1 ft.

Elevation of living room and dining room, bungalow No. 1.

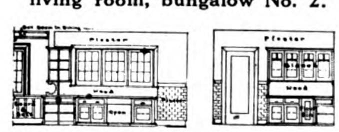


Side elevation of bungalow No. 2, scale 1/16 in. = 1 ft.

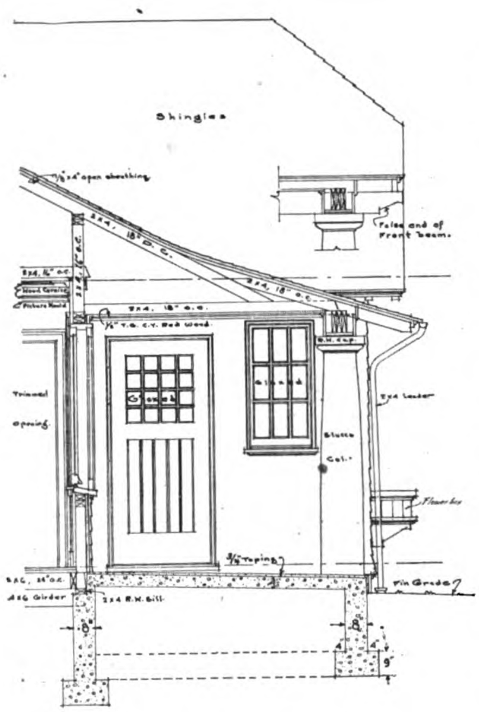
Elevation of dining room and living room, bungalow No. 2.



Side elevation of bungalow No. 2, scale 1/16 in. = 1 ft.



Elevation of dining room and kitchen, bungalow No. 2.




Typical 3/16 in. detail through porch.

range in the kitchen. The heater, of course, would be operated either by gas or electricity.

The dining-room opens directly into the kitchen, there being no pantry. A sink with drain boards on either side is placed under a triple window, through whose wide-open casements plenty of ventilation can be had. The kitchen contains a vent leading into the attic, thus helping to keep this room cool if a gas range or electric heater is used. A dresser is placed opposite to the sink in the end houses and directly alongside of it at right angles in the center house, thus providing plenty of closet space for the dishes. A cool-closet, one of the characteristic features of the California bungalow, is placed in each kitchen, this being the California equivalent of an icebox.

A hall runs at the center of the house, all rooms opening from it. A scuttle to the attic renders this space approachable when desired.

Each of the bungalows has two bedrooms, each of which has a large closet. As these closets are placed in the partition dividing the bedrooms, they form a sound barrier that helps to keep noises from penetrating from one room to the other, especially as no other rooms connect directly to the bedrooms. Each one of the bathrooms is entered directly from the central hall and from the kitchen porch, being vented from above.

The sleeping porch at the rear of each bungalow is entered from the rear or master's bedroom.

These bungalows were erected at Santa Barbara, Cal., for E. W. Alexander, 214-222 East Victoria Street, in accordance with plans and specifications prepared by Roland F. Sauter, architect, Santa Barbara, Cal.

# What an "Open" Market Means to Building

## *Influence on Prices—Tendencies Now That Industries Board Has Taken Its Hands Off*

Now that there are to be no further attempts to stabilize commodity prices—the result of the conference recently held in New York City between the Industries Board and the steel industry which forced an "open" market having created an unmistakably better feeling—it is to be hoped that the Government's tinkering with business is at an end and that the progress of construction will be allowed to resume its normal cadence.

Just how firmly the restriction has been while the Industries Board and Railroad Administration were at deadlock is shown in practically every large municipality where all but the more daring speculators and those soundly financially backed were hesitant about proceeding with building projects. The Government's apparent disregard of the fundamental principles of economics in strangling the always present law of supply and demand and the substitution of a price fixing policy, did more than any other one thing to retard the needed impetus that should long ago have been given post-war construction.

### *When Error Was Corrected*

Not until the Railroad Administration refused to order steel rails at the price fixed by the Industries Board was an effort made to put an end to such ill-advised procedure. The Railroad Administration's attitude in the matter has not received proper recognition, due possibly to the fact that its reasons for taking the stand it did were not made public. Industry consequently has just had to surmise that it was done to prevent possible violation of the Sherman Act.

Subsequently another effort was made to fix the price of steel, but when the leading corporations proved to the Industries Board that no further reduction could be made without a reduction of wages, they won their fight for an "open" market. But in the meantime it has been business that has been held up, as usual.

In the past it has been very clearly demonstrated that American business men can always find a way to solve problems that may confront them no matter how difficult they may appear. There is no reason to believe that they could not have worked out the solution of reconstruction period business difficulties had they been given a free hand and assurance that there would have been no crossfire interference by Governmental departments. Recently the Administration has been getting a dose of its own medicine, but, of course, at the expense of business.

### *Navy Department's Experience*

No better illustration of the futility of the Administration's efforts to tinker with business can be had than the recent Navy Department experience.

Over a month ago the Navy Department requested bids on 20,000 tons of steel, and on opening the orders found that each of the fourteen companies had submitted the price fixed by the Industries Board. Naturally, the bids were rejected as being non-competitive. Last week, on opening bids on another lot of plates, the same situation was found to exist. The bidders either referred the Navy Department to their bids of early April, or put in new offers amounting to practically the same thing.

As far as the Navy Department is concerned, action has been taken under authority conferred by war emergency legislation by placing an order, or what amounts to a requisition, for 14,000 tons of steel with the Carnegie Steel Company. Decision to requisition the steel was the result of a conference on how to meet the situation when it was found that the bids submitted were the same as the bids previously submitted, and which were based on prices agreed upon between the steel manufacturers and the now abandoned Industries Board, which were rejected on the ground that they showed no indication of competition.

The present order, according to an announcement made by Acting Secretary of the Navy Roosevelt, was placed "at a tentative price subject to later adjustment," and that only one company bid on the entire order. Whether the steel company will get a higher price than that fixed by the Industries Board, or whether, on account of the fact that it is put through as a war emergency requisition the price paid will be lower, remains to be seen.

The freeing of the price situation from Government muddling by the dissolution of the Industries Board and the resultant "open" market for building materials has already brought about an unmistakably better feeling in the construction industry.

# Higher Lumber Prices Probable

## *What the Price Situation Is—General Tendencies in Yard Business*

DURING the past two weeks the lumber market has taken quite an interesting turn. Prices of practically all items are advancing and the question now is, not "when will they go down," but "how high are they going"?

The old law of supply and demand is ruling the present market. Judging from reports of mill men, the demand exceeds the supply. The rise in the lumber market has affected nearly all items and may be termed a general advance. The reasons for this are many and show that the general rise is no "flash in the pan," but that prices will not only stay there but it is predicted will go to a higher level.

The domestic demand for lumber at present is chiefly from the West and Middle West, where industry and home building has started.

Five reasons for the advance in lumber prices may be said to be: 1. Demand from West and Middle West for home and industrial construction. 2. Furniture, Piano and Box Industries booming. 3. Public improvements being started. 4. The export demand. 5. The shortage of stocks at the mill points and a like shortage in most retail yards.

It is a fact that many Western mills, cutting Douglas Fir, Spruce and Red Cedar Shingles have withdrawn all quotations and are booking no more business. This is because the mills in the West are swamped with orders. Labor trouble is a big problem, causing a shortage in this year's cut.

Yard trade in the East is quite slow, but trade in the West and Middle West is very good.

The export trade in lumber is developing at a rapid rate. With more bottoms available, this end of the lumber business will serve to bolster up any weakness likely to be shown by the domestic lumber market.

Yards in suburban towns are reporting quite a demand for house building sizes of lumber. Yards in big cities are not getting the benefit of this demand, however, and therefore the trade of these yards is quite slow.

At last month's writing, the "weak sister" in the lumber market was North Carolina Pine, but at this time this lumber has surrendered this least coveted position to West Virginia Spruce. A month ago the N. C. situation was described as "shaky." Nearly half of the mills were closed down because of lack of demand and because the millmen could not make their costs meet the market figure quoted at that time. Since then, the demand has increased considerably and the market can be described as strong. A month ago there was very little demand for low grades. As 85 per cent of the cut of an N. C. mill are low grades, a mill could not very well run while those conditions existed.

With mills swamped with orders and stocks badly depleted at mill points, stocks in the hands of retailers low, furniture and other wood using industries booming, home building activity on the upward grade, foreign demand for lumber increasing, and prices therefore advancing rapidly, one may truthfully and conscientiously advise, "Buy Now and Buy Wisely."—A. C. S.

## Glue Failure Not Always Due to Glue

Glues are often blamed for failures for which they are not responsible. Tests made at the Forest Products Laboratory of the U. S. Forest Service at Madison, Wis., show that properly handled commercial glue develops a shearing strength greater than most woods.

The average glue user prepares his glue with reasonable intelligence but commits atrocities in preparing surfaces to be glued and in handling pieces after gluing. To get full strength from any glue, proper surface contact is imperative. Good glue will adhere fairly well even with poor surface contact. Joints of this kind possess, however, inherent weakness and the added disadvantage that they are more liable to ruin through bacterial action than tight joints, since the glue in them is more exposed.

The proper application of pressure is important in all glued work, but doubly so in the manufacture of plywood. Securing proper pressure involves keeping cauls and press in first-class condition and using them skillfully. With the hydraulic press it is easy for careless or ignorant workmen to spoil a batch of stock by applying too much pressure and starving the joint.

## Houses Built of Seaweed

A novel use has been found in England for seaweed. Combined with crushed slag and other heretofore neglected waste mineral products, it is used to make a kind of concrete out of which are being fashioned building bricks and blocks. The seaweed acts as a binding and strengthening element.

Arrangements are being made to put up a large number of houses composed entirely of these bricks, and it is predicted that the material, owing to its cheapness, will aid in solving the housing problem.

Not only the foundations and walls, but the doors, window frames and mantelpieces are to be constructed of the new concrete. The houses are to be made in sections and bolted together. The window frame is a new idea in itself. The glass, in one large pane, slips into a slot and the edges of molding are then turned over, so as to grip it. To mend a broken window will be a simple matter, not requiring a glazier.

It is said that dwellings made of the concrete will be warm and thoroughly damp proof.

# New Publications

**Management and Executive Control.** This book explains management and executive control especially as applied to banks, being volume five of the Shaw Banking Series. Although limited to this field, yet valuable data concerning management in general are contained, applicable to other business.

The book contains 328 pages, size 5½ x 8½ in., is illustrated by diagrams, fully indexed, published by the A. W. Shaw Co., and sells for $3.00.

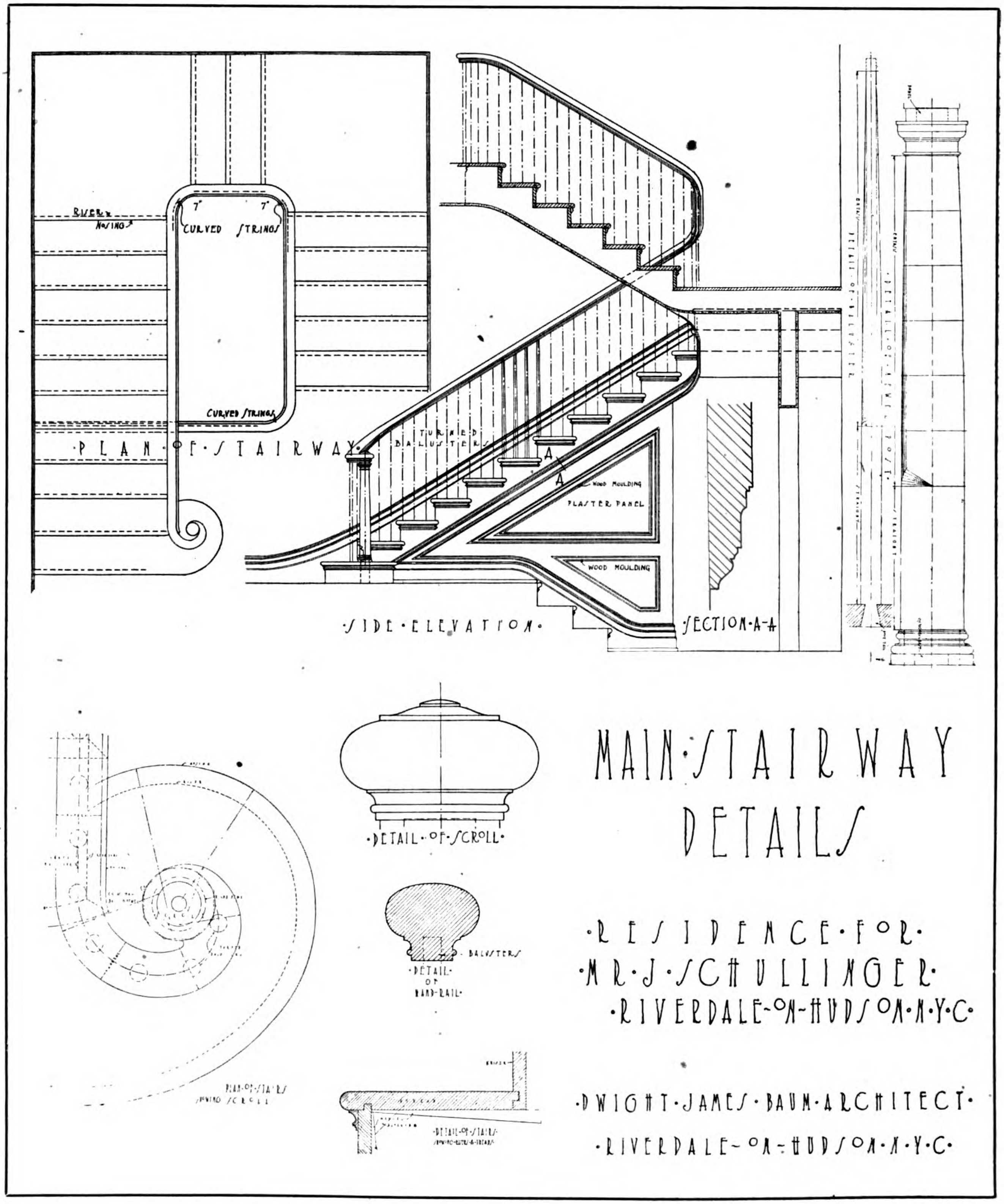
**Buildings, Equipment and Supply.** This book, written from the viewpoint of the banker, gives valuable data on planning banks and installing the necessary equipment. For the architect and builder interested in this class of work, the book will prove worth while as showing the building needs of up-to-date banks.

There is interesting information that can be used in presenting the advantages of a new building to bank authorities, such as how one bank doubled its accounts after moving into a new building, and how another increased its deposits 40 per cent with a new building.

The book covers such subjects as how much the bank can afford to spend; planning the banking room, lobby, etc.; placing cages effectively, where to locate the vaults. A chapter is devoted to selecting and installing effective heating, lighting and ventilation systems. A separate section is devoted to special equipment, thus enabling valuable recommendations to be made.

The book has 193 pages, size 5½ x 8½, is fully indexed, illustrated by photographs and diagrams, bound in cloth, published by the A. W. Shaw Co., and sells for $3.00.

## Details Showing Construction and Manner of Detailing



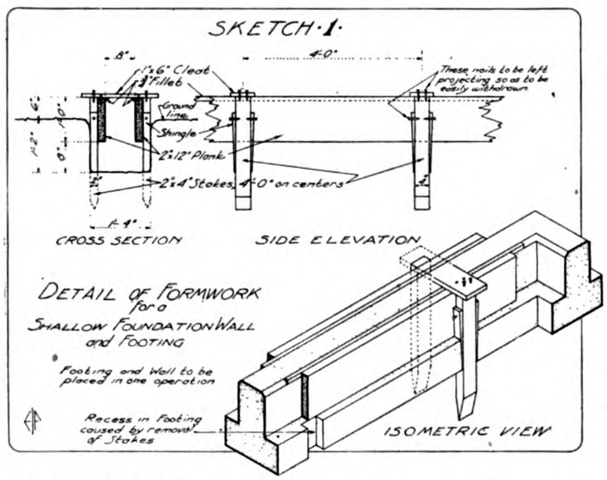
# Hall Beautified by Well-Proportioned Stairway


# Forms for Concrete Footings and Foundation Walls

## *Design and Construction of Formwork to Meet Conditions that May be Encountered*

By ERNEST IRVING FREESE

THE design of timber forms to safely withstand the hydraulic pressure of wet concrete is not a matter of guesswork. On the contrary, it is a matter of calculation, in the same manner that the design of a dam is a matter of calculation. In fact, the lateral pressure of a semi-liquid mass of concrete against the forms is of precisely the same nature as the pressure of water against the face of a dam—the only difference being that the pressure of the concrete, before taking its initial set, *is more than double the pressure of an equal depth of water*. It is thus seen that the hydraulic pressure of wet concrete is a destructive force of such magnitude that it can neither be safely neglected nor guessed at. In other words, the size and spacing of studding for any given thickness of sheathing, and the spacing of ties for the given size of studding, must be calculated to resist this lateral pressure without exceeding the safe strength of timber and, at the same time, to provide sufficient stiffness to resist excessive outward deflection, or bulging, of the forms.




In the accompanying table, complete data is given for the design of formwork to conform with any given thickness of sheathing. The calculations by which the tabulated values were derived are based on the assumption that the rate of fill will not exceed 2 ft. 6 in. in height per hour. In summer weather the initial set should begin about one-half hour, or not later than one hour, from the time of depositing the concrete in the forms. Hence, 2 ft. 6 in. of hydraulic head is the maximum used in the calculation of wall forms, since the lateral pressure is relieved when the concrete begins to take its initial set. In other words, when a height of fill equaling 2 ft. 6 in. is reached, it is assumed that at least one hour has elapsed and that the bottom inch begins to set and therefore exerts no lateral pressure against the forms. In effect, this means that concrete, while being poured, exerts a constant maximum hydrostatic pressure of 2½ lb. per square inch against the forms at a point 2 ft. 6 in. below the rising level of the concrete. Tests have shown that the hydrostatic pressure of wet concrete is equivalent to that of a liquid weighing 144 lb. per cubic foot, or one pound per square inch per foot of head. This value has been used in the calculations for the accompanying table. Other values that have been used in computing the tabulated values are as follows:

Maximum flexural stress on timber = 1200 lb. per square inch.

Lateral deflection, or outward bulging of the forms between vertical supports, not to exceed ⅛ in.

Modulus of elasticity of timber = 1,200,000 lb. per square inch.

Bending moment for continuous sheathing $= \dfrac{WL}{10}$

Resisting moment of sheathing $= 200bd^2$.

Bending moment for vertical studding $= \dfrac{WL}{7.8}$

Deflection formula for continuous sheathing $= \dfrac{WL^3}{128EI}$, in which

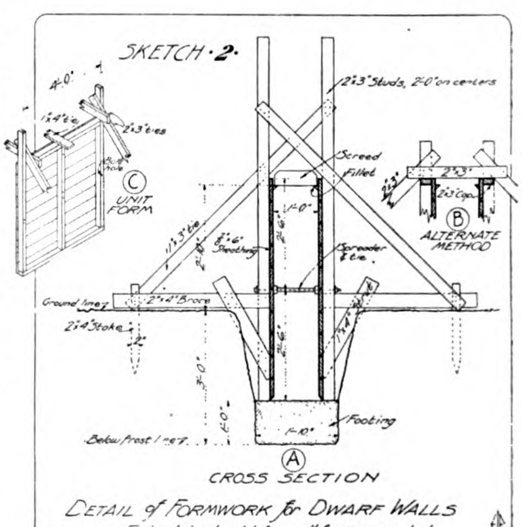
$W$ = total hydrostatic pressure, in pounds, on a strip of sheathing 1 in. wide at a plane 2 ft. 6 in. below the surface of the concrete, and for a span equal to the distance, center to center, of the studding.

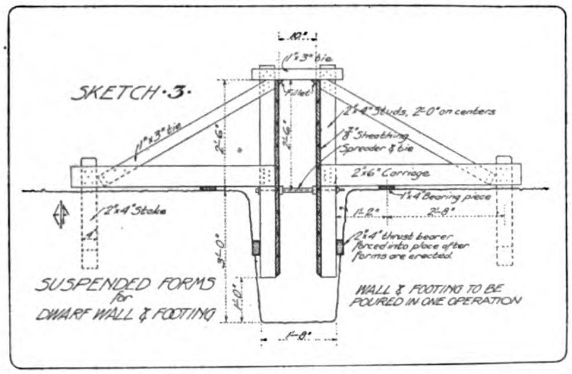
$L$ = span of sheathing, or distance center to center of studding, in inches.

$E$ = modulus of elasticity of timber, in pounds, per square inch.

$I$ = moment of inertia of the section considered, in biquadratic inches.

By making the above formula for deflection equal to the allowable deflection of ⅛ in., and then solving for $L$, it will be found, upon equating this value of $L$ with the corresponding value deduced from the strength formula, that the maximum deflection of ⅛ in. and the maximum flexural stress of 1200 lb. per square inch will be developed when the thickness of the sheathing is exactly 1 in.






Hence for thicknesses less than 1 in. the safe span is fixed by the *strength* of the sheathing, while for thicknesses exceeding 1 in. the safe span is fixed by the allowable *deflection*. All of the above conditions have been considered in the compilation of the accompanying table, and the above discussion and formulas have been given for the benefit of those who are familiar with structural mechanics and who hesitate to use tabular values without a knowledge of their derivation.

The table, it should be noted, applies to any and all thicknesses of wall, for the hydrostatic pressure is not dependent upon the width, but rather upon the depth, or "head," of the wet mixture. Moreover, since the pressure is the same against both sides of the forms, these pressures will equalize and balance each other if ties and spreaders are inserted between each opposite pair of studs at the tabulated intervals. Hence no exterior bracing will be required other than that necessary to merely hold the forms in place during the pouring of the concrete.

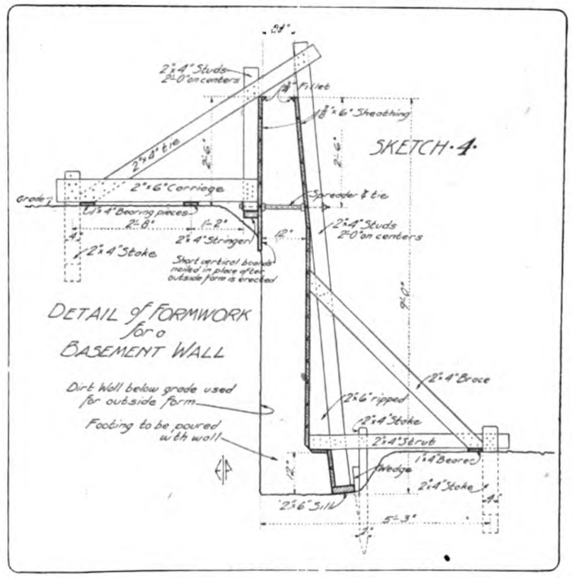
DESIGNING DATA

FORMWORK FOR CONCRETE WALLS

| Thickness of Sheathing | Maximum Spacing of Studs, Ctr. to Ctr. | Size of Studs | Maximum Spacing of Ties and Spreaders |
|---|---|---|---|
| ¾" | 1'-9" | 2"x3" | 2'-7" |
| | | 2"x4" | 3'-2" |
| ⅞" | 2'-1" | 2"x3" | 2'-6" |
| | | 2"x4" | 3'-0" |
| 1" | 2'-4" | 2"x3" | 2'-4" |
| | | 2"x4" | 2'-10" |
| 1⅛" | 2'-6" | 2"x3" | 2'-4" |
| | | 2"x4" | 2'-10" |
| 1¼" | 2'-9" | 2"x3" | 2'-3" |
| | | 2"x4" | 2'-9" |
| 1⅜" | 3'-0" | 2"x3" | 2'-2" |
| | | 2"x4" | 2'-8" |
| 1½" | 3'-3" | 2"x3" | 2'-1" |
| | | 2"x4" | 2'-7" |
| 1⅝" | 3'-5" | 2"x3" | 2'-1" |
| | | 2"x4" | 2'-6" |
| 1¾" | 3'-7" | 2"x3" | 2'-1" |
| | | 2"x4" | 2'-6" |
| 1⅞" | 3'-10" | 2"x3" | 2'-0" |
| | | 2"x4" | 2'-5" |
| 2" | 4'-0" | 2"x3" | 2'-0" |
| | | 2"x4" | 2'-5" |
| | | 2"x6" | 3'-2" |

Sketch No. 6 indicates two practical and satisfactory methods of tying and spreading the wall forms. In the detail at *A*, the tie is of No. 10 or No. 12 annealed wire. The wooden spreaders are inserted to prevent the collapse of the forms, and the tie wire is then tightened by means of a hardwood wedge driven between the face of the stud and the bearing plate of the tie, as is clearly shown in the drawing. The surprising amount of labor and time required to place the wire ties, together with the difficulty and uncertainty of placing and removing the wooden spreaders, render the method shown at *B* much more desirable. In this method ⅜ in. or ½ in. tie bolts are used instead of wire. The wooden washers and the pipe sleeve spreaders are slipped over the bolt as it passes through the inside form. The bolt is then passed through its hole in the outside form and is then tightened by being screwed into the nut, which has previously been secured in its proper place by two nails driven through small holes in the bearing plate and into the stud, as is shown and noted in the cross-section and end view at *B* in sketch No. 6. In a deep wall, where the outside form is necessarily set close to the bank of the excavation, it is thus possible for one man alone to place and remove the tie bolts easily and quickly, for the bolts are placed and withdrawn by working only from the accessible side of the forms, and by screwing, or unscrewing, as the case may be, on the *head* of the bolt instead of on the nut. After the bolts and forms are removed, the wooden washers are easily cut out of the concrete and the resulting holes then pointed with cement mortar. The pipe sleeves of course remain in the wall, but the bolts and their bearing plates can be used over and over again on different work. The pipe sleeves can very well be of old discarded gas pipe or water pipe, cut in lengths enough shorter than the thickness of the finished wall to allow space for the wooden washers at each end against the inside face of the forms. In any case, whether wire or bolts are used for ties, bearing plates should be provided as indicated, so as to distribute the pressure over a greater area and thus prevent the wire, or bolthead, from sinking into the timber and allowing the forms to spread. The bearing plates can be of steel or iron, 3/16 in. thick, 1½ in. wide, 2 in. long, and drilled or punched for the bolt holes and for the nail holes that hold the plate and nut in place.

In the sketches accompanying this article it will be seen that the forms are designed and built in such a way that the pressure of the liquid concrete naturally forces the boarding against the studding. Hence very few nails, and small ones, are needed to hold the boards in place. Unless the forms are built in units for repeated use, very little nailing is required, except in the outside braces, etc., that hold the forms against displacement. Even in the latter case, it is highly probable that bolts would prove more economical than spikes as a means of rigid connection, for the bolts are easily placed and removed and can be used repeatedly on different work.




Moreover, a single ¾ in. bolt is more reliable than perhaps a dozen spikes.

The joints in the sheathing should be tight enough to prevent appreciable leakage, for leakage is not only detrimental to the finished appearance of the concrete, but is, moreover, detrimental to the strength of the wall. The most satisfactory method of preventing excessive leakage, and yet provide against the possible buckling of the sheathing from swelling, is to slightly bevel one edge of the boards, as the sketches numbered 2 to 5 indicate. The boards can then be placed tightly together, for subsequent swelling will only result in a slight crushing of the beveled edge and thus serve to keep the joints continually tight.

In erecting the forms, it will be found that often times a slight excess of concrete will save many times its cost in carpenter work and lumber, for ease of erection and removal demand simplicity

(*Continued on page* 208)

# How to Build and Fireproof with Hollow Tile—XIV

## *Construction of Columns—Tile Used for Fire Protection*

By J. J. COSGROVE

ONE of the constant efforts of engineers and architects in the design of buildings is to cut down the amount of steel required, without sacrificing strength in so doing. To this end long-span arches are used; short-span arches of special design to cut down the weight of the floor construction, and concrete columns, both plain and reinforced.

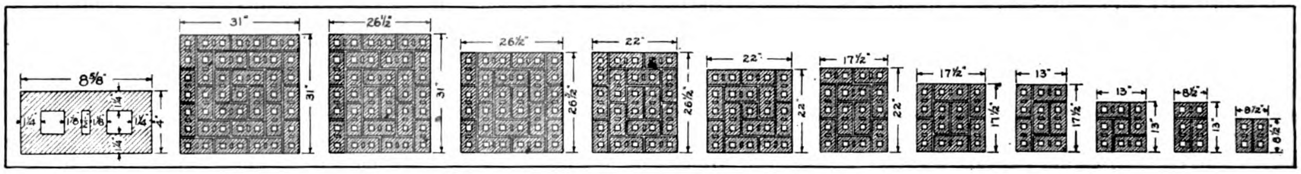


**Fig. 100.** Section of hollow tile useful in column construction.

**Fig. 103.** Manner of application to an iron column of the tile illustration in Fig. 102.

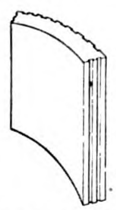


**Fig. 102.** Solid block type for fireproofing of columns.

During the period of readjustment now at hand, when steel, owing to its great demand, still sells at a high price, it is advisable for the builder as well as for the architect and engineer to know more about an exceedingly valuable and practical column, one made from hollow tile.

In previous articles mention has been made of the value of hollow tile for structural purposes, and the strength of ordinary building blocks of this material for load carrying purposes when used under compression. In this installment some idea will be given of special hollow tile blocks for column construction.

A hollow tile for column construction is shown in section in Fig. 100. It will be observed that the walls and webs are about twice as thick as those of ordinary hollow tile, and for blocks of equal size the cells are consequently smaller. These blocks are made in one size, 8⅛ x 4 x 8 in., and are therefore approximately the size of four bricks when laid in a wall.

Columns of any desired size can be made with these blocks, but the smallest built in practice is 8½ in. square, and the largest 31 in. square. The way the tile blocks are laid in columns of different sizes, both square and rectangular, is shown in Fig. 101. It will be observed that a half tile is needed in some of the square columns, and this is obtained by halving one of the blocks.

The safe bearing loads for these columns can be found in the following table.

**Fig. 101.** This shows columns of various sizes laid up with tile illustrated in Fig. 100.

The values in the table are based on a ratio of one to twelve. That is, the column must not exceed in height twelve times the side dimension; when the column is not square the side dimension must be the smaller dimension of the two equal sides.

TABLE OF SIZES, WEIGHTS, SAFE LOADS AND NUMBER OF TILE IN COLUMNS

| Size of Column, Inches | Safe Load in Pounds | No. of Tile in Cross Section | No. of Tile per Lin. Ft. | Weight of Col. per Lin. Ft., Pounds |
|---|---|---|---|---|
| 31 x31 | 612,500 | 24½ | 36¾ | 612 |
| 31 x26½ | 525,000 | 21 | 31½ | 525 |
| 26½x26½ | 450,000 | 18 | 27 | 450 |
| 26½x22 | 375,000 | 15 | 22½ | 375 |
| 22 x22 | 312,500 | 12½ | 18¾ | 312½ |
| 22 x17½ | 250,000 | 10 | 15 | 250 |
| 17½x17½ | 200,000 | 8 | 12 | 200 |
| 17½x13 | 150,000 | 6 | 9 | 150 |
| 13 x13 | 112,500 | 4½ | 6¾ | 112½ |
| 13 x 8½ | 75,000 | 3 | 4½ | 75 |
| 8½x 8½ | 50,000 | 2 | 3 | 50 |

An interesting comparison can be made between the strength of hollow tile columns and the strength of columns of reinforced concrete. Many building codes of large cities allow a load of only 350 lb. per square inch on columns of reinforced concrete. A glance at the table will show that the safe load for hollow tile per square inch is as high as 692 lb., or approximately twice the load that is allowed in practice for concrete columns.

Two distinctions must be noted here, however. In the first place, 350 lb. per square inch for reinforced concrete, while it represents the limit set by some building codes, does not by any means represent what good reinforced concrete columns will support. To be perfectly safe framers of codes must provide large factors of safety, and in reinforced concrete more so than in any other form of construction in order to take care of the errors of judgment, or in some cases downright ignorance of the builders as to the proper amount and placing of reinforcement in concrete. And this element of uncertainty, which will always exist where the human frailty or human fallibility comes into play, must be guarded against.

Reinforced concrete columns properly designed and carefully built, will safely support twice the load allowed by codes in building practice; but because of the opportunity to err, for instance, in the mixing of a batch of concrete, a very large factor of safety is exacted.

In the second place, building codes of large cities do not allow as a rule the heavy loads on hollow tile columns which they will bear. Leaning again towards the side of safety, they would probably cut down the allowable load until it would be somewhere in the neighborhood of that allowed for columns of reinforced concrete.

But even if they will carry no more than columns of equal size built of reinforced concrete, they require no steel, and the less cost, together with the absence of steel, make columns of hollow tile particularly opportune during the present period of readjustment.

### *Hollow Tile Column Covering*

Experience has demonstrated that it is absolutely necessary to protect thoroughly cast-iron or steel columns supporting walls or floors, if the building is to be saved from destruction when exposed to the flames of a fire. As was pointed out in a previous installment, heat is the agency which destroys, not by consuming, but by heating to the bending temperature. Failure of unprotected columns in great conflagrations has taught that important lesson.

There is an economic side to the question, too, outside of the protection to property afforded by hollow-tile column covering. A low rate of insurance can be secured only when the columns are properly protected, for the durability of the building is dependent upon the stability of the columns.

There are three typical designs of hollow-tile covering made for columns. The solid block type is shown in Fig. 102,

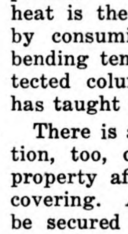


**Fig. 104.** Large cell hollow tile for fire-proofing.

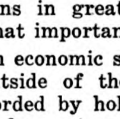


**Fig. 105.** Application of tile illustrated in Fig 104 to a round column.

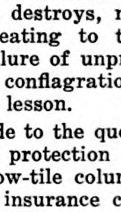


**Fig. 106.** Double cell tile for column covering.

and its application to a round cast-iron column is shown in section in Fig. 103. These blocks are made up in four segments of a circle, and laid up with a space between the inner side of the tile and the column, which is filled with concrete or cement mortar.

A large-cell hollow tile for column covering is shown in Fig. 104, and the way it is applied to a round iron column is shown in Fig. 105. Each succeeding course of blocks breaks joints with the course below and above.

A double-cell hollow tile for column covering is shown in Fig. 106. It will be observed that this block has ribs, *a* on the inner side. These ribs serve a double purpose. In the first place they keep the hollow tile blocks a certain and equal distance from the column; and in the second place the ribs thus form either air cells or spaces for concrete, whichever is called for. If the columns are of cast-iron the spaces may be left unfilled, and the ribs then form air cells. If the columns are of steel, on the other hand, the space between the hollow tile and the steel should be filled with cement mortar or concrete to prevent the possibility of corrosion and for additional security against fire.

Square columns are generally encased in square coverings made of partition tile, set to break joints. A block of this description is shown in Fig. 107. When rounded corners are desired they may be had by using blocks similar to that shown in Fig. 108, or 109.

Typical cross sections of both circular and square columns showing the various methods of treatment, not only to protect against fire and corrosion, but also overload, are not without interest to the practical builder. In Fig. 110 is shown an H column protected by hollow tile with rounded corners. It will be observed that the space between the inner side of the tile and the steel column is filled with concrete. This is to protect the column from corrosion and afford additional protection from fire. But a half inch of cement mortar or concrete will protect from corrosion as well as a foot will, while air cells in the concrete would afford even better protection against fire. Where the columns are large enough to permit it, therefore, hollow tile blocks are bedded in the cement as shown in Fig. 111. Another thing to note about this illustration is that the rivets keep the hollow tile from being laid against the end plates. That is a good thing, as it affords ample space for a protecting layer of cement or concrete.

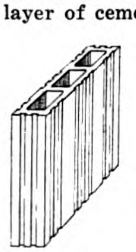


Fig. 107. Tile for a square column.

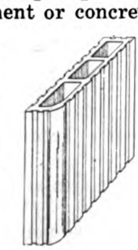


Fig. 108. Tile used when round corners are desired.

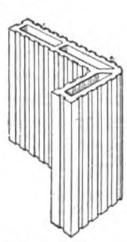


Fig. 109. Another type of tile with round corners.

In Fig. 112 the same type of steel column is shown encased in circular tile coverings. This not only affords the greatest amount of protection against fire and corrosion, but is a light form of construction, and the concrete and hollow tile add greatly to the strength of the column.

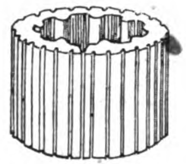


Fig. 115. Solid type of tile for round column.

Fig. 116. Cross section of column in which is used the tile illustrated in Fig. 115.

The box type of column is shown in Fig. 113 covered with square column covering similar to Fig. 118, while a like column is shown in Fig. 114 covered with square column covering similar to Fig. 109. In both these illustrations the spaces between the inner surface of the tile and the steel columns is completely filled with concrete.

Fig. 115 shows in perspective a solid type of round column, covering which is very thick and fluted or ribbed on the inside so that air spaces are formed. The ribs likewise help to keep the blocks equal distances from the columns when set in place. Fig. 116 shows a cross section of a round column where this type of column covering is used.

Fig. 113. Box type of column fireproofed with hollow tile.

Fig. 114. Column fireproofed with tile similar to that shown in Fig. 109.

One method of enclosing a cross column is shown in Fig. 117. Instead of treating it in that manner, however, round column covering could be used, or square column covering, and the spaces in the angles could be filled with concrete and hollow tile.

We come now to a phase of the subject of column covering which is more architectural in its treatment or purpose than engineering or fire protection. That is, the covering of pipes where they pass up through a building alongside of columns. It is not necessary to cover pipes to keep them from being destroyed by heat or fire, for if they should be it would not endanger the stability of the structure. Pipes are unsightly, however, when exposed alongside of columns in a room or corridor, so provision has been made by the fireproofer to hide them from sight.

Fig. 110. An H-column protected by round cornered hollow tile.

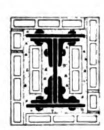


Fig. 111 Where columns are large enough, tile are bedded in the cement.

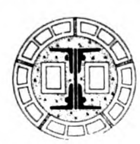


Fig. 112. Circular tile used to cover the same type column shown in Fig. 111.

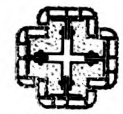


Fig. 117. Fireproofing a cross column.

Fig. 118. Pipes carried up inside of coverings.

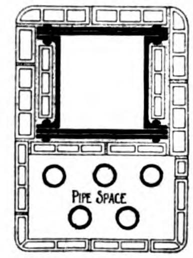



Fig. 119. Here the pipes are carried up in a separate space alongside the column.

In Fig. 118 is shown one method of carrying pipes up inside of round column coverings, and Fig. 119 shows how they may be carried up inside of square column coverings. It will be observed in both illustrations that the hollow tile blocks can be removed from in front of the pipes, thereby exposing them for inspection and repairs, without endangering the columns by exposing them to the danger of fire. In other words a complete unbroken layer of hollow tile blocks is carried around the column, and additional space enclosed with tile blocks in which the pipes can be run.

*To be continued.*

# Reducing Fire Hazard by Proper Chimney Construction

A summary of the various causes of fire, as given by State fire marshals of different States, shows that fires attributable to chimneys annually amount to from 10 to 26 per cent of the total number, while in winter the percentage has reached as high as 50. This is significant when it is realized that most of these fires result from carelessness and could be avoided by proper attention.

In cities and towns with proper fire protection many fires are arrested without serious loss. It is evident, say specialists of the United States Department of Agriculture, that in rural districts, where there are no organized fire-fighting agencies, and where a fire usually results in a total loss, builders should give more attention to making the construction of all new chimneys as nearly fireproof as possible.

With the establishment of peace, home

building, which during the war was practically at a standstill, probably will receive a considerable stimulus. With the increased volume of work, building will be speeded up to the limit, and the fact that carelessness is bound to creep in should not be forgotten. This should be especially guarded against in fire hazards in chimney construction.

It is well known that the ordinary brick-and-mortar chimney as usually constructed is a source of danger. The constant heat from fire in time causes the mortar to become dry, so that it falls out of place, leaving holes in the chimney. Such a condition usually goes unnoticed and is a constant source of danger from fire.

In constructing chimneys in buildings made of combustible material, the chimney should be built straight up from the ground and not placed on a bracket, as is often the case, and should extend 2 feet or more above the peak when the chimney is in the center of the roof and 3 feet or more above the surface when on a flat or slanting roof. For proper draft, the minimum-sized opening for the flue should not be less than 64 square inches, while the walls should be at least 8 inches thick. At the base of each flue a clean-out door should be provided, if possible. Whatever the material used in construction, it should be of good quality and laid in cement. Flue holes should never be filled with any inflammable material, but should be covered over in a secure manner with a metal flue stop.

The joists used to support the floors through which the chimney passes should not have their ends supported in the brick, as the chimney may settle, leaving at these points cracks through which fire may creep to the joists; furthermore, no other woodwork should come in contact with the chimney.

To obviate the fire hazard in brick chimneys it is suggested that some good flue lining be used in their construction. But it is imperative that the interior dimensions of the flue lining shall be the same as those of the brick flue it is to replace, or the capacity of the chimney will be reduced and another trouble encountered difficult to relieve. This lining may be either fire clay or terra-cotta tile, and no difficulty will be experienced in its use. If fire clay is used instead of terra-cotta tile, the results will be similar if the size of the flue is not thereby cut down. The lining serves as a fire preventive, and in the case of terra-cotta tile gives a flue of uniform dimensions. The ordinary brick chimney will not do this. With lining the flue presents a smooth surface, which leaves no place for soot to gather, this eliminating to a great extent the possibility of chimney fires. The cost of such a lining for an ordinary two-story residence would be nominal, and the lining should prove a cheap and effective means of fire protection.

It is possible to use fire brick in place of the fire clay or terra-cotta tile, with the same result, but at greater cost. Fire brick are almost universally used in the construction of fireplaces for lining the fireback, sides, throat, and walls of the ash pit.

Where the home is already equipped with the ordinary unlined brick chimney a close inspection should be given at short intervals to insure safety. If any breaks or cracks appear, they should be immediately repaired. It would also be well occasionally to clean the chimney, thus removing soot. This may be done with a wire or rope to which is fastened any object suitable for the purpose. A one-quarter-inch rope and a pair of old automobile tire chains used for this purpose did the work satisfactorily.

# Country House Details

By A. BENTON GREENBERG, architect

THERE is no standard classification of stone masonry. In general, however, they may be included under one of two divisions, viz: Rubble and Ashlar.

There are two main classes of rubble masonry walls: Uncoursed or random rubble (Fig. 1), and regular coursed rubble (Fig. 2). Random rubble is used for foundation walls below grade, for backing and for other rough work. It is made up of all sizes and shapes of stones which are set in an irregular fashion, without any attempt to build the horizontal joints parallel. Regular coursed rubble may be used for walls above grade. It differs from random rubble in that the horizontal joints are continuous and parallel, or nearly so. An effective example of this kind of walling is illustrated in Fig. 2, which shows brick quoins, the upper and lower lines of which set the range for the different courses of rubble masonry. In coursed masonry work, the courses need not necessarily be of uniform height.

Walls built of rubble masonry are weaker than those built of brick or concrete of equal dimensions. A rubble wall being made up of irregular shapes and sizes of stones requires a great deal of mortar to bind them together. For that reason a minimum thickness of 16 or 18 in. is usually prescribed for a foundation wall of rubble, while 10 or 12 in. would do for one built of concrete or brick.

A rubble wall depends for its strength upon the way the stones are cut and laid, and the manner in which they are bonded.

All stones should be laid flat on their natural bed; that is to say, if a stone has marked stratifications, the line of cleavage should be along these natural divisions. If field stones are used they should be roughly shaped to form flat beds. Stones must be clean and free from dust, and should be moistened before laying, in order that the mortar may adhere firmly.

The largest stones should be selected for the corners and should be laid up in alternate courses of headers and trimmers, so as to bond the two adjoining walls together, see Fig. 1. Stones that are too large are apt to split with the unequal settlement of the wall. Hence, to guard against this possibility of fracture, the stone should be examined to see that its length is not more than 4 or 5 times its depth, and that its breadth is from 1½ to 2 times its depth. Another precaution to be taken is to see that no two stones come in direct contact with each other, but that they are separated by a layer of mortar; for, if a stone bears directly on the projecting angles of another stone, it is liable to spall.

There are two ways of bonding a stone wall. The first is to use a single stone extending through the full thickness of the wall; and the second, is to use two stones, extending from opposite faces through three-quarters of the thickness of the wall and overlapping each other. The latter method is the better, because if a single stone is used it is more apt to split when the wall commences to settle.

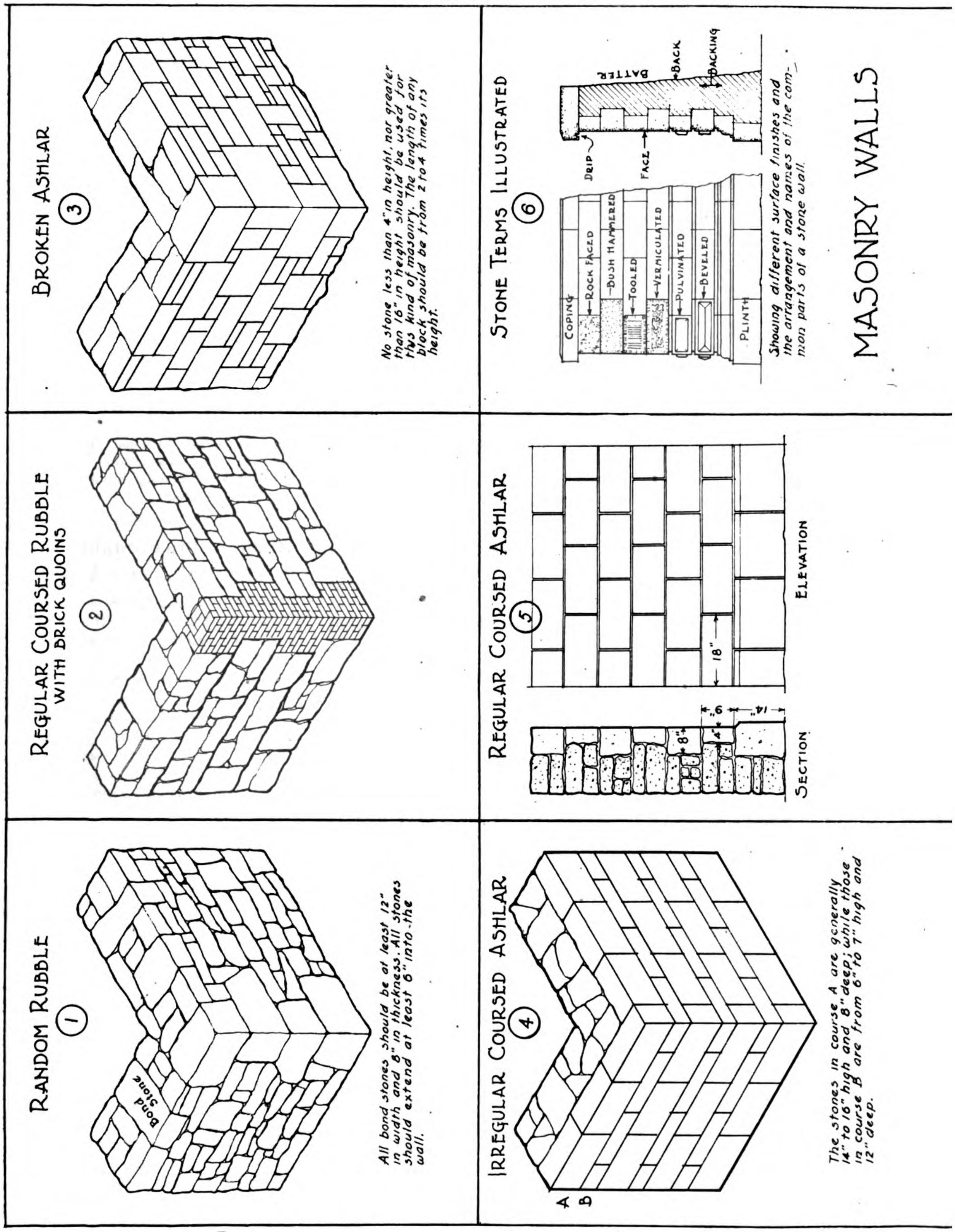
The number and position of bond stones are regulated by the New York Building Code as follows: "All stone walls 24 in. or less in thickness shall have at least one header extending through the wall in every three feet in height from the bottom of the wall, and in every three feet in length; and if over 24 in. in thickness, shall have one header for every six superficial feet on both sides of the wall, laid on top of each other to bond together, and running into the wall at least two feet."

Ashlar is the term applied to a stone that is accurately cut and carefully dressed, and which is used as a material for facing walls. Except in engineering work, ashlar walls are rarely built entirely of cut stone. They are, as a rule, faced with ashlar and backed with brick, concrete or rubble. When brick backing is used, the ashlar must be cut to brick dimension size and the back of the stone must be roughly squared to avoid unnecessary cutting of the brick. When rubble backing is used, the courses of rubble should be levelled up to coincide with those of the ashlar. Ashlar must be at least 4 in. thick and must be anchored to its backing, either by using courses of ashlar of different thicknesses, or by means of iron clamps or anchors, see Fig. 5. Whichever method is employed, the necessity of building up the rubble or brick backing to the same height of the ashlar facing and firmly anchoring one to the other, to avoid the evils of unequal settlement, becomes quite apparent.

There are two classes of ashlar walls—coursed and broken. Coursed ashlar, Fig. 5, is laid in continuous courses with stones of uniform height, while broken ashlar, Fig. 3, is laid without any continuous horizontal joints and with stones of different dimensions. Fig. 4, with its wide and narrow courses alternating with

**each other, is a very pleasing and, therefore, popular variety of regular coursed ashlar work.**

**A rubble wall depends upon the binding quality of the mortar joints for its homogeneity, while in ashlar work the strength depends upon the size of stones used and the accuracy of their bonding and dressing, but scarcely at all upon the quality of mortar in the joints. For that reason joints in ashlar work are ¼ in. thick and those in rubble masonry at least ½ in. thick. As in the case of brickwork, explained in the previous issue of the BUILDING AGE, stonewor[k] low grade or in damp places should b[e] in cement and lime mortar, or pr[efer]ably, in cement mortar. In dry si[tua]tions, when not subjected to heavy l[oad]ing, stone masonry may be set in mortar.**



MASONRY WALLS

## Forms for Concrete Footings

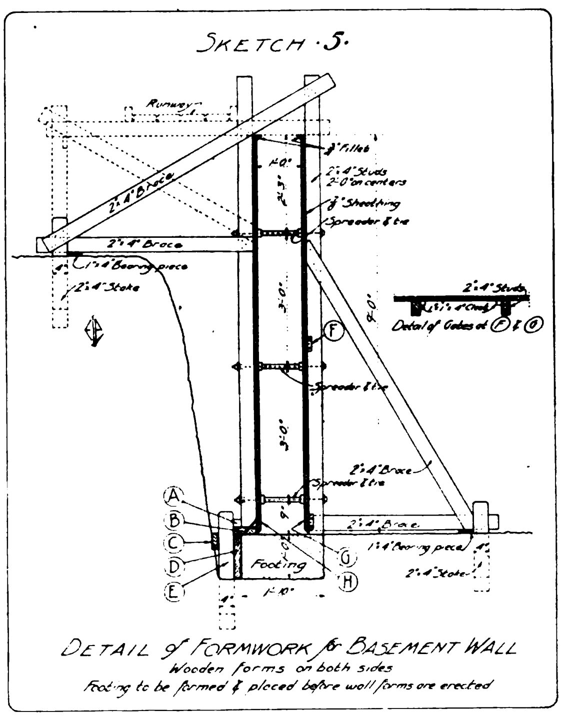
(*Continued from page* 203)

in the design and construction of the formwork. And this simplicity will usually offset any apparent first advantage gained by using less lumber.

Lumber surfaced on one side is essential to smooth work. In fact, surfaced lumber is probably the most economical to use for sheathing in all cases, for concrete adheres very slightly to planed lumber and is easily scraped off. Hence the saving in the labor of cleaning more than balances the extra cost of planing.

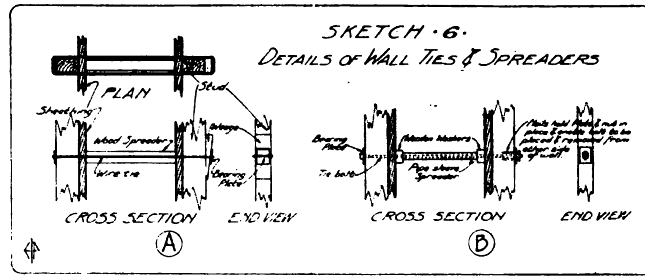
The most preferable lumber for form sheathing is white pine, for it is easily worked and retains its shape after exposure to the weather. It has, however, little durability because of its extreme softness, and hence would be unfit for forms that were to be used repeatedly in units, or for sheathing that was to be used over and over again. Nevertheless, where a perfectly smooth finish is demanded, or where moulded work is called for, white pine is the most satisfactory material for forms. In other cases economy usually decides in favor of Douglas fir or spruce. Hemlock should be used only for the roughest work, for it is very coarse grained and liable to curl when in contact with wet concrete.

Green lumber, or lumber only partially seasoned, is preferable to dry, as the former is less affected by absorption of water from the wet concrete. If dry lumber is used, it should be thoroughly wetted before the concrete is poured. If the sheathing is thoroughly oiled, and not exposed too long to the warping action of hot sun and dry air, it can be used many times over. But long exposure will throw the surface out of true and open up the joints. Hence unit forms should be oiled and stored in a roofed shed when not in use. Oiled forms, however, are unsuitable for a wall that is to be subsequently plastered.




The accompanying sketches, 1 to 5, require little explanation, being in fact working drawings for construction of form-work for various types of foundation walls.

The shallow wall shown in sketch No. 1 is suitable only in those climates where frost does not penetrate deep in the ground. The 1 in. by 6 in. cleats act as hangers, spreaders and ties for the single 2 in. by 12 in. plank forms. The cleats are nailed to the top of the stakes, and the nails left projecting. Then, upon the pulling of these nails, the whole form can easily be lifted off the wall. The strip of shingle tacked to each side of the stakes is done to permit the easy removal of the stakes. The projecting shingle nail is first pulled out, and the loosened shingle, being of tapering shape, allows of the stake being pulled freely without disrupting the fresh concrete. The shingles themselves are then removed.




In the wall shown in sketch No. 2, the footing is carried below frost line. The footing is poured first, directly into the trench. After the footing has hardened sufficiently, it is used as a support for the wall forms, as shown.

Sketch No. 3 shows the wall and footing cast as a unit, and the forms, in this case, are suspended in the manner indicated.

Sketch No. 4 indicates an excellent manner of constructing the formwork for a basement wall in case the earth is sufficiently firm to stand vertically and thus act as the outside form of the wall below grade. In this case the wall and footing are poured monolithically.

Sketch No. 5 shows the more common case of a basement wall where formwork is required on both faces. This occurs in cases where the bank of the excavation cannot be utilized as an outside form either because the earth is not sufficiently firm, or where a wider excavation is required in order to allow space for a footing drain at the outside base of the wall. The footing is formed and poured before the wall forms are erected. The outside form for the footing is a 2 in. by 12 in. plank *D*, held in place by the stakes *E*, which in turn bear against the continuous thrust bearer *C* wedged or forced between the stakes and the bank of earth. After the footing has become set, the 2 in. by 6 in. still *B* is set to line and levelled, and then spiked to the plank *D* which has been left in place. The outside form is then raised into position, as shown, the lowest sheathing board *H* not being nailed in place until the formwork is plumbed, toe-nailed to the sill *B* and tightly wedged against the stakes by means of the wedges at *A* driven between the studding and stakes through the opening at the base of the forms. This opening is then closed by the board *H*, and the inside form next erected. The ties and spreaders are then placed—the gates at *F* and *G* having been left in the forms for this purpose. The lower gate at *G* should be left open until the inside of the form has been washed down with a hose, as this gate allows an exit for any debris that may have collected on top of the footing.

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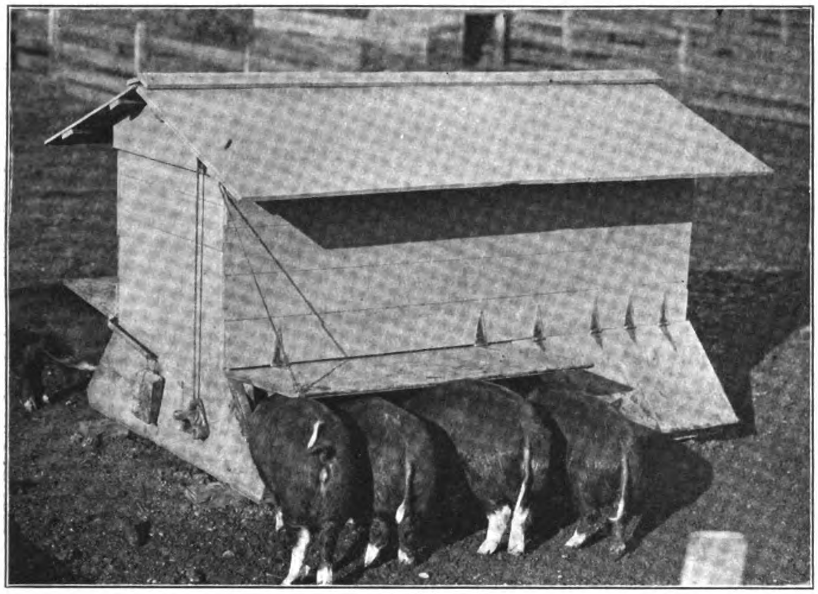
## Building Prices Stable, Washington Experts Assert

Present building prices in all the cities of the country east of the Mississippi River are stable. Nothing is to be gained by postponing work.

These are broad conclusions made public by a committee of experts named through government agencies to make a close study of building industry conditions in the eastern section of the country. While called the Building Industry Stabilization Committee, neither its work nor report has any relation to the general price stabilization campaign of the industrial board of the Department of Commerce, which has ended in the resignation of members of the board and a flood of charges, counter-charges and personalities.

In view of the fact that scores of cities are situated like New York with grossly inadequate housing facilities, the belief exists here that the survey, which shows that the present level of prices of both material and labor represents a stable basis from which to figure construction work for 1919, and will assist materially in bringing about an immediate revival in the building industry.

The survey, preliminary to the details of the industry, says: "The country at large is two years behind in building, which cannot be long delayed, and which, when started, will be reflected in a tremendous demand for materials and labor."



# A Practical Self-Feeder for Hogs

## *Reduces Labor and Saves Feed—Bill of Materials*

By F. C. LEWIS, Rural Architect

SELF-FEEDERS for fattening hogs have become very popular in the corn belt of the United States. They are not only adapted to the feeding of corn, but are used for ground feed and tankage.

A Self-Feeder may be defined as a cafateria for hogs or in other words, it is a device for holding feed and making it available as the appetites of the hogs demand.

Self-Feeders may be made in many different ways, but the general principles of all are practically the same.

More feeders should be used by farmers, especially at a time like this when feed and labor are both scarce and high priced. When the feeder is used the hogs have plenty of good clean food, they eat as their appetites demand, and they do not waste feed by tramping it into the ground.

Little labor is necessary with the feeder, as but little attention is required other than keeping a supply of food in the hopper and an occasional glance to see that the food does not become clogged; this should not happen often with a properly constructed feeder. Other advantages are that the hogs get their food on time, and a small boy can expect as good results as the most experienced hog raiser.

Experiments show that a hog will eat more feed, gain more rapidly, be ready for the market earlier when self-fed than when hand fed.

The photograph shows a Self-feeder for hogs that has been designed, built, and tried by the author and has overcome many of the difficulties found in many other feeders.

This feeder is built on skids and may be easily moved by hitching a team to one end. The frame work is of two by fours and two by twos covered on the outside with shiplap or flooring. The roof is made in sections which slide up under the ridge boards, making a rainproof joint; they may be easily removed for filling. The sides are perpendicular, thus preventing the feed from sticking and clogging.

A hinged lid, easily raised by the food-seeking hogs, is placed over the feed trough, preventing the feed from becoming wet and souring, and keeps the wind from blowing the feed out and also keeps chickens from scratching and dirtying the feed so that the hogs will not eat it.

Small doors at either end allow a free circulation of air through beneath the deflector, which carries out the dampness from the deflector floor.

Three partitions are used, allowing three kinds of feed to be fed with one feeder.

The lumber should be of a good grade, free from loose knots. The flooring should be of one and a quarter inch material and edge grain to stand the wear. The outside of the feeder should be well primed and painted to prevent absorption of dampness from the atmosphere.

### Bill of Material for Self-Feeder

| Lumber Bill:— | Board Feet |
|---|---|
| 1 4 x 4″ x 18′ skids | 24 |
| 1 2 x 4″ x 16′ side rails | 11 |
| 1 2 x 4″ x 12′ end rails | 8 |
| 1 2 x 4″ x 18′ deflector joist | 12 |
| 1 2 x 2″ x 16′ deflector joist | 6 |
| 1 2 x 4″ x 16′ deflector joist and ridge | 11 |
| 1 2 x 4″ x 16′ plates | 11 |
| 1 2 x 4″ x 12′ studding | 8 |
| 1 2 x 2″ x 16′ studding | 5 |
| 1 2 x 2″ x 10′ nailing strips | 4 |
| 1 1 x 10″ x 8′ gables | 7 |
| 7 1 x 4″ x 12′ cleats and braces | 21 |
| 1 2 x 6″ x 8′ feed adjuster slides | 8 |
| 2 2 x 2″ x 10′ feed adjuster slides | 4 |
| 2 1 x 4″ x 10′ ridge boards | 7 |
| 1 1 x12″x8′ gables | 8 |
| 1 1 x 10″ x 12′ feed adjusting slides | 10 |
| 7 1 x 6″ x 16′, 1 ¼″ T&G edge grain flooring | 56 |
| 8 1 x 8″ x 12′, 8″ shiplap | 64 |
| 14 1 x 8″ x 16′ shiplap | 150 |
| 5 1 x 8″ x 12′ shiplap | 40 |
| 1 1 x 6″ x 16′ fence board | 8 |
| Total lumber | 483 |

Hardware:—

6 Prs. 6″ heavy strap hinges.
2 Prs. 4″ light strap hinges.
6 Doz. 2″ F. H. stove bolts.
2 Doz. 1″ F. H. stove bolts.
4 ⅜″ x 4½″ carriage bolts.
12 5/16 x 3″ carriage bolts.
2 7/16 x 6½″ bolts, threads both ends.
4 Pcs. 3/16 x ¾″ x 20″ strap iron.
2 Pcs. ¼ x 1″ x 42″ strap iron counter weights.
2 door buttons.
5 Lbs. 16d nails.
8 Lbs. 8d nails.
4 Lbs. 6d nails.

Painting:—

1 Gal. prepared paint.

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## How to Test Strength of Floors

(*Continued from page* 195)

S=safe fibre stress (bending extreme fibres)

Q=section modulus

The safe bending stresses to use for the various kinds of timber should be taken at 1600 pounds per square inch for Long Leaf, Yellow Pine, Spruce, Douglass Fir and White Pine at 1200. Short Leaf Yellow 1000, and Hemlock 800 pounds to the square inch.

The stresses are those permitted by the New York City Building Regulations, and allow a factor of safety of six.

With the information given, you can now work out the safe carrying capacity per square foot for the following example, which is your problem:

*Example:* The second story of a certain building is used as a machine shop. The floor area is 40′ x 80′, Georgia pine joists 10″ x 14″ on 10′ 0″ centres span 22′ 0″. Tongued and Grooved Flooring laid on these joists is of 42/8″ x 7½″

Pine. What safe load will the floor sustain per superficial square foot?

The first step is to find out how much weight the girder will carry, using the formula

$$\frac{10 \times 196 \times 1600}{9 \times 22} \cdot 15{,}840 \text{ pounds gross}$$

deducting the weight of the girder, we have—14,790 lbs. net, the safe load the girder will carry.

The girder carries 10′ x 22′ of floor area or 220 square feet. This area divided into 14,790, the weight which the girder is good for, give us 67 pounds per square foot, which the girder would carry, if that were the only thing to be taken into consideration. From 67 lbs. must be deducted the floor weight, which will be about 20 lbs. per square foot, leaving a net load the girder would carry of 47 lbs.

To find out what our floor is good for let us take a strip 12 inches wide by the span width and find out what that much is good for—

$$\frac{12 \times 25 \times 1600}{9 \times 10} = 5333;$$

this divided by 10′ 0″ the span will give what the floor will carry per square foot gross, deducting 20 pounds per square foot for the weight of the floor, which will leave 513 pounds net, as the weight which the floor will carry.

The figures indicate that the floor will carry more weight per square foot than the girder. The girder being the member which will carry the least weight will, therefore, determine the load which the floor will carry—we know that the girder will carry 47 lbs. per square foot on the span given. Therefore, the live load which the floor will carry can only be taken.

*Note:* Deflection was not considered in the calculations. W. G.

## Scratched Joints Versus Smooth Joints in Gluing

The common assertion that scratched surfaces make stronger glued joints than smooth surfaces seems hard to prove. Comparative tests made on several occasions by the Forest Products Laboratory all indicate that the strengths of these two types of joints are practically the same.

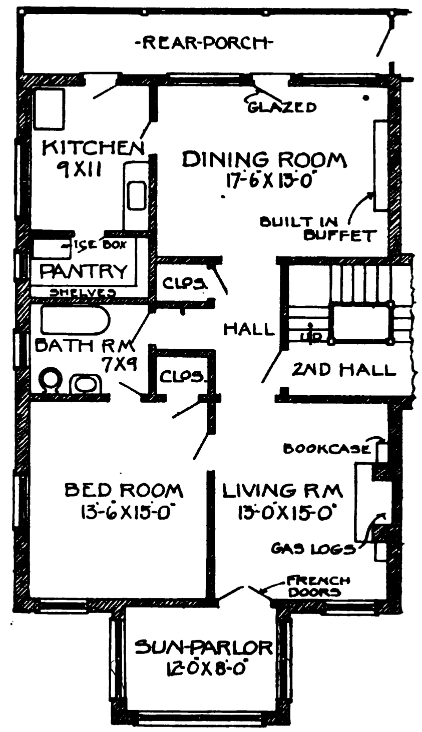
The test specimens used by the Laboratory were pairs of hard maple blocks, some with smooth and some with tooth-planed contact surfaces. These blocks were glued with a high grade hide glue, allowed to stand for a week, and then sheared apart.

On seven of the eleven tests smooth surfaces gave the better adhesion. Consequently it would seem that there is no advantage in tooth-planing wood for gluing purposes.

## Practical Plan for Apartment House

By C. H. BISHOP

The tendency these days, in the Middle West at least, is toward the construction of two, three, six and twelve-family apartment buildings. In the field of moderate priced construction brick apartments predominate in Chicago, and most

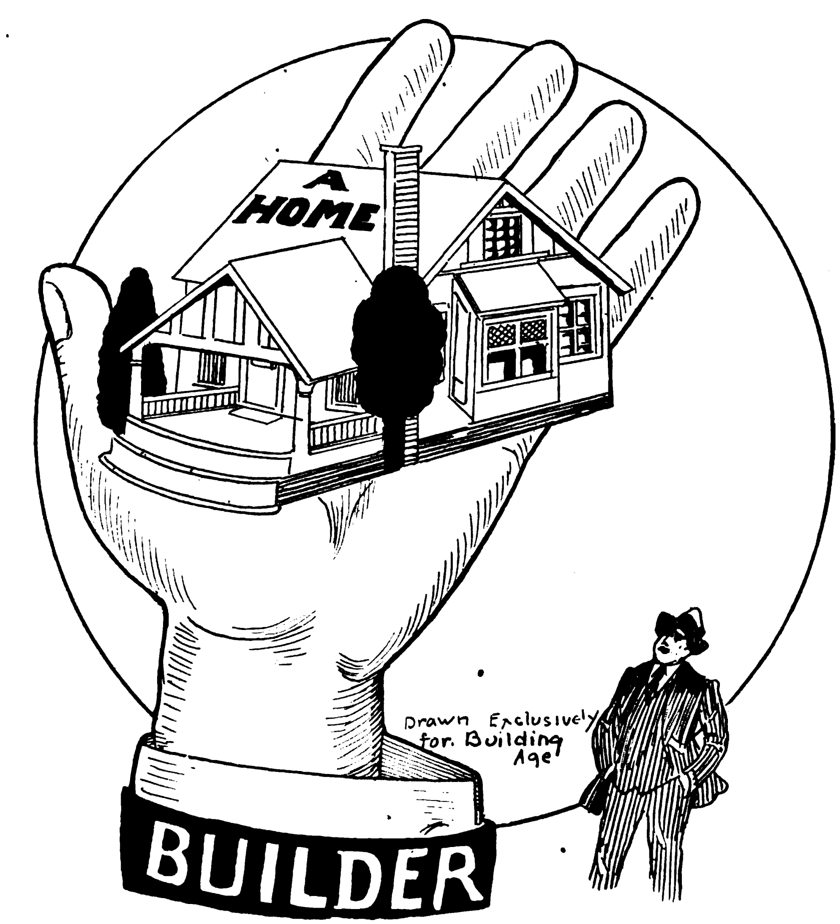



buildings are being constructed with the enclosed sun parlor, because it can be used all year round, in preference to the open porch. This feature adds much to the architectural effect in addition to the pleasure it affords the occupant.

The sun parlor is indeed very popular in Chicago and nowhere else in the Middle West have I found it included in all classes of apartment buildings, renting from around $35 per month and up.

As an example of what the visitor may find in Chicago I am enclosing a floor plan of a comfortable apartment in a 12-flat building in Ravenswood. The building is three stories high, which is common practice for apartments accommodating three families and up, there being few apartments in Chicago exceeding this height and requiring elevator service, except in the more exclusive sections of the city. There are two entrances to the building, one on the east side and the other on the south, each side of the building having six apartments. These flats rent from $35 to $40 per month, and the floor plan shown is typical of all flats in this building.

## The Family's Future Is in Your Hands



# THE EDITOR'S PAGE

### *Paying for Estimates Will Lower Cost of Building*

The average builder doing competitive work will estimate on ten jobs in order to secure one. Each one of these estimates will cost on the average at least $75. Thus an outlay of at least $750 must be made before a contract is secured, $675 of which is waste pure and simple.

This $675 goes into the builder's overhead. It is charged up against the one job in ten secured, adding just that much to the cost.

Many an architect's expenses also goes into useless overhead. In a recent competition, 75 architects submitted plans for an expensive structure. Each set of plans prepared on the chance of securing this job averaged $1000. Wasted, $74,000. And the owners paid for this in the form of the architect's overhead.

That condition is deplorable. If owners who desired competitive plans or a choice of estimates, paid for just as many as desired, then less waste effort would be required and overhead would be lowered. That means an appreciable reduction in costs.

Of course when a builder goes after a job, having no competition, it is good business for him to give an estimate of cost. The owner naturally desires to know the cost of the work before proceeding. If it is too high the builder does not secure the job, but neither does anybody else.

Too often, however, in localities where many contractors are willing to bid, ten or twelve will be asked to submit estimates—free. All bids may be rejected. At best only one will win out; the others will have had their trouble for nothing.

That is not fair, but unfortunately the trade has educated the public to expect this sort of indiscriminate service.

Now that costs have advanced so considerably, it is time that such wholesale free estimates on competitive business be eliminated. Let owners pay for just those estimates required; they will find their costs lower.

Elimination of the free estimate evil will do much to lower the cost of building.

### *Why Not Go After the Biggest Work in Town*

There is many a man capable of handling the largest work in his locality —if he had the courage to go after it.

Of course, it is human nature to look doubtingly into the future and say "Wonder what would happen if I didn't put this through?" Exaggeration of that attitude keeps many a good man down.

If a man knows and *knows* that he knows, then he is in a fair way to dominate his field. Let him doubt and wonder and distrust his abilities—and he is sure to fail.

That great quality, "courage," will carry a man up and over the top. The man who knows his work need never fear to tackle a job that is bigger than anything he has ever yet handled. In most of us there is a latent ability to develop ever higher, if we only have the courage to rise.

It is that quality, courage, backed by judgment which causes a contractor to be considered the right kind of man to employ. It gives people confidence in him and makes them trust his ability.

A quiet self assurance is many a successful man's main stock in trade.

### *Build Up Loyalty in Your Men*

A little praise now and then will do much to build up loyalty in the men who work for you. The man who only hears from the boss when something goes wrong is quite likely to either dread the boss's appearance or to hate him cordially.

One of the best workers I ever knew became a trouble maker and finally quit his job because he had introduced a first class idea that was gladly adopted, but the boss didn't trouble to thank him for it. This fellow's attitude became, "What's the use of doing good work for a man who doesn't seem to know or care for it?"

Many an employer is depriving himself of the best efforts of his workmen by a lack of expressed appreciation. A, "That's a pretty neat job, Jimmy," will bring a smile to a man's face. And when your back is turned, he'll be trying his level best to keep up to the same standard.

One builder will come on the job and say to an offending carpenter, "What the h—— do you mean by wasting good timber like that?" Another will say, "Jimmy, I always thought you a pretty careful man who wouldn't do a bonehead thing like that. What's the matter, feeling a bit under the weather this morning?"

There is no question as to which boss would be the better liked. A reprimand can be expressed in language that will either make a man fighting mad, or cause him to be ashamed of his carelessness and resolve to do better. Rile the average workman and he's likely to make you pay for it somehow. Make him a friend and he'll work his head off for you. There are many men who can boss others, few who can really manage them.

These times especially it pays to consult the feelings of the men who work for you. Treating them much as you yourself would like to be treated pays good dividends. Have you tried it?

### *Know Your Costs*

The other day a contractor wrote to me, "I have been doing quite a bit of business, but haven't made any money. What's the trouble?"

That condition is not confined to one man or to one line of business. Failure after failure in the business world is due to the same thing, plenty of business but no money made.

And what is the reason? The problem is one whose correct solution is the fundamental cause for success in the business world to-day—KNOWLEDGE OF COSTS.

That reason was put in capitals because it is the biggest, most important bit of information ever evolved out of sad experience. Think it, live it, make it a part of your very being—"Knowledge of Costs."

On that last job of yours you had the masonry and carpentry contract. You estimated 28 cu. yds. of concrete for the cellar wall, 55 hours work for two men. You put down what you thought a fair figure to charge. *How much did it cost you?*

Do you *know?* Did you make the profit expected? If not, why not? Again, do you *know?*

You should. The time actually spent, both in mixing and placing, the material used, the time spent in supervision, time consumed in hauling material to the job, if haulage was necessary—all these should be known exactly. If you estimate too little or too much, that knowledge will make your next estimate more accurate. If you see that you are falling behind your estimate, you can make every effort to speed up the work so that your proper profit is not eaten up.

You may find that by buying a small mixer you can cut time sufficiently for the equipment to pay for itself before the season is over. A different kind of shovel, more effective placing of materials on the job—all this data will be given you if you have a knowledge of costs.

Every successful firm has a knowledge of costs. If it did not, it either would not be making as much money as it might, or it would be headed toward bankruptcy.

Which way are you headed, toward bankruptcy or success? Knowledge of costs will tell you.

Get that knowledge and you are on the road to prosperity.

### *How a Live Builder Is Creating Confidence*

I was recently told of a clever method used by a builder to stimulate confidence in the stability of prices. On every contract, he is filing with the owner a list of the material prices his estimate is based on. If prices fall before the building is completed, the owner gets half of the saving.

The owner is thus protected if prices weaken. Naturally this builder is securing contracts that otherwise would not be let. And the people who make use of this builder's services to-day will remember his fairness to-morrow.

Taking advantage of such a method to build reputation is good advertising. That builder at the worst will certainly lose nothing by his offer—and he is gaining much.

### *How an Employer Secured the Co-operation of His Workers*

Labor to-day is the big problem in all lines. The building trade in all sections of the country either has been or still is suffering from this vexing problem to no small extent.

Labor has found that through collective action it can obtain by force what it could often obtain by no other means. The spirit of Unionism is spreading rapidly. It has even invaded the ranks of teachers and other salaried workers whom one would think would view the movement with alarm.

Employers are being forced to do one of two things. Either fight Unionism or co-operate with it enough to ensure that the employers' rights may be fairly dealt with. Workers are generally a fair-minded lot, but trouble making ideas can only be combatted by "selling" the workers the right and fairer view.

Ideas that are advanced for the genuine good of the workers are often turned down with suspicion and fail to "get over." Why? Because they have not been "sold" right. Workers have been and are being taught by agitators to view the advances of employers with suspicion, a suspicion that unfortunately is sometimes justified.

Considering the closeness of this subject to everyone's heart, the manner in which the co-operation of workers has been secured by the Wm. Demuth Co. will be of interest.

The plan is called "Industrial Democracy." Although put into operation in a plant employing 900 people, yet it contains an idea that can well be adapted by the smaller man. The main idea of the plan is to "sell" the workers the employer's needs and to secure the worker's co-operation for his own benefit.

In brief, the plan adapts the organization of the United States Government to an industrial plant. A cabinet is composed of the executives of the company, the foremen and department heads comprising the Senate; these two bodies are therefore not elective.

The House of Representatives comprises the workers, one representative being alloted to every 30 workers. This body is elective, the representatives being elected from among the workers themselves. The representatives receive and transmit to the House all complaints and suggestions. Instead of a man acting as a secret trouble maker among his fellows, he feels impelled to take the matter up with the representative elected by himself.

Half of what the workers can save in overhead and production goes to them in a separate envelope every two weeks. The workers have learned that idle machines increase overhead and so cut down his dividends. Consequently during the recent labor unrest, every effort was made by the workers themselves to keep a man at every machine.

Under the influence of this plan hours have been reduced from 53 to 48 hours without loss of efficiency, the workers agreeing to go back to the old hours if production suffered. Naturally many of the workers at first viewed the plan with suspicion, but they were "sold" right on the idea.

There is an idea here that even the small man may be able to turn to his own use. Treat labor fairly and make it realize that you *are* treating it fairly. That's one of the main secrets of solving the labor problem.

### *Getting the Most Out of the Magazines You Take*

In the course of a day an enormous amount of material comes to an editor's desk. Magazines, valuable government bulletins, financial statistics—all is material that is valuable and of decided benefit. Yet it is physically impossible for any one man to give this mass of facts more than the most cursory reading. What is to be done?

Builders with limited time are up against exactly the same problem as an editor. They take several periodicals, peruse them more or less carelessly, see a worth-while article, and put the paper away with an idea that that article must be read. It seldom is. Magazines pile up at an alarming rate and soon they occupy too much space in the living quarters. The consequence is that the whole pile is either relegated to the attic or junked.

That means that much worth-while information is practically scrapped. My method, merely common sense applied, may be of interest to men who have little time and must sift the chaff from the wheat.

As soon as I see a valuable article I read it then and there. If I don't, I know from experience that it will never be read, for it would go into an ever larger pile of material meant to be read to-morrow—and to-morrow never comes. Material that is not interesting enough to be read immediately I junk at once, for time has proved the uselessness of holding it.

It is surprising what a sense of discrimination such a method brings. I manage to keep in touch with all the really worth-while ideas and information, whereas before much of this valuable data was put away to be read tomorrow.

That same idea applied to reading magazines will result in all the really valuable information being gathered. An article, especially a long one such as that on steel beams published in BUILDING AGE a few months ago, is worth reading, but its length with many takes it into the "meant-to-be-read" class. Such articles should be read immediately, not put by to be read to-morrow.

Form the habit of reading worth-while articles immediately—and be sure of keeping in touch with the really worth-while ideas advanced by practical experts.

# Building Activity in the United States

All available statistics point to the fact that building is now well under way. The latest figures received direct from city building departments throughout the country show that the estimated money value for plans filed during April, 1919, is 84 per cent greater than for April, 1918. The total estimated value is $88,320,258 as

**against $48,007,171. This is by far the largest increase reported this year.**

**That this prosperity is widespread is shown by the fact that out of 170 cities reporting, 139 show gains, as against only 31 showing losses. This is decidedly encouraging.**

**Middle state cities show the largest gain, [illegible] Southern cities are next with 82 per cent .gain. Eastern cities show 81 per cent gain, and Western cities 45 per cent.**

CITIES IN EASTERN STATES

| | April, 1919 | | | | April, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Albany, N. Y | 248 | $237,188 | ... | ... | 172 | $199,060 | ... | ... |
| *Allentown, Pa | 31 | 200,560 | 27 | $24,050 | 30 | $184,280 | 18 | 18,440 |
| *Altoona, Pa | 34 | 55,756 | 106 | 49,124 | 6 | 3,750 | 52 | 17,817 |
| *Atlantic City, N. J | 9 | 32,735 | 105 | 66,298 | 8 | 2,906 | 93 | 31,379 |
| *Binghamton, N. Y | 120 | 92,724 | 165 | 36,428 | 124 | 67,991 | 132 | 31,114 |
| *Boston, Mass | 189 | 799,991 | 361 | 500,492 | 69 | 459,540 | 361 | 389,856 |
| *Bridgeport, Conn | 140 | 318,419 | ... | ... | 158 | 310,002 | ... | ... |
| Brockton, Mass | 31 | 12,250 | 30 | 11,860 | 22 | 47,425 | 25 | 30,810 |
| Buffalo, N. Y | 449 | 608,500 | 144 | 125,500 | 550 | 939,000 | ... | ... |
| Camden, N. J | 106 | 139,131 | ... | ... | 72 | 592,143 | ... | ... |
| *Easton, Pa | 36 | 38,400 | ... | ... | 15 | 12,500 | ... | ... |
| *Erie, Pa | 132 | 163,138 | 99 | 65,921 | 97 | 140,260 | 82 | 56,753 |
| Fitchburg, Mass | 8 | 6,155 | 17 | 10,840 | 10 | 46,560 | 10 | 4,675 |
| *Harrisburg, Pa | 54 | 136,870 | ... | ... | 24 | 18,925 | ... | ... |
| Hoboken, N. J | 6 | 14,200 | 20 | 19,715 | 7 | 165,494 | 9 | 8,825 |
| Holyoke, Mass | 15 | 31,725 | 11 | 4,120 | 9 | 30,255 | 10 | 24,150 |
| *Fall River, Mass | 20 | 23,225 | 35 | 17,115 | 6 | 11,855 | 20 | 8,660 |
| *Lancaster, Pa | 2 | 38,975 | 41 | 39,800 | 5 | 10,900 | 17 | 12,350 |
| Lawrence, Mass | 27 | 46,055 | 13 | 9,450 | 17 | 172,500 | 10 | 19,500 |
| *Lowell, Mass | 55 | 69,730 | 73 | 91,310 | 26 | 41,808 | 49 | 27,075 |
| *Manchester, N. H | 51 | 92,795 | 60 | 22,052 | 22 | 15,005 | 59 | 32,840 |
| *Mount Vernon, N.Y. | 50 | 207,898 | 20 | 17,550 | 21 | 76,400 | 11 | 6,725 |
| *New Bedford, Mass. | 95 | 281,130 | ... | ... | 44 | 163,300 | ... | ... |
| *New Britain, Conn | 75 | 94,205 | 32 | 9,640 | 49 | 33,015 | 28 | 5,050 |
| *New Haven, Conn | 165 | 527,260 | ... | ... | 130 | 269,469 | ... | ... |
| New York: | | | | | | | | |
| *Manhattan | 49 | 3,333,750 | 315 | 2,600,280 | 17 | 558,700 | 277 | 1,202,550 |
| *Bronx | 69 | 2,154,550 | 235 | 144,948 | 21 | 180,800 | 238 | 121,971 |
| *Brooklyn | 468 | 4,197,770 | 598 | 525,330 | 204 | 3,106,525 | 719 | 428,445 |
| *Queens | 1337 | 3,290,226 | ... | ... | 357 | 743,510 | ... | ... |
| *Richmond | 197 | 379,580 | 73 | 28,856 | 88 | 211,634 | 53 | 38,320 |
| *Nutley, N. J | 11 | 11,595 | 18 | 1,430 | 9 | 1,905 | 4 | 203 |
| *Auburn, N. Y | 24 | 59,019 | ... | ... | 20 | 45,155 | ... | ... |
| *Passaic, N. J | 24 | 26,268 | 12 | 9,300 | 10 | 13,545 | 9 | 6,500 |
| Paterson, N. J | 70 | 82,375 | 78 | 37,570 | 57 | 82,883 | 58 | 40,687 |
| *Philadelphia, Pa | 1381 | 4,180,565 | ... | ... | 765 | 2,378,075 | ... | ... |
| *Pittsburgh, Pa | 538 | 1,014,383 | ... | ... | 349 | 771,381 | ... | ... |
| *Portland, Me | 48 | 93,841 | 50 | 22,147 | 31 | 59,350 | 17 | 25,585 |
| Quincy, Mass | 96 | 150,825 | ... | ... | 82 | 156,208 | ... | ... |
| *Reading, Pa | 58 | 101,300 | 210 | 46,400 | 31 | 7,950 | 179 | 27,450 |
| *Rochester, N. Y | 261 | 605,378 | 149 | 89,023 | 135 | 216,065 | 89 | 49,333 |
| *Schenectady, N. Y | 86 | 293,960 | 49 | 14,815 | 70 | 117,970 | 48 | 19,115 |
| *Scranton, Pa | 43 | 165,030 | ... | ... | 27 | 48,097 | ... | ... |
| Springfield, Mass | 188 | 365,755 | ... | ... | 123 | 447,275 | ... | ... |
| Stamford, Conn | 52 | 40,995 | ... | ... | 31 | 59,930 | ... | ... |
| *Syracuse, N. Y | 141 | 192,195 | 135 | 114,030 | 96 | 111,925 | 115 | 57,382 |
| *Trenton, N. J | 98 | 227,911 | ... | ... | 57 | 95,455 | ... | ... |
| *Troy, N. Y | 37 | 13,828 | ... | ... | ... | ... | ... | ... |
| *Utica, N. Y | 62 | 214,485 | 18 | 9,925 | 50 | 114,100 | 18 | 24,150 |
| *Cambridge, Mass | 79 | 265,775 | ... | ... | 70 | 204,885 | ... | ... |
| *Medford, Mass | 49 | 57,545 | ... | ... | 33 | 55,700 | ... | ... |
| Wilkes-Barre, Pa | 82 | 38,042 | ... | ... | 97 | 41,763 | ... | ... |
| *Worcester, Mass | 158 | 427,862 | 93 | 70,145 | 109 | 159,341 | 75 | 73,492 |
| *York, Pa | 30 | 97,725 | 48 | 34,020 | 22 | 13,595 | 44 | 12,237 |
| *Chelsea, Mass | 14 | 19,500 | ... | ... | 11 | 14,525 | ... | ... |
| *East Orange, N. J | 76 | 482,515 | ... | ... | 38 | 165,621 | ... | ... |
| Elizabeth, N. J | 69 | 214,853 | ... | ... | 64 | 229,243 | ... | ... |
| *Salem, Mass | 38 | 17,281 | ... | ... | 37 | 11,802 | ... | ... |
| *West Hoboken, N. J. | 30 | 17,900 | ... | ... | 12 | 3,666 | ... | ... |
| Yonkers, N. Y | 31 | 119,500 | ... | ... | 24 | 366,100 | ... | ... |
| | 8142 | $37,223,097 | 3440 | $4,869,484 | 4840 | $14,809,022 | 2929 | $2,853,439 |

CITIES IN WESTERN STATES

| | April, 1919 | | | | April, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Berkeley, Cal | 23 | $84,058 | 61 | $16,834 | 15 | $51,200 | 42 | $20,500 |
| *Stockton, Cal | 66 | 102,094 | ... | ... | 70 | 96,209 | ... | ... |
| Colorado Spgs., Col | 11 | 30,389 | 22 | 15,060 | 9 | 59,792 | 25 | 11,487 |
| *Denver, Col | 190 | 483,600 | 115 | 46,850 | 123 | 297,450 | 101 | 64,050 |
| *Eureka, Cal | 7 | 20,575 | 10 | 7,000 | ... | 11,000 | ... | 1,800 |
| *Fresno, Cal | 80 | 371,049 | 62 | 30,381 | 71 | 353,572 | 60 | 31,380 |
| *Long Beach, Cal | 339 | 437,329 | ... | ... | 172 | 241,499 | ... | ... |
| *Los Angeles, Cal | 619 | 1,449,117 | 337 | 161,138 | 325 | 575,257 | 284 | 184,057 |
| Oakland, Cal | 297 | 527,677 | 88 | 45,710 | 164 | 544,922 | 47 | 47,969 |
| *Pasadena, Cal | 28 | 45,327 | 49 | 20,309 | 17 | 39,040 | 43 | 14,715 |
| *Portland, Ore | 547 | 830,845 | 398 | 159,125 | 209 | 205,890 | 230 | 132,175 |
| *Salt Lake City, Utah. | 78 | 268,175 | 36 | 26,100 | 60 | 132,775 | 41 | 33,230 |
| *Pueblo, Col | 83 | 67,183 | ... | ... | 40 | 58,407 | ... | ... |
| Sacramento, Cal | 108 | 157,660 | ... | ... | 74 | 368,967 | ... | ... |
| *San Diego, Cal | 117 | 118,580 | ... | ... | 101 | 107,210 | ... | ... |
| *San Francisco, Cal | 156 | 955,303 | 328 | 137,403 | 71 | 535,788 | 284 | 158,512 |
| San Jose, Cal | 36 | 154,017 | ... | ... | 31 | 164,752 | ... | ... |
| *Seattle, Wash | 1377 | 1,341,415 | ... | ... | 1083 | 898,455 | ... | ... |
| *Spokane, Wash | 130 | 99,990 | 106 | 37,480 | 64 | 28,290 | 53 | 15,815 |
| *Tacoma, Wash | 196 | 215,332 | 215 | 53,280 | 141 | 203,937 | 89 | 34,433 |
| *Phoenix, Ariz | 35 | 114,771 | 45 | 17,256 | 17 | 40,785 | 20 | 9,833 |
| *Boise, Idaho | 16 | 45,800 | 37 | 21,138 | 5 | 7,500 | 31 | 8,362 |
| Missoula, Mont | 18 | 10,175 | ... | ... | 8 | 95,335 | ... | ... |
| | 4557 | $7,930,461 | 1909 | $795,064 | 2870 | $5,118,032 | 1350 | $768,316 |

*Indicates increase.

CITIES IN SOUTHERN STATES

| | April, 1919 | | | | April, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Atlanta, Ga | 125 | $859,100 | 218 | $88,120 | 41 | $409,500 | 155 | $110,398 |
| *Baltimore, Md | 470 | 995,864 | 872 | 261,600 | 130 | 1,108,243 | 540 | 108,200 |
| Charleston, S. C | 23 | 20,600 | 13 | 18,340 | 16 | 36,425 | 9 | 8,075 |
| *Tulsa, Okla | 235 | 627,285 | 50 | 25,665 | 149 | 455,870 | 52 | 28,789 |
| Charlotte, N. C | 37 | 83,550 | ... | ... | 34 | 217,982 | ... | ... |
| *Chattanooga, Tenn. | 249 | 156,483 | ... | ... | 156 | 77,276 | ... | ... |
| *Corpus Christi, Tex. | 22 | 14,340 | ... | ... | 4 | 430 | ... | ... |
| *Dallas, Tex | 117 | 239,050 | ... | ... | 82 | 225,934 | ... | ... |
| *El Paso, Tex | 140 | 126,000 | ... | ... | 110 | 59,041 | ... | ... |
| *Fort Worth, Tex | 119 | 787,802 | 53 | 37,785 | 26 | 301,405 | 25 | 31,650 |
| *Galveston, Tex | 605 | 65,552 | 143 | 2,804,511 | 344 | 714 | 326 | 225 |
| *Jacksonville, Fla | 23 | 61,350 | 37 | 72,499 | 13 | 46,510 | 22 | 45,610 |
| *Houston, Tex | 137 | 302,273 | 195 | 52,097 | 73 | 253,649 | 113 | 25,265 |
| *Huntington, W. Va | 110 | 214,667 | ... | ... | 41 | 83,850 | ... | ... |
| Louisville, Ky | 72 | 114,400 | 188 | 87,760 | 22 | 77,895 | 155 | 163,042 |
| *Memphis, Tenn | 63 | 588,825 | 99 | 135,302 | 28 | 212,624 | 84 | 59,019 |
| *Miami, Fla | 78 | 387,450 | ... | ... | 48 | 202,475 | ... | ... |
| *Augusta, Ga | 28 | 113,823 | 112 | 20,086 | ... | 57,635 | ... | 7,003 |
| *Covington, Ky | 24 | 50,950 | ... | ... | 29 | 13,550 | ... | ... |
| *Macon, Ga | 14 | 33,900 | 80 | 38,746 | 9 | 56,365 | 46 | 11,960 |
| *Montgomery, Ala | 150 | 32,063 | ... | ... | 105 | 30,849 | ... | ... |
| *Muskogee, Okla | 27 | 78,650 | ... | ... | 6 | 13,600 | ... | ... |
| *Nashville, Tenn | 465 | 192,912 | ... | ... | 367 | 97,840 | ... | ... |
| *New Orleans, La | 41 | 156,869 | 35 | 54,175 | 33 | 68,666 | 32 | 37,585 |
| *Norfolk, Va | 165 | 728,275 | 18 | 28,979 | 62 | 330,313 | 17 | 19,065 |
| *Oklahoma City, Okla. | 72 | 300,555 | 57 | 31,875 | 72 | 274,925 | 40 | 30,775 |
| *Pensacola, Fla | 5 | 6,450 | 157 | 20,650 | 10 | 9,290 | 138 | 12,966 |
| *Richmond, Va | 64 | 625,936 | 86 | 54,662 | 25 | 107,330 | 68 | 72,446 |
| Roanoke, Va | 117 | 38,380 | ... | ... | 27 | 49,830 | ... | ... |
| San Antonio, Tex | 272 | 331,330 | ... | ... | 246 | 773,880 | ... | ... |
| *Savannah, Ga | 53 | 68,625 | 20 | 16,625 | 28 | 77,905 | 5 | 4,300 |
| *Shreveport, La | 69 | 158,729 | 61 | 34,665 | 14 | 17,990 | 40 | 11,142 |
| *Sioux Falls, S. D | 23 | 47,250 | 18 | 4,125 | ... | ... | ... | ... |
| *Tampa, Fla | 15 | 109,575 | 77 | 17,765 | 14 | 35,000 | 55 | 6,930 |
| *Washington, D. C | 241 | 1,857,376 | 427 | 254,855 | 117 | 1,407,090 | 250 | 96,900 |
| *Wheeling, W. Va | 12 | 10,719 | 53 | 14,593 | 6 | 8,440 | 47 | 11,440 |
| *Wilmington, Del | 135 | 313,575 | ... | ... | 93 | 179,878 | ... | ... |
| *Birmingham, Ala | 91 | 93,900 | 333 | 78,636 | 53 | 46,375 | 88 | 70,060 |
| *Knoxville, Tenn | 24 | 92,950 | 80 | 21,945 | 9 | 24,000 | 65 | 22,687 |
| *Lexington, Ky | 108 | 133,868 | ... | ... | 37 | 37,280 | ... | ... |
| | 4840 | $11,221,251 | 3482 | $4,246,061 | 2679 | $7,487,854 | 2372 | $985,523 |

CITIES IN MIDDLE STATES

| | April, 1919 | | | | April, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Akron, Ohio | 811 | $2,590,775 | ... | $164,975 | 312 | $470,285 | ... | $59,850 |
| *Bay City, Mich | 34 | 68,450 | 57 | 28,250 | 61 | 38,575 | ... | ... |
| *Canton, Ohio | 220 | 673,374 | ... | ... | 162 | 337,280 | ... | ... |
| *Cedar Rapids, Iowa. | 60 | 167,000 | 10 | 21,000 | 21 | 65,000 | 12 | 14,000 |
| *Chicago, Ill | 705 | 7,447,800 | ... | ... | 396 | 2,767,900 | ... | ... |
| *Cincinnati, Ohio | 1129 | 435,850 | ... | ... | 1014 | 389,885 | ... | ... |
| *Cleveland, Ohio | 323 | 2,204,100 | 951 | 333,260 | 194 | 1,503,300 | 952 | 293,900 |
| Columbus, Ohio | 274 | 462,225 | 128 | 122,980 | 162 | 231,815 | 110 | 2,102,245 |
| Davenport, Iowa | 173 | 135,046 | ... | ... | 158 | 153,939 | ... | ... |
| *Decatur, Ill | 71 | 400,855 | 20 | 11,750 | 29 | 51,100 | 8 | 5,400 |
| Des Moines, Iowa | 67 | 144,555 | ... | ... | 94 | 228,945 | ... | ... |
| *Detroit, Mich | 1491 | 4,001,696 | 525 | 609,035 | 555 | 895,655 | 329 | 297,520 |
| *Duluth, Minn | 244 | 434,673 | ... | ... | 215 | 146,276 | ... | ... |
| *East St. Louis, Ill | 40 | 97,440 | 3 | 20,000 | 33 | 38,230 | ... | ... |
| *Ft. Wayne, Ind | 58 | 101,629 | 21 | 23,325 | 21 | 46,075 | 18 | 15,850 |
| *Fargo, N. D | 36 | 60,000 | 18 | 55,000 | 10 | 21,000 | 9 | 8,000 |
| *Grand Rapids, Mich. | 236 | 263,699 | ... | ... | 141 | 137,602 | ... | ... |
| *Hamilton, Ohio | 27 | 106,578 | 19 | 14,283 | 13 | 53,487 | 31 | 16,225 |
| *Indianapolis, Ind | 410 | 840,072 | 392 | 147,927 | 213 | 358,784 | 266 | 86,688 |
| Jackson, Mich | 60 | 85,195 | 37 | 28,050 | 45 | 100,454 | 28 | 10,701 |
| *Joplin, Mo | 12 | 252,650 | 18 | 6,105 | 28 | 33,230 | 17 | 11,575 |
| Joliet, Ill | 6 | 23,000 | ... | ... | 8 | 39,000 | ... | ... |
| *Kalamazoo, Mich | 24 | 89,600 | 6 | 6,500 | 5 | 6,650 | 4 | 1,600 |
| *Kansas City, Kan | 30 | 56,175 | 32 | 34,072 | 32 | 45,985 | ... | ... |
| *Kansas City, Mo | 507 | 726,225 | ... | ... | 197 | 454,455 | ... | ... |
| *Lansing, Mich | 132 | 293,360 | 21 | 16,730 | 34 | 48,450 | 2 | 1,600 |
| *Lincoln, Neb | 63 | 123,015 | 16 | 26,650 | 120 | 136,755 | 9 | 6,335 |
| *Milwaukee, Wis | 546 | 1,804,521 | ... | ... | 389 | 733,817 | ... | ... |
| *Minneapolis, Minn. | 947 | 1,780,100 | ... | ... | 607 | 764,945 | ... | ... |
| *Peoria, Ill | 54 | 81,500 | 14 | 29,708 | 29 | 59,810 | 32 | 11,065 |
| *Richmond, Ind | 13 | 71,040 | 15 | 9,385 | 5 | 6,200 | 7 | 3,855 |
| *St. Louis, Mo | 323 | 749,900 | 421 | 269,570 | 648 | 530,028 | ... | ... |
| *Sioux City, Iowa | 127 | 360,150 | ... | ... | ... | ... | ... | ... |
| *Evansville, Ind | 119 | 128,643 | ... | ... | 70 | 330,715 | ... | ... |
| *South Bend, Ind | 188 | 187,965 | ... | ... | 98 | 74,115 | ... | ... |
| Springfield, Ill | 29 | 56,050 | 54 | 37,270 | 27 | 39,450 | 48 | 122,350 |
| *Springfield, Mo | 27 | 36,475 | 46 | 21,725 | 10 | 9,875 | 22 | 7,025 |
| *Toledo, Ohio | 442 | 596,980 | ... | ... | 239 | 184,739 | ... | ... |
| *Topeka, Kan | 21 | 519,620 | 18 | 122,700 | 10 | 3,260 | 7 | 2,083 |
| Wichita, Kan | 114 | 201,425 | ... | ... | 112 | 441,730 | ... | ... |
| *Youngstown, Ohio | 158 | 312,112 | 29 | 15,195 | 141 | 226,940 | 31 | 18,625 |
| *Zanesville, Ohio | 32 | 40,000 | 18 | 20,000 | 17 | 15,000 | 16 | 18,000 |
| *Terre Haute, Ind | 56 | 141,655 | 45 | 13,965 | 44 | 29,817 | 36 | 11,755 |
| *Omaha, Neb | 206 | 512,815 | ... | ... | 105 | 410,480 | ... | ... |
| *Saginaw, Mich | 108 | 108,803 | ... | ... | 33 | 33,070 | ... | ... |
| *Springfield, Ohio | 58 | 52,880 | ... | ... | 26 | 24,700 | ... | ... |
| *St. Joseph, Mo | 74 | 109,225 | ... | ... | 34 | 44,880 | ... | ... |
| *Superior, Wis | 132 | 444,534 | ... | ... | 88 | 90,005 | ... | ... |
| | 11,017 | $29,825,430 | 2934 | $2,209,410 | 7005 | $12,848,788 | 1994 | $3,126,197 |

# New Catalogs of Interest to the Trade

51. **Andes Furnaces.** Phillips & Clark Stove Co., Inc., Geneva, N. Y.—Catalog illustrating and describing these furnaces in the various types manufactured for houses, school houses, garage heaters; also one-pipe furnaces, etc. Gives formula and rules for installation of warm-air heating with pipe furnaces, the finding of warm-air pipe diameters, register sizes, etc.

52. **The Uses of Mineral Wool in Architecture.** United States Mineral Wool Co., 280 Madison Avenue, New York City.—Booklet describing places where mineral wool can be used to advantage, together with drawings showing manner of using. Gives rules for estimating quantity of mineral wool required; also prices and testimonials.

53. **Pumps and Hay Tools,** Catalog No. 53. F. E. Myers & Bro., Ashland, Ohio. —550-page catalog illustrating the various lines carried by this company, including pumps, door brackets, hangers, garage door hangers, rafter brackets, etc.

54. **The "Van Guilder" Building System.** Van Guilder Double Wall Co., 77 South Ave., Rochester, N. Y.—Folder describing construction with Van Guilder hollow walls of concrete and showing pictures of buildings erected by this method.

55. **American Ready Wall Board.** Bird & Son, Inc., Dept. B, East Walpole, Mass. —Folder describing American ready wall board.

56. **Our Home Builder's Club.** National Lumber Manufacturers' Association, Chicago, Ill.—Booklet describing the starting of a home builder's club.

57. **Contractor's Atlas, May, 1919.** Atlas Portland Cement Co., New York City. —This number is devoted to showing how to build concrete silos, septic tanks, milk-cooling houses, etc., descriptions being accompanied by dimension drawings.

58. **The Only Sanitary Means of Garbage Disposal.** The Majestic Co., Huntington, Ind.—Folder describing this underground garbage receiver, the top of which only is exposed. Prices given.

59. **The Dutch Boy Painter.** National Lead Co., New York City.—House organ devoted to boosting paint and giving interesting data on its use.

60. **Rocbond Exterior Stucco Specifications.** The Rocbond Co., Inc., Van Wert, Ohio.—Gives specifications for applying Rocbond stucco to various bases, including overcoating old houses.

61. **Detached Core Forms.** 2-E Flexible Concrete Form Co., Eagle, Wis.—Describes the method of using these forms in building concrete walls, showing construction of window frames, etc.

62. **The "Marvel" Floor Surfacer and Polisher.**—M. L. Schlueter, 225 W. Illinois Street, Chicago, Ill.—Folder describing and illustrating this floor surfacer.

63. **Builders' Hardware.** National Mfg. Co., Sterling, Ill.—Catalog illustrating and describing various types of builders' hardware.

64. **Modern Furnace Heating.** Hess Warming & Ventilating Co., 1201 Tacoma Bldg., Chicago, Ill.—Catalog illustrating approved methods of furnace installation, both pipe and pipeless systems. Describes various types of furnaces manufactured by this company.

65. **Richards-Wilcox Woodworkers' Benches.** Richards-Wilcox Mfg. Co., Aurora, Ill.—Folder describing benches and vises manufactured by this concern.

66. **The Yellow Strand.** Broderick & Bascom Rope Co., St. Louis, Mo.—House organ describing ropes, this issue featuring wire rope.

67. **Alpha Aids, No. 16.** Alpha Portland Cement Co., Easton, Pa.—Gives blueprints of concrete dam, also reinforced concrete coal pockets, and articles on their construction. An article on "Prospects for the Rural Contractor" describes sources of new business. A valuable table gives amount of concrete materials required for silos of various diameters.

68. **Medusa Review.** Sandusky Cement Co., Cleveland, Ohio.—April issue describes a pre-cast concrete unit construction recently developed. Contains photographs of numerous houses in which the company's product has been used.

69. **American Portable Variety Woodworker.** American Saw Mill Mchy. Co., 1362 Hudson Terminal Bldg., New York City.—Booklet illustrating and describing various types of portable woodworkers manufactured by this company.

70. **Curtis Stairs.** Curtis Companies, 2046 S. Second Street, Clinton, Iowa.—Folder describing construction of Curtis stairs, together with description how to order them.

71. **Taylor Clamps.** James L. Taylor Mfg. Co., Poughkeepsie, N. Y.—Catalog and price list No. 14 describing various styles of clamps manufactured by this company.

72. **Data on Using Self-Sentering, Trussit and Steel Tile for Roofs, Floors, Ceilings and Partitions.** General Fireproofing Co., Youngstown, Ohio.—Data in specification form giving valuable information on construction with these materials, the various steps being illustrated by photographic reproductions. Blueprints show details of construction.

73. **Panic-Exit Door Bolt.** Columbia Iron & Wire Works Co., Canton, Ohio.—Booklet describing and illustrating these fire door exits, with prices.

74. **Concrete Clinch.** M. L. Schlueter & Co., 225 West Illinois Street, Chicago, Ill.—Folder describing this material, which is stated to waterproof concrete and clinch or bond newly mixed cement to old set concrete.

75. **The Modern Way Up.** The Bessler Movable Stairway Co., Akron, Ohio.—Booklet describing construction when this movable stairway is used; shows various methods of installation.

76. **Champion Mortiser.** J. Leukart Machine Co., Columbus, Ohio.—Folder describing and illustrating a mortiser used for door locks, sashes, screen frames and cabinet work.

77. **Barrett's Everlastic Tylike Shingles.** The Barrett Company, New York City.—Booklet illustrated in colors describing these slate-surfaced shingles. —

78. **Roof Designs of Tin.** N. & G. Taylor Co., Philadelphia, Pa.—Advance notice of book to be published illustrating and describing covering various types of roofs with tin.

79. **Distinctive Garage Door Hardware.** Richards-Wilcox Mfg. Co., Aurora, Ill.—Booklet describing and illustrating various types of garage doors and the proper hardware to use.

80. **Where Big Business Places Its Trust.** General Fireproofing Co., Youngstown, Ohio.—Folder describing "Allsteel" files, desks, safes, etc.

81. **Better Walls and Ceilings.** Beaver Board Companies, 72 Beaver Road, Buffalo, N. Y.—Booklet showing in colors various rooms finished with Beaver Board.

82. **Saw and Knife Sharpening Machinery and Tools.** Wardwell Mfg. Co., Cleveland, Ohio.—Illustrated booklet describing this product for wood-working and metal-cutting saws.

83. **Service Sheet of Ingersoll Concrete Houses.** Alpha Portland Cement Co., Easton, Pa.—Folder giving detailed drawings of this type of concrete house, with photographic reproductions. Gives general description of the houses.

84. **The Wallace Bench Saw.** J. D. Wallace & Co., 1419 Jackson Boulevard, Chicago, Ill.—Folder illustrating and describing the various features of this bench saw.

85. **Composition Flooring.** Cementitious Compound Co., Seattle, Wash.—Folder describing and illustrating this composition flooring, which can be applied over old wooden floors.

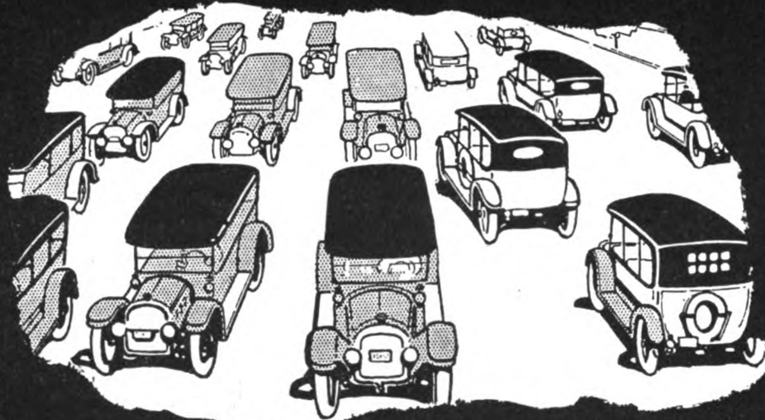
**If you desire any of these catalogs, write the date of this issue and the number of the catalog on a postal and mail it to Building Age, 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.**

86. **Northwestern Engines and Concrete Machinery for Concrete Mixers.** Northwestern Steel and Iron Works, Eau Claire, Wis.—Booklet describing accessories to concrete mixers and various types of concrete mixers.

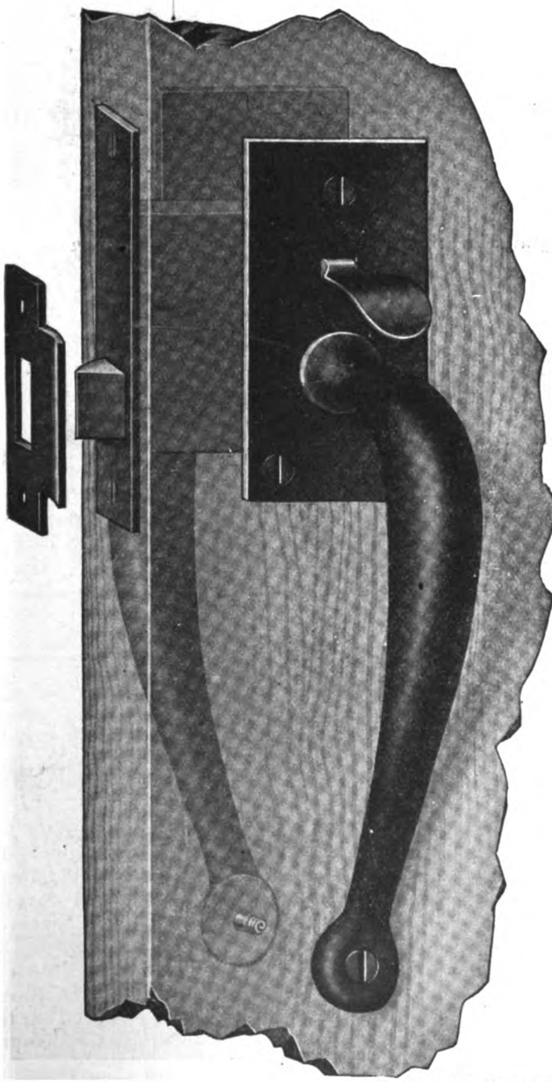
87. **The Door Beautiful.** Morgan Sash and Door Company, Chicago, Ill.—Booklet illustrating various types of Morgan doors, the views showing the doors as they appear when installed. Sizes and specifications for finishes given, also sheet in color showing the finishes.

88. **The 4 in 1 Roofing.** The Barrett Company, New York City.—Describes these slate-surfaced shingles laid four at a time.

# Car Owners



are as particular about the latch that goes on their garage door as they are about the garage itself



# The NATIONAL

## is the Aristocrat of Garage Door Latches

Note the long, graceful lines of the handles, one on either side of the door, which give it the resemblance of the higher grade door locks. The National will improve the appearance of any garage door.

No complicated mechanism—not a part that will get out of order. And here's a good feature about it—it's Reversible for either Right- or Left-hand doors. Packed one complete latch with screws in a neat strong box. One dozen in a case.

Finished regularly as follows: Japan, Dead Black Japan, Sherardized and Dead Black Japan, Sherardized and Plated any finish.

Don't think of putting any hardware on your garages until you have investigated the National line.

Catalog sent free on receipt of dealer's name.

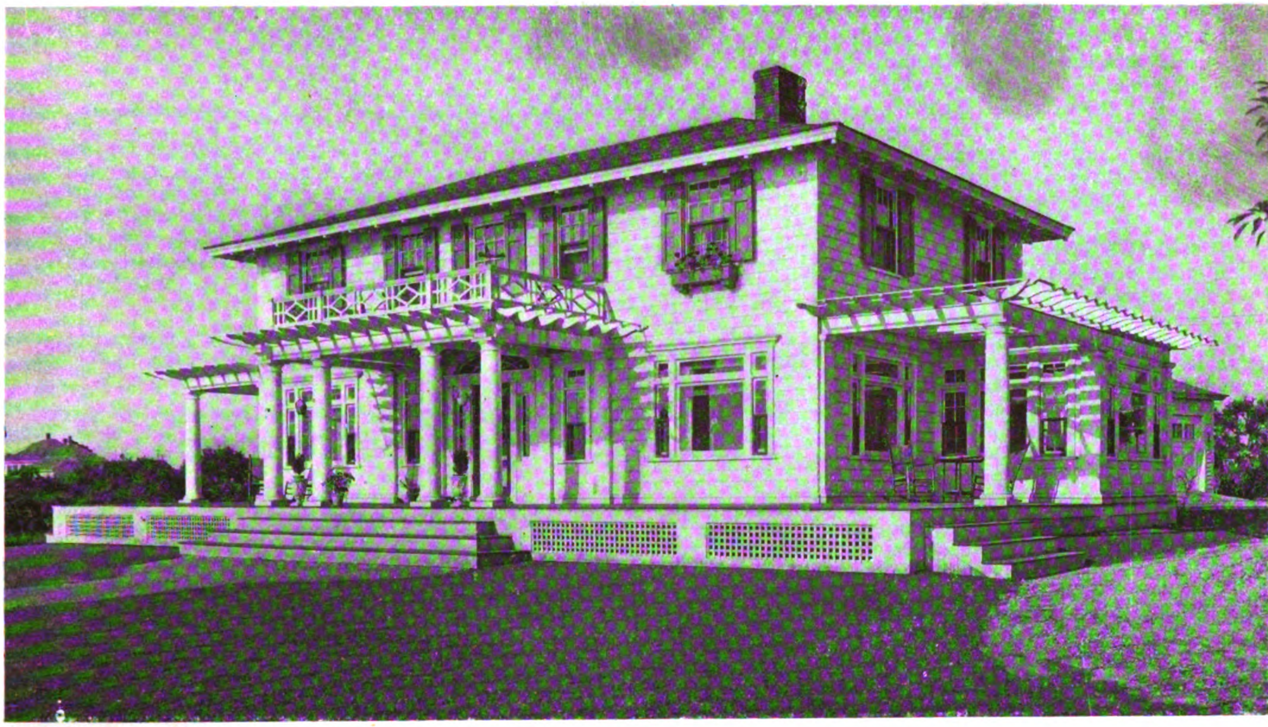
## National Mfg. Company

**STERLING, ILLINOIS**


SARGENT
SARGENT
For screen doors that slam or bang
It's going to be a big summer for screen door closers—for really sturdy, sure-action ones like the Sargent Closer here illustrated. We are advertising them widely—our hardware friends will push them strong—and you can contribute to summer comfort in your neighborhood by supplying the Closer and applying it. Write for details of this practical Closer—also suitable for light inside doors, lavatory doors, telephone-booth doors, etc.
It's always a good time to buy a better plane—like the Sargent Auto-Set Bench Plane. It has the right "feel", plenty of handle room, is exceptionally light—and, above all, has the Auto-Set adjustment for the cutter: the cutter can be removed, whetted and replaced without readjusting. You will like this superior time-saving feature. Made in six sizes. Write for details, if your hardware store does not have this plane.
SARGENT & COMPANY
Hardware Manufacturers
53 Water Street, New Haven, Conn.
LOCKS AND HARDWARE

BUILDING AGE

NEW YORK, JULY, 1919



# Effective Handling of Rectangular House

## *Horizontal Lines Predominate—Living Room a Feature*

The Living Room Is Characteristic of the Well Planned and Attractively Furnished Country Home

THE rectangular type of house is one that is exceptionally popular by reason of the economy that can readily be effected in plan. Providing that the proportions are correct, such a house can be made to appear exceptionally attractive by reason of the very simplicity that is the main characteristic of the design.

The house illustrated shows careful attention to the proper proportioning of the windows and the porches, these scaling in well with the mass of the house itself. The roof is pitched in entire harmony with the design. The overhang is simply treated, the mistake of too much ornamentation being entirely avoided. Treatment of the covered front porch and the pergola at the sides is especially interesting. The pergola effect is well carried out, and with proper planting enables an agreeable contrast of color to be obtained.

The house itself is rather unusually placed on a wide, open porch, of which the lattice constitutes an interesting detail.

It should be noted that in this house the main idea is a rather low, long building, and that all the details are calculated to carry out this effect. For instance, the placing of the shutters on the second story makes these windows harmonize more agreeably with the mass of the building than would be the case if the shutters were not used. The triple windows on the first story are designed with the same effect in mind.

One enters directly into the living room, which is planned in harmony with the main idea of the exterior. The living room is exceptionally long, its wide windows giving a pleasing and homelike effect. At the left, a den is semi-separated from the living room with which it is practically one.

A rustic effect is often desired in the planning of the main rooms of a country home. This effect is well gained in the handling of the fireplace and general trim of the living room. The fireplace, which is long and comparatively low, is well proportioned with the room itself and its rubble finish is in keeping with the beamed ceiling and simple cornice that is carried above the fireplace and its flanking bookcases.

To the rear of the living room at the right hand side of the house is the dining room, likewise provided with a fireplace. This is economically placed by reason of utilization of the same chimney that cares for the living room fireplace.

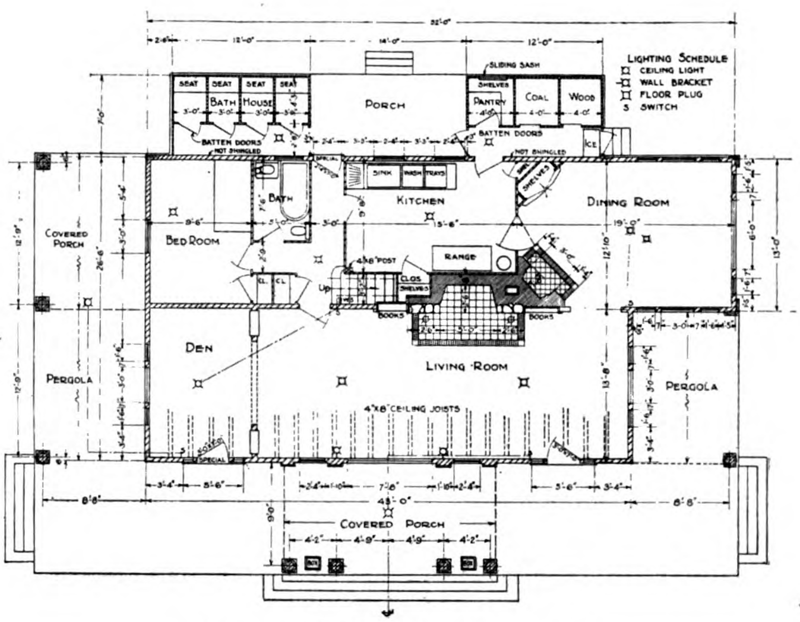
No pantry is provided between the dining room and kitchen, the tendency in many of the smaller houses of to-day being to regard this feature as waste room.

The first floor plan provides for a bedroom with adjoining private bath placed at the rear left hand side of the house. This is a feature that especially appeals to elderly people who do not like to climb stairs, provision in up-to-date homes is increasingly being made for the convenience of the older members of the household.

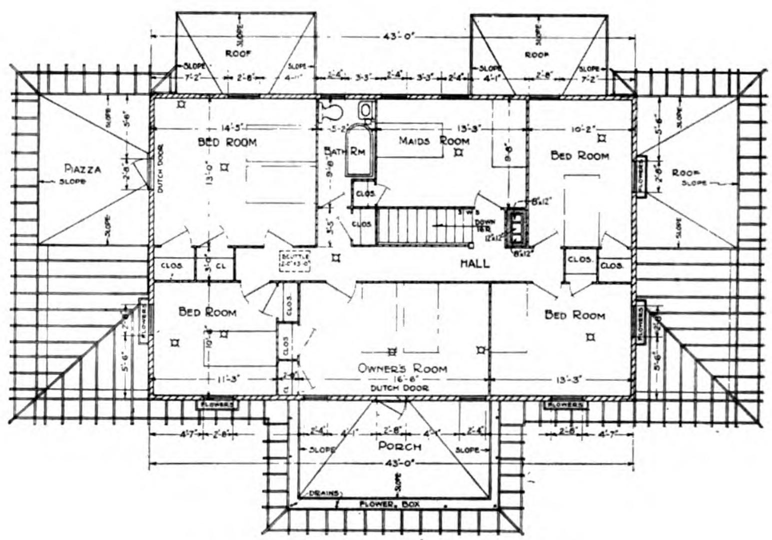
As the house is located near the water, four bath houses are provided at the back.

The second story contains five bedrooms, a good sized maid's room, and a bath. The owner's room opens upon the front porch through a Dutch door. The beds in this room, it will be noted, face towards the windows, which is generally regarded by physicians as the most healthy arrangement. Two large closets are provided. Each of the other bedrooms have ample closet space.

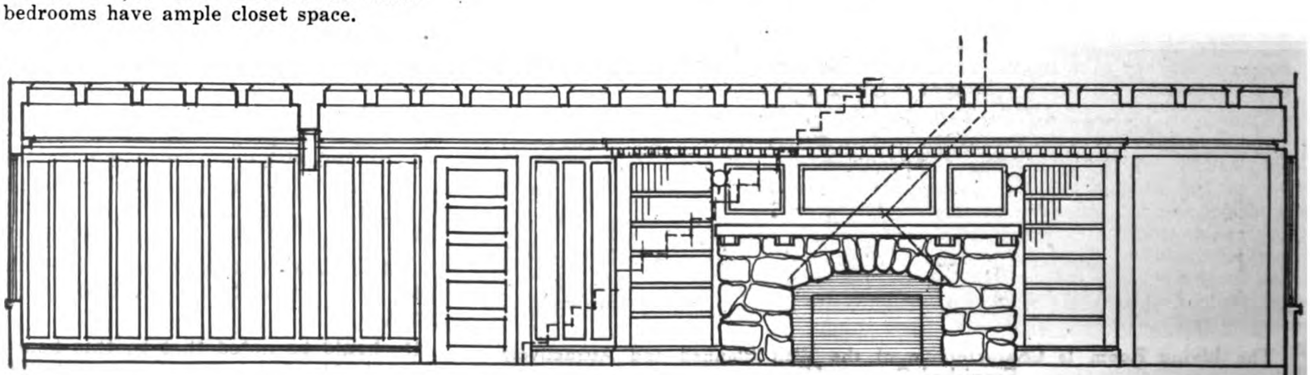
This house is located at Duxbury, Mass., and was erected for Mr. H. B. Whittington, in accordance with plans and specifications prepared by Harold Field Kellogg, architect, 93 Federal Street, Boston, Mass.




First Floor Plan, Scale 1/16" = 1 Ft.




Second Floor Plan, Scale 1/16" = 1 Ft.



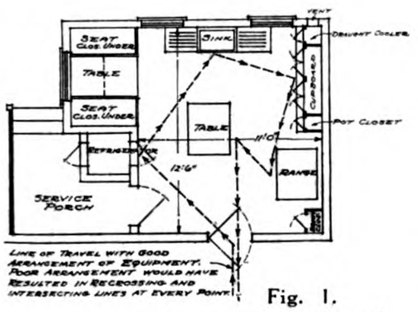
Elevation of Living Room Toward Fireplace

# Bringing Efficiency to the Kitchen

## *Gladden the Housewife's Heart by Eliminating Waste Steps— Conveniences That Have Proved Worth While*

By ARTHUR WEINDORF, Architect

USUALLY in the planning of the home very little thought is given to the arrangement of the kitchen. This room is practically one of the most important rooms in the house, as it is the workshop of the home, where the housewife spends most of her time and



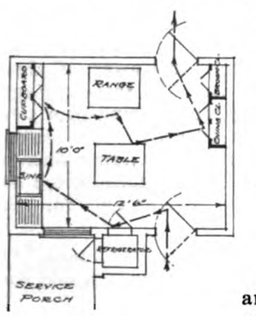




Fig. 1. Sketches of two types of kitchens, showing line of travel.

does most of her thinking and planning. Unfortunately, the planning and arrangement of this room is overlooked, many times, until the family moves in. Then there is a realization that more attention and thought should have been given to the details of this part of the home.

### *Kitchen Arrangement Important*

In the time of our great grandfathers, the entire family assembled in the kitchen. This part of the house was made to serve as the dining and living room and the workshop as well, because of lack of heating facilities in the rest of the home. Here the whole family would gather around the fireplace to watch the burning logs and discuss the topics of the day, amidst the odor of the cooking.

The custom of placing the kitchen in some remote part of the house and investing as little money and attention as possible in the fittings is now out of vogue. The careful architect nowadays gives as much thought to the planning and arrangement of this part of the home as to any other part, and the progressive builder likewise gives as much attention to this room as to any other.

Within the past twenty-five years, kitchen planning has undergone a greater revolution than any other part of the home planning. At present the tendency is toward a small compact well arranged and ventilated room. It must be of a size to take care of the family's needs and still be of a size so that practically no steps will be retraced or wasted in doing the work.

### *Steps Saved by Proper Planning*

Although we may not consider the great amount of unnecessary steps we take each day to do a certain amount of work, yet if we check ourselves we would find that we could accomplish the same results with less time and energy. And so in the kitchen where approximately the same amount of work is usually done each day, the scheming and arranging should be carefully thought out.

The diagrams presented in Fig. 1 will give a good idea as to the proper arrangement for the average family needs. Note the lines of travel. Of course there are various ways, but the general idea is to reduce the amount of the everyday unnecessary travel in this department of the home.

If it is possible for the owner at the time his home is being constructed to have the kitchen walls tiled it will be well for him to do so. The walls should be tiled to the ceiling and the ceiling covered with metal. If this is not possible, the walls should be tiled to a height of four feet at least. This tile work is one investment that will never be regretted and the kitchen can be kept to the standard of hospital cleanliness.

### *Washable Paints Aid Cleanliness*

There are also many good washable enameled paints that may be used to advantage on the walls; there are also oil cloth wall coverings of a tile effect that will also be found very attractive and sanitary for this purpose. The kitchen should have first consideration above all other rooms to make it sanitary and efficient.

The floors should be of the best possible materials, many varieties being on the market. Although each may have its individual merits or faults, they are better than the old wood floor. The floor should be laid with the fewest possible seams or crevices, as dirt may collect in these places. There are cement wood mixtures that are ideal for this purpose and that can be laid without a seam and with a sanitary base and cove. The floor should be sanitary, warm, silent under foot, durable, moderate in cost, and easy to keep clean.

The trim should be of a design so that the housewife will be able to keep it clean at all times, without making a slave of herself. All wainscoting, fancy designed trim or any projecting pieces that causes dust to collect, should be eliminated. Also, all plaster corners should be rounded so that walls can be washed with ease and a curving baseboard obviates corners, which is also a point worth considering in building a new kitchen.

### *Obtaining Proper Ventilation*

The cookroom should be properly lighted and ventilated and should have at least two windows, one on each side of the room so that there will be a cross draught.

There should also be at least one drop light over sink and one over range, so that no shadow will be thrown from fixtures over the work one is doing.

The furnishings are the next items to be given consideration and one should aim to get those things which can be kept in sanitary condition at all times.

It is important that you select the best furnishings and arrange them in proper relation to each other as well as to the dining room and pantry, so that you will get the best results and reduce the retracing of steps.

The cupboard can contribute a great deal to the efficiency of the kitchen, depending on its design. It should not have a multitude of compartments as this means more corners and surfaces to keep clean.

The shelves should be of a good size,

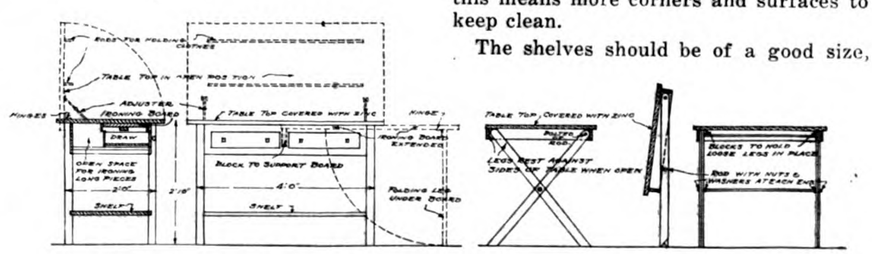


Fig. 2. Combination kitchen table and ironing board. At the right is a good type of kitchen table

well spaced and movable, as shown in Fig 3. It is also well to have the shelves enameled so that they can be easily washed, if one can afford it, glass shelves should be used.

The lower shelf should be arranged so that they will take the large receptacles and should be inclosed with panel doors. The upper shelves should be eleven inches wide and be inclosed with sash doors. The counter shelf should be of sufficient height, about thirty-four inches, so that working around same will not be a hardship. A large bread board should be so constructed that it will slide out from under counter shelf if greater space is desired.

The cupboard here designed contains a draught cooler on the side and it will be found quite indispensable. It is open all the way through from basement to the ceiling, at which point it opens to the outside. It is divided in two compartments, shelves above and drawers below. All shelves are made up of wire screen and are movable; the bottom of all drawers are built up of same material to insure a draught throughout the closet. The lower part of the kitchen cupboard also contains built-in flour bins.

The work tables can be built as shown in Fig. 2, one of which is so arranged that it can be placed out of the way when not in use or the ordinary kitchen table can be used. The table top should be covered so that it can be easily washed; a piece of zinc can be used for the purpose, which will outwear its cost many times in oil cloth. It will also be sanitary and look well. For those that can afford it, the table top can be of porcelain or glass; tables of this sort are also on the market.

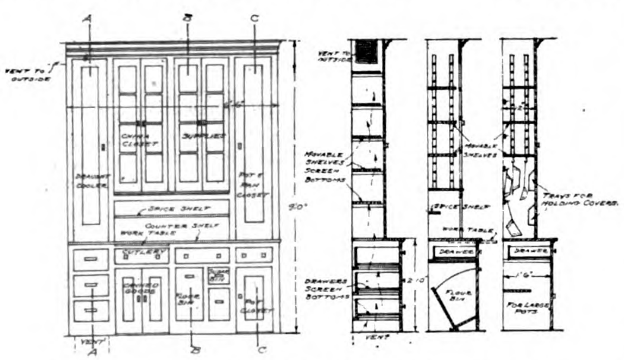


Fig. 3. A good type of kitchen cupboard. At the right is section A—A through cooler; section B—B through cupboard; and section C—C through pot closet

The table should be constructed or blocked up to a height so that it will be convenient for the worker; about thirty-four inches is average at which to work.

*(To be concluded)*

## Nothing but That

**Neighbor—Has your wife made any changes in the plans for your new bungalow?**

**Owner—Nothing except to make it two stories and brick instead of frame.**



# How to Develop Contracts

## *Making Money for Yourself and Others by Showing How Property Can Be Improved*

By BRICKSAND MOTTOR

"SAY, Jones, I saw a vacant lot out near Prospect Avenue and Main Street. Know the one I mean?" asked Jameson, the traveling salesman for a big material concern as he strode into Jones' shop early one Spring morning.

"Sure I know that lot," replied Jones. "That property has been a sore spot with Watson for quite some time now. He has been trying to sell it, but unimproved real estate isn't changing hands very readily in this town just now, and he's done nothing but pay taxes on it to quite some extent."

"What do you think Watson would say if you showed him how you could spend $3,000 on that lot and make it bring about $2,000 a year income?"

"What would Watson say? He'd greet me as if I were his long lost brother, coming home with the proverbial fortune that all long lost brothers are supposed to have. But I don't see how you can put over any such proposition as that."

"I am just hazarding a guess on this particular proposition, but it seems to me as if that particular lot could be put to good advantage. There is a frontage of about 60 feet, and it runs back about 100 feet, if I am not mistaken.

"Now, suppose we do a little bit of investigating and see what the chances are for a community garage down there. Do you know what a community garage is?"

"No, I don't," replied Jones.

"It's a number of private garages built together, row fashion. Each one of these garages is, to all intents and purposes, entirely separate, the owner having a key so that there is little chance for any property that he may leave in the car to be stolen. Every car owner knows that it is pretty risky to leave things in the average country garage. Community garages have proven very desirable in many localities and each compartment rents for $10 to $15 a month.

"Now there is room on that property for about twenty garages, running ten on each side of the lot and facing toward each other, leaving a driveway of about 25 feet in the center. If these garages were put up, they would bring in a total rental of at least $2,000 a year, renting them for $10 monthly. Building them of hollow tile, they can be constructed for about $140 each, or $2,800 for the twenty."

"As cheap as that?" asked Jones. "It seems to me that the garages would cost more."

"The Building Department will probably let you get away with 4 or 6 inch party walls. The roof can be of some cheap fireproof material, the roof joists of wood, supporting a ceiling of asbestos plaster on wire lath. This sort of construction will prove to be fireproof. In fact, I know of a community garage built like this where an automobile burned entirely up, without setting fire to the wooden roof joists."

"Well, that would prove to be a pretty good investment for Watson, nearly 100 per cent a year. I don't think, however, that we could get him to put up the building just now, even when there is such a chance to make money as this. You know that he has been pretty tight lately, what with one thing and another, and I don't think that he could raise sufficient cash to pay for the building."

"That is easily gotten around with," cheerfully replied Jameson. "That lot is easily worth $2,000, for it's in a rather good location. You could get the exact figures by having an appraiser look over the property for you. Now, if the lot is worth $2,000, you can easily borrow up to 60 per cent of the value of the lot and proposed building combined. In other words, Watson won't have to lay out a single cent for his building, but can secure the money by taking up a loan. The Building and Loan Association may make the loan, but if they won't let him have it, the bank certainly will. The bank will lend him the money to put up the building, and he can then secure a permanent mortgage from somebody."

"That's a pretty good idea," exclaimed Jones. "Watson is merely letting that lot eat its head off, and without spending a single cent of his own, he can turn it into a property that will bring him at least $2,400 a year. Why, he even can hire a man to look after the garages, sell gasoline, clean cars, etc., and derive almost enough revenue from those sources to pay for the man's services!"

"Pretty good proposition, isn't it?" asked Jameson. "Do you think that Watson will be glad to see you if you go to him with that idea?"

"You bet he will! I don't think that I'll have any difficulty in convincing him that that is a proposition worth going into fully."

"I would suggest that before you go to Watson you see either the Building and Loan or the bank people and make sure that Watson can secure his loan if he decides to put up the property. You are pretty well known around here as a reliable man, and that reputation will help you to get the money for Watson where perhaps he could not get it for himself. You know that character and reputation are big assets to a man who wants to get a loan from any source; in fact, it is very often the deciding factor.

"Now, I have given you an idea that will show you just how this thing can be worked out. If you get the data and go to Watson with it, you will have no difficulty in landing a contract that will net you several hundreds of dollars' profit. The actual cost to you for each garage may run around $130, giving you a clear profit of about $200. Of course, you will estimate the cost of the building pretty carefully before you go to see Watson or the bank people, as the figures that you give will have to be the contract price for which you are willing to do the work. I would not advise you to quote a figure that would be higher than the loan that can be secured, as it seems pretty likely that in this case Watson might not be able to put money of his own into the proposition. You may find that the loan can be for more than $3,000, and you might be able to secure a larger profit. In a case like this you are certainly entitled to a profit that is larger than would be fair for another builder to ask, because you are giving Watson the benefit of your ideas and your influence in getting a loan for him. He certainly should pay you for this trouble, either separately or in the contract price. If you do it in the contract price, you stand more chance to get the job than if Watson should decide that he won't pay you for your idea and get some other chap to figure on it.

"I think that in any case when you approach a man with a worthwhile idea like this that he will prove to be fair enough to give you the job without trying to steal your ideas. If he does, your influence with the bank and the Building and Loan people might render it rather hard for him to get his loan, since they would know that you have approached him with an idea and that he was dishonest enough to steal it, which is just what it would be to all practical purposes. In other words, his reputation would be so bad that he probably could not secure the loan if he threw you down.

"Do you begin to see why I told you before that it is a good thing to stand in well with the banks and other financial people in this town? They are your best


friends, and can give you a lot of help that will prove worth while."

"Right you are," exclaimed Jones. "I am going to go over and see about that loan to-day right after I work up the preliminary estimate. I'll even go so far as to get up a sketch showing the front elevation and a plan, so that I can show the bank just what I am going to ask Watson to do. Then, of course, the same dope ought to be a big help in landing the contract with Watson. Besides, I'll have to work them out anyway in order to get an accurate estimate of my cost."

"Go to it, old top. It's always a cinch to land a contract like this when you have got an idea and can sell it to the right party."

## Making Glue Waterproof

TO render glue insoluble in water—even hot water—it is only necessary when dissolving the glue for use to add a few crystals of bichromate of potash to the water, and to expose the glued part to light. The proportion of bichromate will vary with circumstances, but for most purposes about one-fiftieth of the amount of glue used will suffice. In other words, glue containing potassium bichromate, when exposed to the light, becomes insoluble, and upon this fact is based the photographer's carbon process of printing, as well as several photo-mechanical methods.

Another method of making waterproof glue is to soak ordinary glue in cold water until it softens, and remove it before it has lost its primitive form—that is, before it runs into a mass—which is the test of the right degree of absorption of water. After this, dissolve it in linseed oil over a slow fire until it comes to the consistency of jelly. This glue can be used for joining any kind of material. In addition to strength and hardness, it has the advantage of resisting the action of water.

Glue that is both waterproof and fireproof can be made by mixing a handful of quicklime with 4 oz. of linseed oil. Boil until quite thick, and spread on tin plates. It will become very hard, but can be dissolved over a fire, or in a gluepot like common glue. This composition really is not glue at all, but a sort of waterproof cement that is extremely tenacious.

A very cheap waterproof glue is made by melting common glue with the smallest quantity of water possible. Add to this by degrees linseed oil made "drying" by boiling it with litharge. While the oil is added, the ingredients must be well stirred, so as to mix them thoroughly.

Another plan: Take of a very thick solution of glue 10 parts, linseed oil varnish 5 parts, and litharge 1 part. Boil these together for ten minutes, and use while hot. The additional ingredients have no effect whatever on the adhesive properties of the glue, which is rendered entirely waterproof.

There are a few other methods of treating glue to resist moisture, or the application of water, but there is no glue for wood which must be kept in contact with water that is better than that containing bichromate of potash, which may be called "bichromated glue." Be sure to allow it to harden thoroughly by exposing the glued joints to sunlight before allowing water to come in contact with them.—*Wood Craft.*

## How Can a Good Estimating System Be Developed?

PROBABLY the best method of developing a good system of estimating is to secure a reliable book which will give you data to work on at first and then gradually develop your own data from the buildings you erect.

These books, for instance, will tell you how many square feet of flooring a man can lay in a certain time, how many brick he can lay per hour, time occupied in mixing and placing concrete, etc. It is impossible to give any general rule covering the methods of estimating labor, as each kind of work would be treated differently. For instance, no general rule could cover the labor required for flooring and concrete foundation walls or other widely different subjects. The only basis on which one can work is from a book or from practical experience.

The best building estimators in the business develop their methods somewhat as follows:

Either through experience or through books they will estimate a first job, carefully calculating the material and labor required for each item separately. Thus the labor required for excavation will be calculated separately, labor for erecting forms for concrete foundation wall and

(Continued on page 236)

# How I Make a Bull-Nose Step

## *Method of Laying Out and Framing*

By W. S. WILKIN

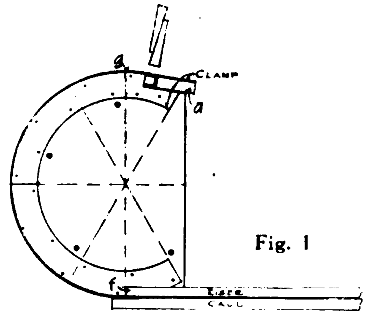



Fig. 1

THE following is a description of how I make a circle riser, or what I call a bull nose step. While this is not the cheapest way, I think it affords about as good a step as can be made.

Suppose we are going to make a step with 7 in. rise and 9 in. tread, and the stairs are 3 ft. wide, using ⅞ in. risers and 1⅛ in. treads. Now the circle riser will set on the floor and will finish 5⅞ in. under the tread. Get a piece of veneer about ⅛ in. x 6½ in. thick and from 8 ft. 6 in. to 9 ft. long. Take a board about 4 in. wide and 6½ in. long and square across one end of the veneer as shown at (*a*) in Fig. 1, and lay it away to dry. Then get a scrap board about 13 or 14 in. wide and 19 in. long, as shown in Fig. 2.

Suppose it is to be a right hand step, that is when you are standing facing the stairs the round end is to the right. Lay off the top side of the board as shown in Fig. 2. Take *o* as center and 9 in. as radius and mark at *b*, which is the outside of the veneer. Now with a radius of 8⅞ in. draw the line *c-d*, which is the line to saw out on after it is built up. Cut out at *d* for the riser and at *c* for the block and wedges as shown in Fig. 1. Now turn the board bottom side up, locate the center *o* opposite *o* and lay off as shown in Fig. 3. Build up over these lines, keeping the nails in so you will not hit them with the band saw.

After laying off the circles with the same radius start at *e* and take two steps each way, this gives you just two-thirds of a circle, plenty of room on each end, as will be seen in Fig. 1. In laying it off this way it makes it easy to get the length of the pieces to build up with. It takes two like Fig. 4 for one, then one like Fig. 4 and two like Fig. 5 for the next.

Get some scrap blocks, 1⅛-1⅜ and 1¾, or whatever you may have, run them through the planer so as to size them all, that is 1⅛ to about 1 in. and 1⅜ to about 1¼ in., etc., so they will build up level. After you have run them through the planer, lay two down as in Fig. 4, and with a center on one block lay off a pattern on the other as shown. This is a pattern for one big one or two small ones like Fig. 5. They can be gotten out of smaller pieces. The pieces can be sized so they will come out the right height after they are glued and nailed or they may be glued up any height. Then set the nails, band saw and size on the rip saw.

Now get a piece of cull lumber and dress one side so as to have it clean for the veneer to be glued to. Then rip to 5⅞ in., square one end and glue and screw in place, as shown in Fig. 1. The round end must be smooth so the veneer will draw tight all around.

Get the length of the veneer from the block *a* around to *f* and mark it there. Be sure to allow enough for the wedges; the veneer will shorten just a little when you bend it. Now get a board for a caul, lay the veneer on it, spread the glue, and place the joint at *f* on the line *f* on the veneer and clamp down. Now take hot water and dampen the outside of the veneer, spread the glue on both the veneer and round end, then bend the veneer around carefully and clamp and put the wedges in. Use two hammers, striking with both at the same time.

For the tread, get a board about 10¼ in. wide, allowing 1¼ in. for nosing; get a short piece and glue on as shown in Fig. 6. Take a center in the joint and lay off with a 9 in. radius on the bottom side of the tread. This is the outside line of the riser. Now with a radius of 10¼ in. strike the other arc, saw out to this line and nose. Now screw on as shown in Fig. 1 and Fig. 7, the straight riser as in Fig. 7. Be sure not to get the screws in Fig. 1 where you will want to saw them when setting up.

You can cut the veneer off at the wedges, but it is best to nail it down at *g* so as to keep it from getting broken loose while it is laying around. You will find this makes a step that is hard to beat.

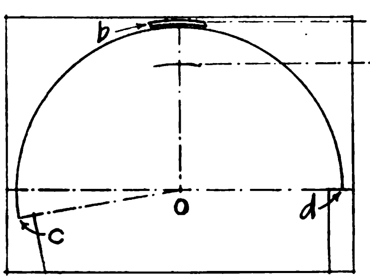



Fig. 2

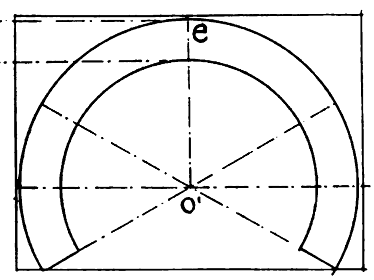



Fig. 3

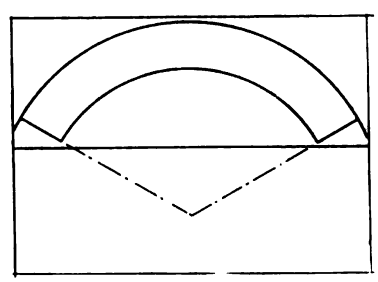


Fig. 4

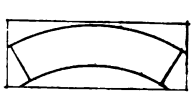


Fig. 5

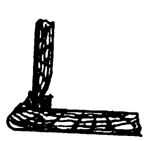


Fig. 7

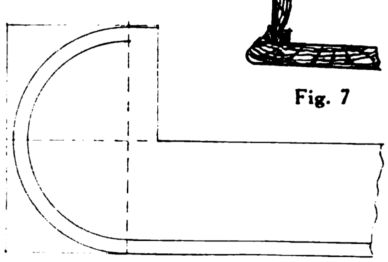


Fig. 6

# Preventing Shrinkage of Interior Trim

By LAWRENCE V. TEESDALE *

IT is very disheartening to the architect or builder on visiting a building a few months after it is completed to find the interior trim shrinking, the glued and mitred joints pulling apart, the door panels showing unfinished areas, or the cracks in the floors opening up. These troubles are caused by moisture changes in the wood after it is in place. Insufficient kiln-drying or the absorption of the moisture following the removal of the wood from the kiln, make redrying and shrinking possible after the trim is in place in the building. If the cause and effect of moisture changes in wood were well understood and appreciated, such troubles as these might be avoided,

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or at least minimized, by the proper drying and handling of the stock.

### *Wood Never Absolutely Dry*

Contrary to the general impression, wood never becomes absolutely dry, but will retain some moisture even in a very dry atmosphere. Thoroughly seasoned lumber, dried in the open air, retains from 12 to 15 per cent moisture,[1] whereas furniture and interior woodwork vary from 4 to 6 per cent moisture content in the winter when rooms are heated, and from 6 to 8 per cent during the spring and summer months. Inasmuch as air-dried lumber continues to dry when placed in buildings, all stock for interior finish must be kiln-dried to about 5 per cent moisture content before it is fit to use. This is done to prevent the shrinkage that would occur in wood when drying from 12 down to 5 per cent, or from the air-dry to the room-dry condition. It is just as necessary to prevent the kiln-dried wood from absorbing moisture, which will dry out later and cause shrinkage as it is to kiln-dry it in the first place. A loss of only 2 to 3 per cent is sufficient to cause perceptible shrinkage in hardwood lumber of low moisture content.

The first step, therefore, in preventing shrinkage troubles is to obtain material that has been kiln-dried to the proper moisture content. This will vary from about 10 per cent at the seashore or in damp climates to about 5 per cent in drier climates or where buildings are kept heated for several months during the year.

To specifiy the moisture content to which the wood is to be dried will not be sufficient unless the architect selects a mill equipped with kilns capable of meeting the specifications. In the days before the war it was possible for the mills to obtain thoroughly air-seasoned material that could be left in a hot box kiln until it was judged to be thoroughly dry. Now, as there is comparatively little air-dry material in the market, the mills must use stock that ranges all the way from air-dry to green, and their drying problems have become very important. Investigations made at the U. S. Forest Products Laboratory show that stock properly kiln-dried from green material will meet the exacting requirements and is superior for almost any purpose to material kiln-dried from air-dry stock. However, green stock cannot be kiln-dried under the same conditions as air-dry stock, nor can it be dried in the same time. This makes it necessary to use kilns that are designed to handle green material and are under the supervision of a competent operator. If the wood has not been sufficiently dried for the purpose which it is to be used, nothing can be done to keep it from shrinking and causing trouble.

[1]Moisture content is calculated from the oven-dry weight of wood.

### *When to Deliver Flooring and Trim at Building*

The second step is to prevent the stock from reabsorbing moisture from the time it leaves the dry kiln until the painter has completed his work. Flooring and lumber that are to be used for fine interior work should not be stored outdoors or in open sheds after kiln-drying, because they will absorb moisture from the atmosphere. Such stock should be stored in dry rooms at the mill. It should not be delivered at the new building during damp weather nor until the building is thoroughly dry. Unfinished wood will pick up moisture very rapidly from green, brick, concrete, or plaster walls. It is usually customary in buildings that are being completed in late fall and winter temporarily to connect the radiators and keep the rooms warmed where the painters are at work. If this is done while the plasterers are working, it will assist in drying the plaster and provide dry storage for the trim when it is delivered.

The wood should receive the filler or priming coats at the mill if practicable; otherwise, immediately after being delivered at the building. A stain, such as is used on close-grained woods, is not a filler, nor will it resist absorption of moisture. In fact, water stains will add moisture to the wood and should only be used where oil or spirit stains will not produce the desired effects. When it is necessary to use water stains, the wood should be allowed to dry at least 48 hours before applying a coat of shellac or varnish. Finally, if an egg-shell finish is desired, heavy-bodied or gloss varnishes that can be rubbed should be used in preference to the usual flat or self-rubbing varnishes, which have but little protective value.

### *How to Treat Panelwork and Wainscoting*

High-grade panel work and wainscoting against outside walls should always be back-painted; otherwise, the dampness absorbed from the walls through the unprotected back is very likely to cause buckling of the panels and later opening up of glued joints.

The swelling and shrinking of doors usually requires the attention of a carpenter from time to time for weeks after the building is occupied. The fact that the top and bottom edges of a door are practically always left unfinished is largely responsible for this trouble. The exposed ends of the vertical stiles are particularly troublesome, since wood picks up or gives off moisture more rapidly through surfaces cut across the grain than through those parallel to the grain. It is imperative that the top and bottom edges of all doors be protected by paint or varnish and, if it is necessary to refit the door after it is hung, the freshly exposed surface should be refinished at once.

# Making Factory Roof Timbers Last Longer

Although there is scant information on the service and cost of treated roof timbers in cotton mills, paper mills, and other buildings where high humidity causes rapid decay, a number of preservative treatments which it will undoubtedly pay to use may be suggested, several of which follow:

The steeping process consists merely in soaking the timber in a water solution of a preservative such as zinc chloride, sodium fluoride, or mercuric chloride. The wood must be thoroughly seasoned. It is left in the solution one day for each inch in thickness and one additional day. After treatment, the timber should be air dried before using. Zinc chloride attacks lead paints, but is very desirable otherwise. Mercuric chloride is very effective but is poisonous and has a decided corrosive action on steel, so that steel tanks cannot be used with it. Sodium fluoride does not attack paint, is not corrosive, and in most other respects is very desirable.

Timbers may be coated with coal tar creosote by a brush treatment, by dipping in hot oil for 5 to 15 minutes, or the hot and cold bath method. This last method consists in submerging the lumber in hot oil for several hours and then either allowing the oil to cool down slowly with the wood in it or plunging the wood into cool oil and leaving it for several hours.

Coal tar creosote is objected to by some insurance companies as a fire hazard, but whether or not it really does add greatly to the inflammability of wood is a debatable question. The odor of creosote may be objectionable in food storage rooms, but is not usually displeasing to workmen. Creosoted wood cannot be painted over successfully because the oil quickly comes through the paint and discolors it.

Although pressure treatments are the most expensive, they are the most effective because they result in the greatest absorption and penetration of preservative. Roof planking should receive 8 to 12 lb. of creosote per cu. ft., or ½ lb. of the salt if zinc chloride is used. Such treatment should add at least 20 years to the life of roof plank.

The effectiveness of treating timber depends upon maintaining a complete envelope of treated wood around the untreated interior of the piece. If this treated layer is broken through decay can enter and destroy the untreated interior in spite of the treated outer layer. For this reason lumber should be cut to final dimensions before treatment. Whenever it becomes necessary to cut into treated timber the untreated wood exposed by cutting should be given two brush coats of creosote or some other preservative.

# Temporary Buildings with Maximum Salvage Valve

## *How This Problem Was Solved by an Ingenious Builder*

By HEE H. SEE

WE had temporary buildings to construct, for the accommodation of some sixty workmen. The buildings consisted of bunkhouse, cookhouse, dining room, etc. Our work was made more interesting by reason of the fact that our

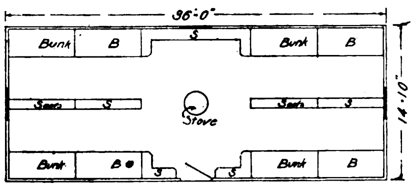



Fig. 1. Plan of bunk house

time was very limited and our choice of material equally so. The only material we had was 2 in. x 4 in. x 16 ft. and 1 in. x 10 in. x 16 ft., and coupled with the information that we must make this do for everything was the instruction to do no more cutting than absolutely necessary, so thta when the buildings were torn down again as much as possible of the material could be saved. The foregoing instructions were about all the plans and specifications that were supplied, so the first thing the foreman considered was the best shape and size to make the buildings. He figured somewhat as follows:

Our longest material being 16 ft., that should be the over-all width of our building. The roof boards must run across the building and should project about 6 in. on each side, which would give us 15 ft. for the width of the building, out to out of studs. There will be a pitch to the roof, and as that will increase the necessary length of the roof boards a trifle we had better figure what that pitch will be, and make the necessary allowance. In deciding the pitch of the roof and the height of the walls our lumber must again be considered. Two feet is sufficient pitch for the roof, and we can do one of two things: make the wall 8 ft. high at the back and 10 ft. at the front, in which case one board cut in two will make two boards for the back, and there will be a waste piece off the front board; or we can use 7 ft. for the back and 9 ft. for the front, when one 16 ft. board will make both of them. We come to the conclusion that 7 ft. is not high enough to secure proper breathing space, and knowing that there will be plenty of places on the job where the short pieces can easily be used, we decide to make the front and back walls 9 ft. 6 in. and 7 ft. 6 in. respectively, from the top of the floor to the under side of the roof boards. Two feet having been decided upon for the pitch of the roof, we measure across our steel square, from 15 on the tongue to 2 on the blade, to find the true length of the rafter. This we find to be approximately 15 ft. 2½ in. There is a double thickness of boards to go on each wall, so that with this extra length for the pitch of the roof, a 16-ft. board will not give us more than 3 in. projection on each side. This we consider too little, and decide to make the width of the building 14 ft. 10 in., out to out of studs.

Next, to decide the length. Bunks will be double in height and may be stood along each side wall. If we put the doorway in the side of the building we can put a double length of bunks on each side of it; there should also be an open space in the center for the stove. Allowing 12 ft. 6 in. for each double length of bunk, and 11 ft. for the open space, will give us a bunkhouse 36 ft. long, with a capacity of sixteen men. Four houses this size will hold sixty-four men, four more than required. Fig. 1 shows the plan decided upon. No plan was drawn, however, and all this figuring was done mentally, in less time than it has taken the reader to read it.

Having all our sizes, we are ready to start work. Some men are set cutting

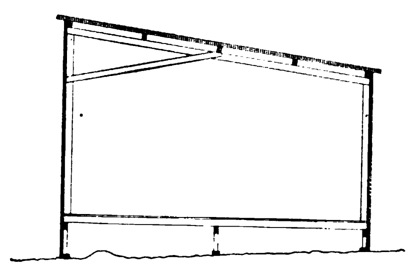


Fig 2. Cross section of bunk house

sills, others floor joists, others studs and rafters, all out of 2 in. x 4 in. The ground has a slight slope, but disregarding this, as soon as enough material has been cut the sills are laid out in their proper position and the joists are spiked in place on top of them. The joists are spaced 2 ft. apart and an extra sill is run down the center of the building to support them. After the joists are nailed we proceed to level up, letting the highest point set flat on the ground and bringing up the remainder to it. Where the sill is close to the ground, one or more pieces of 2 in. x 4 in. are shoved underneath it for blocking; as soon as there is space enough to make it worth while, however, another 2 in. x 4 in. is laid flat on the ground and, instead of blocking, short posts are cut in between this and the sill proper. In passing, it may be well to point out that it's almost impossible to level a 2 in. x 4 in. sill by itself; there must be some weight on it to straighten out the crooks.

As soon as the floor system is level, we lay the floor (two lengths of 16 ft. boards, with a joint right across the middle of the building) and are then ready for the studs and rafters. While the previous work has been going on, the foreman has been doing some more figuring, with the following result: The buildings were required to be weatherproof, and among the original instructions was the suggestion that he make battens to cover the cracks, by ripping a 10-in. board down the center. He decided that, as he had plenty of lumber, he would save all this ripping by putting the sheathing on double, and had no sooner made this decision than he realized that he might just as well put the boards on horizontally as vertically,

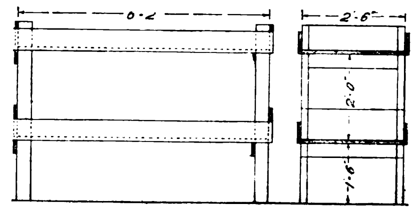


Fig. 3. Elevation and section of bunks which were built separate in sets of four

which would save some cutting and obviate the necessity of putting girts, or nailers in between the studs.

The studs were set 4 ft. apart, and Fig. 2 shows a cross section of the completed bunkhouse. The studs, rafters and braces were cut to patterns and were assembled into bents on the bunkhouse floor; a short stud was laid along the rear edge of the floor, a long stud along the front edge, a rafter laid across the top of them and spiked fast; the ends of the studs were made even with the end of the floor (which of course squared the bent) and then the brace was nailed in place. Two men carried these bents to the far end of the floor and nailed them in place as fast as they were made. When all the bents were in place the purlins were marked out at the foot of the studs (so as to get the spacing correct), placed on top of the rafters and nailed. After they were nailed, plumbing one end of the building brought every bent into its proper place. No plumbing was necessary sideways, because the bents had been built square, and had been held so by the brace that was spiked to each one.

Windows of second-hand single sash were put in at each end, and wherever

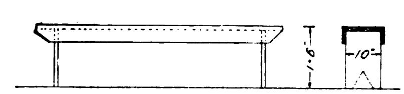


Fig. 4. Movable seats, which were arranged around the wall

possible along the sides they were made to slide, either up or down, whichever was most convenient.

Bunks were made, separate from the

building, in sets of four, as shown in side and end elevation (Fig. 3). Movable seats 6 ft. long were made as shown in Fig. 4. The seats around the central space were fastened to the wall.

The dining room was built the same width as the bunkhouses, but made 8 ft. longer, giving room for four tables 2 ft. 6 in. wide and 15 ft. long. The kitchen and commissary, 20 ft. long, was built on the end of the dining room.

Building paper was placed between the two thicknesses of boards on the side walls, the roof was covered with three-ply roofing. All sheathing was nailed with six-penny nails, for greater ease in tearing down. The stovepipes were connected, straight up, to a sheet metal roof plate.

There being quite a demand for temporary housing facilities at the present time, it is hoped that the foregoing may contain some hints for those who may be called upon in an emergency to handle work of this or a similar nature.

## Interesting Type of Combination Stairs

What are known as combination stairs are very popular in many sections of the country. Combination stairs are an economical arrangement whereby the staircase can be reached both from the kitchen and the main hall or living room.

An interesting arrangement is shown in the illustration. The placing of the landing is such as to permit an exceptional sense of spaciousness, which is the main attraction in this arrangement. The bookcases give a sense of homelikeness that is interesting. The double windows afford plenty of light.

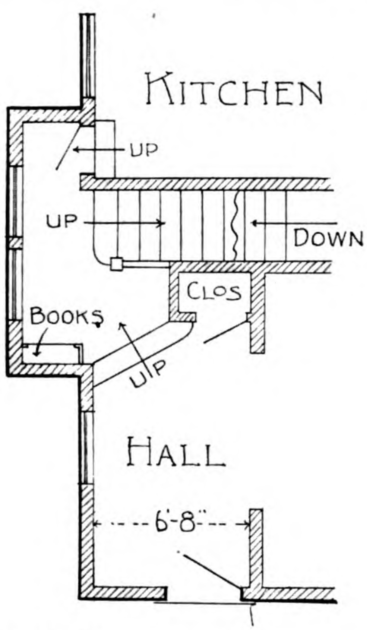
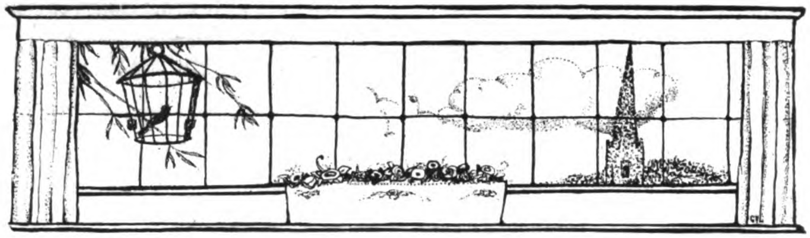



**Fig. 5. This arrangement gives a sense of spaciousness as one looks toward the stairs**



# Color Schemes for Up-to-Date Rooms

## *Securing Maximum Effect by Proper Selection of Finish*

By G. V. LEONARD

A natural love of the beautiful is born in all of us. It is the foundation of good taste, but it must be cultivated before we can acquire that nice sense of discrimination which recognizes harmony and fitness. The appreciation of beauty is a quality which is fortunately being more developed now than it has been during the last few generations. This shows itself in a demand for the simplicity and grace of design which marked the Colonial period in our history and in the avoidance of the ostentation and over ornamentation which caused much that is hideous in the way of architecture and furniture. This same fine feeling should be evident in the selection of colors for our surroundings. It will help to develop our comfort and pleasure.

The hall is an index to the type of people who live in the house. Here the guest forms his first impression and also his last mental picture upon leaving. The hall should present a feeling of hospitality and cheer, though a certain sense of dignity should be retained and the treatment should be more or less impersonal. There is no necessity of its being a large room, and its location, usually through the middle of the house, makes it often rather dimly lighted. A creamy yellow or old gold on the walls will remedy both of these traits at the same time and also give the desired feeling of welcome. Yellow is known as a "receding" color and will give an appearance of spaciousness. Landscape papers create much the same illusion. They do not make good backgrounds for pictures or furniture, but should in themselves help to furnish this room which requires so little in the way of furniture.

The atmosphere of the living room should be one of rest and comfort. To be effective backgrounds for furniture and pictures which add so greatly to the pleasure of the hours spent in this room, the walls should be neutral and unobtrusive. Gray is an excellent choice, especially if used in the warmer shades or in soft, silvery tones. The walls need not be perfectly plain, but may be in two-toned effects or in the popular glazed or stippled treatment. Rugs in quiet, well-designed patterns and figured or flowered hangings will add interest if plain walls are to be used. The artificial lighting will do much to make or mar the appearance of the room. Lamps and side-brackets are much the most satisfactory methods of lighting unless the room is too large to be adequately lighted in that way. The indirect method of lighting is an inexcusable waste of light and creates and unpleasant glare on the ceiling. It may be used effectively in such places as railroad stations, restaurants and hotel lobbies, but had best be confined to that purpose.

In no room does color play a more important part than in the dining room. It has a strong influence on our spirits and must be both cheerful and appetizing. Certain color effects all seem to have had their day in the dining room, the latest being the mania for blue. This choice was doubtless founded upon sound reasons. Perhaps the wish for harmonious settings for beautiful pieces of Delft, Wedgewood and Willow-ware led to it. Blue is a durable color for the dying of linen or cotton fabrics and much used in the quaint Japanese toweling for the breakfast room and modest dining room. The mistake lies in following out this color scheme not wisely, but too well. Blue used in large quantities is depressing.

Whether the dining room is to be rich and massive in treatment or light and graceful, is largely a matter of personal taste, provided of course it is in keeping with the rest of the house. The natural lighting conditions are of great importance. It is wiser to sacrifice personal preference than to lose the opportunity to reduce any shortcomings of the room. Heavy furniture and dark hangings have no place in the room which is of less than average size. The light, gracefully designed furniture and plain light walls will diminish such a handicap. A paneled wall preserves a charming sense of dignity and richness. It may be stained and varnished or given an "artificial" finish with paint or enamel. It is suitable for dining room, hall, library or den. The wood in itself is beautiful and the paneling adds decorative quality.

Daintiness and freshness should be the keynote of the sleeping rooms, together with an atmosphere of rest. This last need is especially felt by the sick or convalescent, who may be driven nearly to the point of madness by an ugly set pattern thrust upon him in his weakened and nervous state. Unobtrusive stripes, quaint all-over patterns or delicately mottled papers are good. The flat painted wall possesses the charm of simplicity and absolute cleanliness. The owner's personality may be more freely expressed here than in other rooms. Neutral wall shades are wisest, but the favorite color of the occupant may be added in smaller touches. The hangings may be of the jolliest of gay cretonne or chinz or in dainty flowered materials.

Don't use both figured walls and hangings.

Don't have sharp contrast between the walls and woodwork.

Don't use striped paper on a high-ceilinged room.

Don't use large patterned papers on a small room.

Don't use drop ceilings or many horizontal lines in a low-ceilinged room.

Don't use brilliant colors in large quantities.

The brighter the color the smaller amount of it should be used.

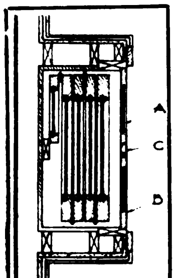
Don't forget nature's wise rule of using the darker and duller tones underneath, the lightest shades overhead, with the medium tones for the side walls.

# Partition Doors That Are Concealed When Closed

*Various Types That Can Be Used to Solve This Problem*

By E. J. G. PHILLIPS

PARTITION doors of the folding or accordion type are generally installed in such a way as to leave them exposed to view when the partition is open and the doors are in their folded position. In some special cases, such as fine residences, dining rooms or in exceptionally well finished churches where appearance and completeness of finish is considered of first importance, it is preferred to have all partition doors concealed when not in use. This can be accomplished by providing pockets in the wall or columns as shown in the accompanying illustrations.



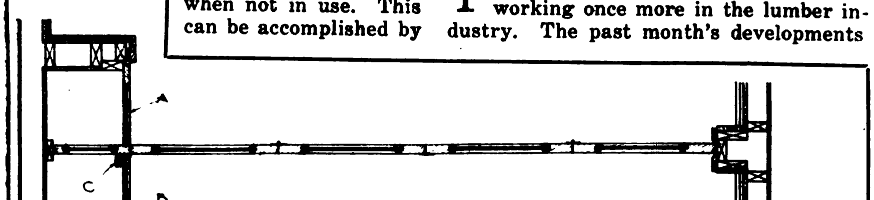




Fig. 1. At the top to the left the doors are closed; below, the doors are shown open

A partition composed of four full doors and one half door is shown open in the upper plan Fig. 1. The small doors A and B, which may be thin panels, serve to close the front of the pocket when the doors are folded as well as after the doors have been withdrawn. The lower plan shows the partition closed. The strip C closes the space between doors A and B which is normally occupied by the doors when the partition is closed. This strip is hinged to door "B" so it can be swung around out of the way when not in use as may be noted from the lower plan.

The illustration Figs. 2 and 3 shows a series of similar installations except that in this case the partitions divide at the center, half folding each way. The pockets for one-half of the partitions adjoin the wall of the building, but the pockets for the other half are built around the columns, producing a massive square column effect. As may be noticed from the illustrations, the strip C referred to above, has been omitted from these pocket covers. This omission materially detracts from the completeness of finish which has otherwise been attained. By means of the partitions, this public dining room may be divided into a series of small rooms for private parties.

A different condition which is rather exceptional is presented in Figs. 4 and 5. The doors when open fold into a pocket formed between the end of a divisional wall and a column as will be noticed by referring to Fig. 4. Pocket cover doors are not required because the last door of the partition closes the pocket on one side and the half door closes it on the other side when the partition is open. When the partition is closed, as in the plan Fig. 5, the columns stand apart somewhat from the doors. The small recess on the opposite side is finished all around and does not detract from the completeness of finish.

The elevation Fig. 6 of one of the partitions closed and elevation Fig. 7 of two partitions opened and folded in pockets give a clear conception of the installation.

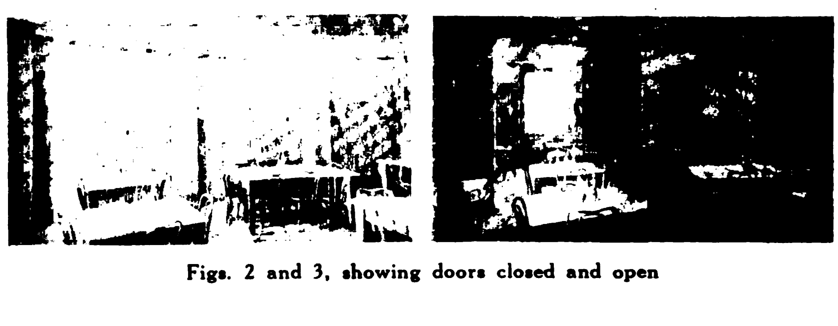
In all the plans shown, the standard accordion method of hanging doors has been followed. In all cases flush foot bolts should be used to hold the pocket cover doors in place or the last door of the partition, when pocket cover doors are omitted.

Conditions frequently occur where the pocket may be set back into a closet or some other out of the way place, in that way leaving the front of the pocket flush with the wall.

One advantage of the closed pocket, especially in public buildings, is that the pocket cover doors may be locked with a key and in that way no one except the janitor or other authorized person can move the doors.

# Conditions in Lumber Trade

THE law of supply and demand is working once more in the lumber industry. The past month's developments never showed this natural law as working more clearly. Price advances, shortages of stock, and buyers clamoring for lumber has been the case during the past month, while three months ago depression and uncertainty were predominant. These two bugaboos have no place in the lumber dealer's life and optimism is paramount. The West and Middle West have been experiencing one of the biggest booms that the lumber industry has ever experienced. There is reason to believe that the biggest part of that boom has been spent. However, during the time when the West was buying every stick of lumber that it could, the Eastern dealers were wondering where the market was going to. Prices were advancing at an unprecedented rate, in spite of the fact that the Eastern lumber market did not warrant it. During the past two months the demand has, slowly



Figs. 2 and 3, showing doors closed and open but surely, been increasing until to-day it exceeds the supply. Manufacturers report that they are bending every effort to increase production but are handicapped greatly by a shortage of labor.

There is reason to believe that the big boom in the West has reached its peak and the resulting high prices have also about reached their high levels. This last statement should not be taken that there will be no price advances during the current year. There most certainly will be. But they will be the natural result of the law of supply and demand.

Manufacturers are aware of the possibility that prices might go "out of sight." This would naturally kill what building there is now. To prepare against this more or less far-fetched possibility, mill men have been withdrawing price lists and are bending efforts to try to stabilize the market.

Pennsylvania hemlock is reported to be in very good demand. In fact the demand greatly exceeds the supply in this item and about the middle of June the largest operators in this lumber withdrew all quotations and are not accepting any business. It is believed that the mills will be in a position to quote once more by the middle of July. The mills are swamped with business and rain, handicapped by a big labor shortage, they find much difficulty in shipping the several thousand car orders they now have on file. There is reason to believe that when they do quote again, a further rise in price is possible.

The demand for Southern yellow pine is indeed unprecedented throughout the country and a week hardly passes but an advance in price is not announced.

The demand for North Carolina pine is increasing and the better grades are indeed difficult to buy. Only 40 per cent of the mills are running and these are only running 70 per cent of their normal production.

Douglas fir as well as Western spruce are in large demand and few mills are able to quote.

Red cedar shingles took an unprecedented advance during the past month and a half. This is caused by labor troubles in the British Columbia mills.

Oak flooring is on the upward trend and clear quartered white went up about $60 in the last month. Stocks in flooring are short and high in price.—A. C. S.

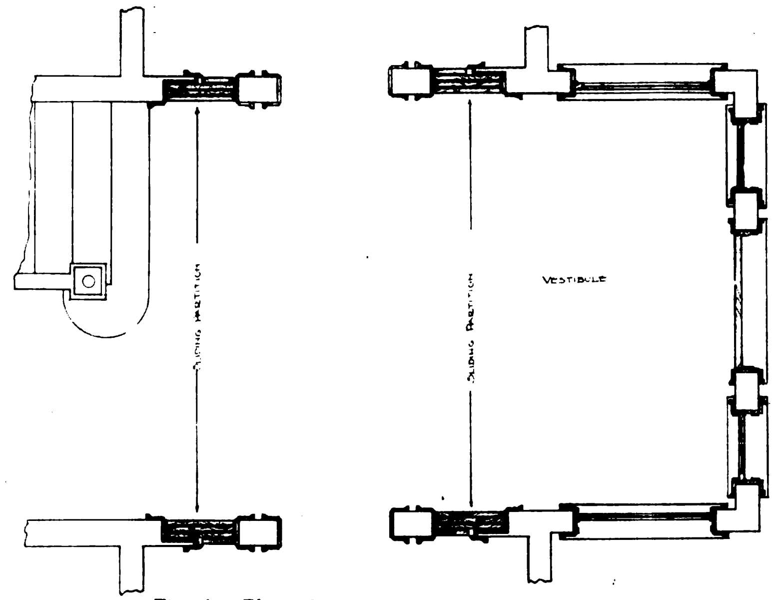



Fig. 4. Plan of partition doors, folded or open.

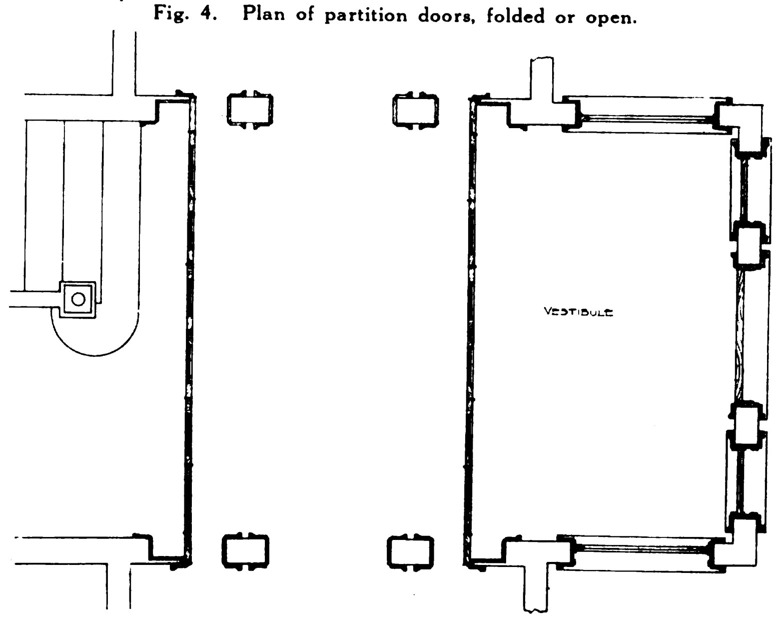



Fig. 5. Plan of partition doors closed

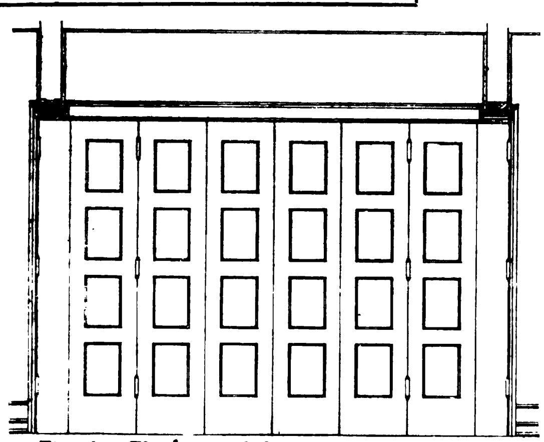


Fig. 6. Elevation of doors in Figs. 4 and 5 when closed

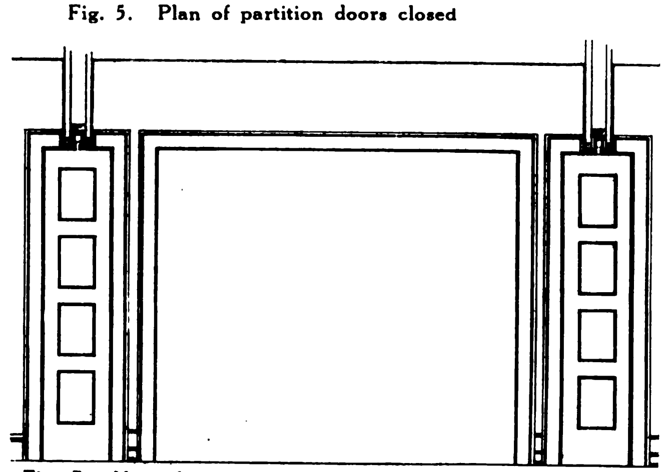


Fig. 7. Note the neat paneling effect at either side when the doors in Fig. 6 are open

# Legal Department

**Are you in need of any information as to building law? If you are, just put your problem up to our legal adviser, George F. Kaiser, LL.B., and you will be answered without charge.**

**Address Legal Department, Building Age, 243 West 39th Street, New York City.**

### *Who Benefits if Contract Is Filed?*

**From W. L. & G. H. O'S.**—We would like to know what advantage and protection there is to a contractor by filing a contract in New Jersey with the County Clerk of the county in which the work is performed.

**Answer**—There is no advantage to a contractor to file a construction contract with the county clerk in the county where the work is being performed in New Jersey. The only persons who would be benefitted by such filing would be either the owner or the mortgagee. If the contractor places the contract upon record, this would deprive him of any lien he might have upon the premises. In view of this fact, it would seem to be inadvisable to file such a contract.

### *Can Contract Specify Where Material Is to Be Purchased?*

**From M. & M. C., Ohio**—Where specifications read, "No doors for a building shall be used that are made outside of the state in which the building is located," would this clause prevent the contractor from buying in the open market?

If the doors are made outside of the state in which they were used and the specifications contain the clause as mentioned above, and the manufacturer was represented in the state in which they were used by a branch office, would this have any bearing on the contract?

Do these specifications conflict with the Interstate Commerce Commission's ruling?

I would be pleased to hear through the columns of your BUILDING AGE as early as possible.

**Answer**—If a person contracts to do a certain thing they must live up to their contract and do what they agreed to do unless they are willing to be penalized for the breach. Of course in a case of this kind if the doors manufactured in the state were as good or better than doors manufactured out of the state, the damages might be merely nominal. The only thing to do though when you make a contract is to try to live up to it and comply with its terms. Whether or not buying in the open market would be a breach of contract is something I do not know. You might buy doors made in the state in the open market and you might buy doors that were made out of the state. I think the word "made" as used in your quotation means manufactured and I do not believe if a firm had a branch office they could by any stretch of the imagination claim that their product was for any reason manufactured in the state.

I do not know of any interstate commerce commission ruling on this point.

### *What Does This Contract Cover?*

**From N. J. H., New Jersey**—From time to time I have read articles in your paper on legal matters, and would like to have a legal construction on the following clause in a uniform contract, adopted by the American Institute of Architects and National Association of Builders, revised 1905 and 1907, and applying to New York State:

"Article 8—The owner agrees to provide all labor and material essential to the conduct of this work, not included in this contrast in such a manner as not to delay its progress, and in the event of failure to do so, thereby causing loss to the contractor it is agreed that he will re-imburse the contractor for such loss, and the contractor agrees that if he shall delay the progress of the work so as to cause loss for which the owner shall become liable, then he shall re-imburse the owner for such loss. Should the owner and contractor fail to agree as to the amount of loss comprehended in this article the determination of the amount due shall be referred to arbitration as provided in Article 12 in this contract."

Where the owner has a separate contract with the contractor for the plumbing and heating and the owner gives out other contracts for general construction, etc., of the building, would the owner be responsible for the loss caused by the delay of the general construction contractor in not having the building ready for the reception of the plumbing and heating equipment within the time limit specified in the contract, and does this clause pertain to the labor and materials only that are to be installed directly with the plumbing and heating equipment? For instance, say if the owner was to supply the plumbing fixtures, which the plumber was to erect.

In this particular contract wherein the above clause appears the owner furnishes no labor or materials in connection with the plumbing and heating work; the question is, does this clause apply to all labor and materials essential for the erection of the plumbing and heating equipment (not included in the plumbing and heating contract) work, such as masonry, carpentry, iron concrete work, etc., necessary to be provided upon which the plumbing and heating can be erected?

**Answer**—When you attempt to construe Article 8 of the uniform contract mentioned by you, you must first take into consideration Article 7 which reads as follows: "Should the contractor be delayed in the prosecution or completion of the work by the act, or neglect or default of the owner, of the architects, or of any other contractor employed by the owner upon the work, or by any damage caused by fire or other casualty for which the contractor . . . . not responsible, or by combined action of workmen in no wise caused by or resulting from default or collusion on the part of the contractor, then the time herein fixed for the completion of the work shall be extended for a period equivalent to the time lost by reason of any or all the causes aforesaid, which extended period shall be determined and fixed by the architects; but no such allowance shall be made unless a claim therefor is presented in writing to the architects within forty-eight hours of the occurrence of such delay." The clause you are interested in applies to all labor and materials included in the job. In order to avail yourself of the remedies or rights provided for in this contract, you must give the notice prescribed in Article 7 and then proceed by arbitration which is provided for in Article 12 as follows: "In case the owner and contractor fail to agree in relation to matters of payment, allowance or loss referred to in Articles 3 or 8 of this contract or should either of them dissent from the decision of the architects referred to in Article 7 of this contract, which dissent shall have been filed in writing with the architects within ten days of the announcement of such decision, then the matter shall be referred to a board of arbitration to consist of one person selected by the owner, and one person selected by the contractor, these two to select a third. The decision of any two of this board shall be final and binding on both parties hereto. Each party shall pay one half of the expense of such reference."

### *When Owner Does Not Answer Letter Charging Indebtedness, Does He Admit It?*

One of the most interesting cases involving architects and owners which has been tried in some time was lately brought before one of the Appellate Courts in Massachusetts.

In this case, the trial court had decided that the failure to answer a letter charging an owner with an indebtedness was an admission of the charge. The Appellate Court, however, refused to follow this line of reasoning. In the case in question, an architect recovered from the owner for services rendered in drawing sketches in connection with the building of a house. Against the protests of the owner, the architect put in evidence a letter which read as follows: "Dear Sir:—

Received a set of blueprints last Friday morning. I have no use for same, as I have four sets of same design in my office now.

I sent a bill of $200 on account last week. Two years ago I made you some drawings of a house drawn for you on your ideas alone, got figures on same and house was not built. I did not send a bill then simply because I expected you to go ahead later. Nothing doing until this spring, when the subject was brought up again. I made you some plans satisfactory to you as two years ago, with the exception of slight alterations for some closet room; got figures from four reliable contractors. Highest offer $12,000, lowest $8,100, for house complete, which figures I mailed you by special delivery letter over a month ago.

I have not heard from you by letter or otherwise since and I have been in my office every day, including Sunday, with the single exception of one day.

Perhaps you thought I was offering my office, my time and all my expense to me, to you for nothing and to do this work according to your own ideas. I am not to blame for the high price of labor and materials or for the set ideas you have on plans or the expensive price you expect to pay for land, but I have followed out your ideas on both houses, done my work properly and expect to be paid for it. I sent you a bill of $200 on account with the expectation of quick payment and acknowledgment of favors shown you and a hope of continuing the work later, either when prices dropped or you found a much less expensive piece of land, but instead I find plans, etc., on my office floor and no check or word from you. An idea of the price paid to an architect for work such as yours when house is not built, 3.5 of 6 per cent:

| | |
|---|---|
| First house | $12,000 |
| Second house | 8,100 |
| | $20,100 |
| | 6 |
| | $ 1,206 |
| 3.5 of $1,206 equals | $723.60 |

I have at no time either by writing or word, promised or offered to do work for you or anyone else for nothing, but I did tell you that I would charge you a certain percentage for doing your work for you."

The Appellate court held that a failure on the part of the owner to answer the above letter did not constitute an admission of the truth of it. That although the owner did not answer it, he nevertheless at the trial could put in evidence to show that statements of fact contained in it were not true.

### *Can Lien Be Filed for Material Used in Forms?*

That no action can be maintained on a contractor's bond which provides for payment of all the material used in the construction of a sewer, on a claim for lumber used to hold banks of earth in place, while laborers are excavating a trench even though by repeated use on the same work such lumber is finally worked out and valueless, is the gist of a late Indiana decision.

The claim in this particular case was for lumber which had been used for "sheeting and bracing."

In Pennsylvania it has been held that there is no lien for lumber furnished when it is used to construct a temporary bridge or for scaffolding. In Massachusetts it has been decided that there is no lien for lumber used to make temporary forms used to hold concrete in place while it hardens.

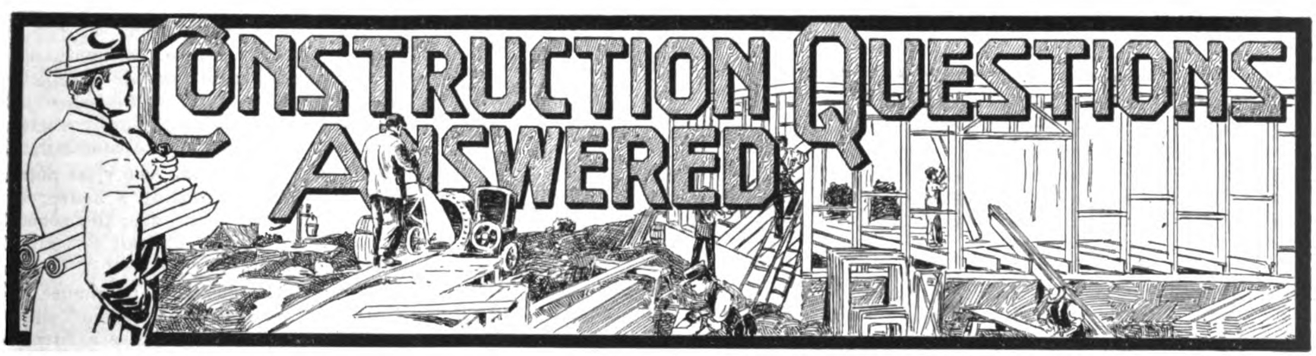
In Illinois claims for liens have been denied for lumber used to construct false work and molds, while in Maryland and Missouri liens for lumber used in like temporary forms have also been denied.

The New York courts in one case similar to those mentioned above said "They are used only to facilitate and make possible the operation of tools, machinery and men which in themselves act upon the structure. The authorities are unanimous in holding that no lien accrues for such materials.

### *When Property Is Jointly Owned, Must All Owners Be Named in Lien?*

That when husband and wife own property jointly in Michigan, a mechanic's lien to be valid and binding in that state must name both of them, is the decision of the Michigan Supreme Court in a late case.

The fact that the notice of lien was served on both of them was not to validate the lien when the law required the "owner, part owner, or lessee" to be named—Lallevich vs. Barbszevitz, 171 N. W. 351.




### *Improving Old House with Sun Porch*

**From W. A. G., Va.**—The illustration shows a residence where they want a front porch window frame 5 ft. to 8 ft., running from cross mark on window to cross on belfry; then on side where window is under dormer window is wanted 8 x 12 bath rooms above and below, with roof connections, not to change designs of either roof or not look "shoddy." Don't desire a gable. Also on side where window is, stairway just on inside.

**Answer.**—From your letter, as I understand it, I believe what you had in mind was to enclose with sash and glass the partition of your front porch from cross mark to cross mark as indicated on photograph. The building will look well if the following idea is carried out.

Remove the ornamental facia from below porch cornice and substitute a plain facia, lining up with the present one, or if it is desired, the present ornamental one could be backed with wood.

The posts supporting the porch roof can remain, the new sash being filled in between them. Sills under sash can be anywhere from 2 ft. 6 in. to 3 ft. 6 in. above the porch floor.

The construction below the sash may be divided into panels or treated similar to second floor porch rails. Should an open design be used it will have to be properly backed.

At any rate, whatever is done, it is most important that it should be in keeping with the architecture of the house.

A good idea of casement sash porch enclosure construction may be had by

**The house that is to be brought up to date**

referring to an article published in the October issue of 1918, under the heading of "How a Sun Porch Was Added to an Old Mansion."

Double hung sash could be used, but I believe casement sash would give the most comfort, for when they are opened they admit the maximum amount of air.

Now in regard to adding a bath room extension on first and second floors.

The way to do that is to build the walls of new extension on a plumb line with porch facia, leaving cornice ornament, etc., just as it is. The extension on the second floor should be run up to the level of the top of cornice at bottom of hipped roof. A cornice of the same design as that now in place to the balance of the house and lining with it should be run around the top of extension. The extension roof should be a flat one with only enough pitch to drain water to leader.—W. G.

## *Preparing Plaster for Wall Coating*

**From W. P. & D. C., New York.**—A few days ago I decorated the walls of an outside room in an office building with Muresco and found after an easterly rain that the dampness on east wall of room showed in salt marks here and there through the Muresco.

The superintendent of the building tells me that some years ago he had the same trouble with room on the floor below, but that a painter that was working for him at the time washed off the wall and put something on the plaster before putting on another coat of Muresco and that since that time the wall has always been right.

Can you tell me what I should do with this wall to make it right? The superintendent does not want to do anythig on the outside of the building inasmuch as that other wall was fixed from the inside.

**Answer.**—You can make Muresco stand up on the walls as the other painter did if you treat the walls as follows:

Wash off all of the present Muresco coating from the plaster and let the plaster dry out for a day or so. When dry, give same a good coat of shellac. A preparation sold under the name of Superlac could also be used successfully instead of the shellac, and might give still better and more permanent result as one of its claims is to resist dampness. And that is what your wall trouble is.

After the walls have been shellaced, dry finish them with Muresco, which I am sure will stay on.—W. G.

## *Deafening Floors Over Bowling Alley*

**From E. A. W., Wis.**—Would you kindly advise which would be the best method for deafening floors of an apartment building, below which bowling alleys and billiard tables would be installed.

Would a ½-in. thick layer of Flaxlinum nailed to the underside of the joists and one layer nailed to the top of the joists be sufficient to exclude the noise of the falling pins.

Possibly you may have had some experience in this line. A personal letter would be appreciated.

**Answer.**—A ½ in. layer of building felt nailed to the under side of the joists and a layer nailed to the top of the joists will tend to deaden the sound of falling pins considerably, but I doubt if it will prove sufficient under the circumstances. There is a great deal of noise in a bowling alley and more than ordinary precautions are advisable in order to make the apartments above desirable.

There are several ways of deafening floors. First, 1 x 2 in. cleats can be nailed to the floor joists about 4 in. below their top. On these ⅞-in. rough flooring can be laid. Above this can be placed from 3 to 4 in. of a lean mix of cinder concrete, which will deafen the floors very well. The objection to using concrete is that in from 10 to 15 years there is a probability that the joists will rot out and trouble develop. If mineral wool is used instead of the concrete, the same end will be obtained and there will be obviated the danger of joists rotting.

## *How Can This Pipeless Furnace Be Made to Heat the House? A Criticism*

In April number of BUILDING AGE on page 130, I note a communication from J. C., Mass., setting forth heating troubles.

Notwithstanding the claims of the manufacturer of the furnace installed that it has double the capacity to properly heat the house, the fact remains clear that he has installed or caused to be installed a furnace at least two sizes, or possibly six sizes too small.

Now granting furnace in question has a proper installation in basement, this question of under-size is borne out by fact that there is no complaint of any portion of house being overheated and that there is a super-abundance of cold air circulation. I shall be reasonably flexible in allowing that the furnace is constructed along proper engineering principles, but to obtain a basic conception or reference as to size and the range of sizes mentioned it will be necessary to place a certain rating on the furnace used and base this rating on the diameter of mean combustion area, and shall make reference to sizes in terms of inches of the mean fire-pot diameter.

Since fire-pots vary in shape from vertical type to that of having 4 in. difference between top and bottom diameters, and since it is general custom to give measurement at top, we should have in the extremes 24 in. in the one case and 22 in. in the other respectively; hence a maximum difference of 2 in. or sizes on this point. Now to find the size required in the building in question, we have an effective glass surface (E.G.S.) of 1072 sq. ft. and to allow 134 B.T.U.'s per sq. ft. per hour we should have a total heat loss of 145,000 B.T.U.'s and to allow 40,000 B.T.U.'s per sq. ft. of effective combustion area will give 3.6 sq. ft. which will require 26 in. diameter. This computation is on basis of 70° inside temperature during zero weather through normal conditions of furnace and best quality frame construction (that of sheathed, papered, sided, lathed and plastered). If only weather-boarding is used 20 per cent should be added to above given E.G.S. which will be found as above computed to require 28 in. diameter or size.

To review, it will be seen that if the 24-in. fire-pot used is of a vertical type or represents the mean diameter and that the best grade of construction was used, there would be at least a minimum deficiency of 2 in. or 2 sizes; and if the 24 in. given is the top measurement of a 20-in. fire-bowl at bottom, then we would have the extreme range between 22 in. and 28 in., or 6 sizes. This would be an unnecessary part of the discussion if the very vital points, namely, data on fire-pot and class of construction of building, had been given.

If the furnace was of adequate size, with proper hot and cold air capacities, and if proper means of circulation of air is provided for, it is absolutely certain there will be no cold air to complain of.

We are now up to the two vital points of consideration in heating a house; the first, proper size of furnace; the second, and usually the most difficult is that of proper installation.

To make application to house in question, if the house is "doubled sides" and papered, it would require a furnace with a mean diameter of fire-pot of 26 in.; if either papered or sheathed in connection with siding, 27 in; if sided only, 28 in.

Let it be assumed that the better grade of construction is used and that the size of furnace shall be 26 in. mean diameter of fire-pot.

For a pipeless furnace, the hot air duct shall have not less than 573 sq. in. in area or 27 in. in diameter; the cold air about register shall have at top portion not less than 677 sq. in. This will require a register not less than 50 in. square. Place this register in living room next to wall, on line with and next to door leading from living to dining room; and this door must either be removed or remain open during heating period and there must be a grill cut in over this door having a capacity of not less than 470 sq. in. There must be a grill cut over door between living room and parlor with not less than 500 sq. in. Cut in register over door between dining room and kitchen of not less than 300 sq. in. Cut in register of hot air type between kitchen and rear stair of not less than 142 sq. in. Cut in register of hot air type over door leading from parlor hall of not less than 142 sq. in. All of these grills and registers must have a free effective area equal to capacity given and shall be placed with top not less than 6 in. from ceiling with the preference of extending clear up.

There should be register of hot air type at least 14" x 16" placed in ceiling and through floor and immediately over hot air register in living room and place register of same size and description in dining room next to wall and over door between dining room and living room; and also in wall between bedroom and bathroom. This register must be placed next to ceiling or high as possible. It would be better to substitute this latter arrangement by placing a register next to ceiling in wall between dining room and kitchen; and install as shown by sketch.

There should be transoms over doors to front bedrooms, bathroom and rear hall.

No doubt serious objections will be made to the installing of a new and larger furnace, and to the what might be considered mutilation of walls and ceilings; but to reiterate, it must be remembered first, last and always that the prerequisites are furnaces of adequate size and provision for proper distribution of heat and circulation of air.

If a pipe system should be used it would be essential that the cellar be at least 7 ft. in the clear, or if necessary to obtain this depth (and conditions will allow) to pit the furnace. The size of furnace shall be of the size required for pipeless system; the combined area of heat pipes should be 664 sq. in., the area cold air duct should be not less than 110 per cent of hot air area, or 730 sq. in., and should enter furnace casing with top of boot not higher than grate line; the furnace should be located enough toward front of house as would give at least 12 in. between cold air duct and furnace; the cold air face should be located as indicated for pipeless, and shall have a free net area of at least 730 sq. in. with duct dropping vertically.

There should be a 14 in. diameter lead to front room; a 12 in. to living room leading to register along wall at stair; a 12 in. to dining room (this size will be required through fact of taking heat for bathroom).

Run a 10 in. line to kitchen and a 9 in. line to riser for front bedroom and 10 in. line to riser serving rear and middle bedrooms. Convey heat to bathroom in manner shown by sketch. Run a 9 in. line to register in riser of front stair, placed at point about midway of stair.

I shall not hesitate to here caution Mr. J. C. against the adoption of solution given by Mr. F. C. since the points of error are in common with either installation—the reinstalling of a furnace at least 2 sizes with a maximum possibility of 6 sizes too small which Mr. F. C. has not questioned. The point of recirculation of cold air back to furnace is a normal and necessary condition and is also common to either installation when cold air is taken from inside.

I will not agree with Mr. F. C. that it is an admirable house to heat with a pipe system, or with any hot air gravity system.

**Howard M. Yost,**
Asst. Building Inspector, Dayton, Ohio.

**Answer.**—The first objection raised by H. M. Y. to the solution offered for J. C.'s heating problem is that the furnace is too small. In case the fire-pot is tapered and is not 24 in. in diameter at the grate but 22 in. instead, this might prove to be true for very severe weather; for ordinary winter weather a 22 in. fire-pot would be adequate.

From the location of the furnace and registers, it is at once evident that the kitchen and bathroom are meant to be heated by the kitchen range and are therefore eliminated from the furnace proposition. The following computations are made with this assumption and also that the rooms have 9½ ft. ceilings, that the walls are made up of 7/16 in. clapboards, ¾-in. sheathing, studding lath and plaster and that the windows are equipped with weather strips.

The exposed wall and window surface is approximately 2400 sq. ft. not including the kitchen and bathroom. According to the plans there are nine windows on the first floor and seven on the second floor, making a total of sixteen windows. Assuming a glass surface of 10 sq. ft. for each window gives a total of 160 sq. ft. of glass surface. This leaves 2240 sq. ft. of wall surface. Taking 1.09 B.T.U. per sq. ft. per hour per degree temperature difference for glass and 0.28 B. T. U. for walls and assuming an outside temperature of 0 degrees F. and an inside temperature of 70 degrees F. the total heat lost by radiation is

$$\begin{array}{c} \text{Glass} \qquad\qquad \text{Wall} \\ H = (160 \times 1.09 \times 70) + (2240 \times .28 \times 70) \\ = 56{,}100 \text{ B.T.U.} \end{array}$$

Assuming an air leakage of 1.25 cu. ft. per minute per lineal foot of window sash perimeter, the heat loss due to this cause is obtained by the formula:

$H = 1.5\,P \times 70$, where $P$ is the window sash perimeter in feet.

Assuming the window dimensions to be 3 ft. x 4½ ft., the sash perimeter of each window is approximately 18 ft. and the total sash perimeter is 16 x 18 or 288 ft.

Hence, $H = 1.5 \times 288 \times 70 = 30{,}250$ B.T.U.

This figure checks very closely with that obtained by basing the calculation upon 1½ air changes per hour for the entire house, as is often done.

The coefficient of heat loss through ceilings of lath and plaster with no floor above is taken as .32 B.T.U. per sq. ft. per hour per degree temperature difference. The second floor ceiling surface is approximately 750 sq. ft. Assume an attic temperature of 40 deg. F. then the heat loss from this source is

$H = 750 \times .32 \times (70-40) = 7200$ B.T.U.

The total loss is therefore:

| | |
|---|---|
| By radiation from walls and windows | 56,100 B.T.U. |
| By air infiltration | 30,250 B.T.U. |
| By radiation from second floor ceiling | 7,200 B.T.U. |
| | 93,550 B.T.U. |

To this amount add 10 per cent for exposure and 15 per cent to compensate for chilling of the house at night when the fire is banked.

$93{,}550 \times 1.10 = 102{,}900$ B.T.U.

$102{,}900 \times 1.15 = 118{,}000$ B.T.U. per hr.

118,000 is therefore the total heat loss that must be provided for.

Now coming to the furnace, a 24 in. grate has an area of 3.14 sq. ft. and will easily supply $3.14 \times 40{,}000$ or 125,600 B.T.U. per hour; a 22 in. grate has an area of 2.64 sq. ft. and will easily supply 105,700 B.T.U. per hour.

With a reasonably good draft the 22 in. grate would without difficulty supply the heat necessary to warm the house in moderate winter weather and by opening the drafts and keeping a hot fire it should keep the house comfortable in severe weather with the proper system of piping and sufficient circulation of air.

H. M. Y. should bear in mind that a house cannot be properly heated regardless of how much heat is supplied to it if the heat is localized by improper circulation. The problem encountered by J. C. is one of proper circulation and if he gets that he will have no trouble in heating the house. I also wish to take exception to H. M. Y.'s statement that there is a superabundance of cold air circulation as this is apt to be misleading. There is not a superabundance of cold air circulation, but the circulation takes place in such a way as to cause an objectionable draft across the parlor and still does not drain the cold air from the front bedroom.—F. C.


**Vertical cross-section of suggested arrangement**

# English Type of Stucco House

### *Roof Attractively Broken Up—Effective Handling of Side Porch*

Note the graceful handling of the roof and the proportioning of windows

The back of the house is plain with windows effectively placed

The treatment of the porch is an interesting departure from the usual practice

A stucco fireplace is the main feature of the living room

Note the high windows, which permit furniture to be placed beneath them

The dining room

The bath room

ONE of the characteristics of houses planned in England is the irregular manner in which the various masses of the house are placed, together with windows that are smaller than those usually provided in this country. By placing the windows in groups, an effect of spaciousness is given that leads one to imagine the house as being larger than it really is, due to the smaller scale to which the details are made.

It will be readily noted in the house illustrated that if the windows were all made as one, instead of being 18 in. windows placed in groups, the openings would detract from the apparent size of the house as well as the proper scaling of it.

The house is broken up into several distinct masses, each of which is carefully proportioned so that a harmonious effect is gained. The elimination of wide overhangs is not only a characteristic of this type of design but also reduces the expense of a house to no small degree.

Note how the small gable at the right of the entrance scales in with the projecting part of the front of the house.

In order to make a house of this type appear attractive, it is generally necessary to provide for as much roof surface as can readily be obtained. This spread of roof has been gained by carrying down the first story of the main gable roof, the entrance being located under this overhang. The rear of the house, it will be noted, has the same effect in mind, the main roof being carried down to the first story level, provision for the second story rooms being made by a dormer.

Not the least important part of the design is the porch at the right of the house. Its round headed openings constitute an attractive departure from the usual practice, as is the case with the main entrance.

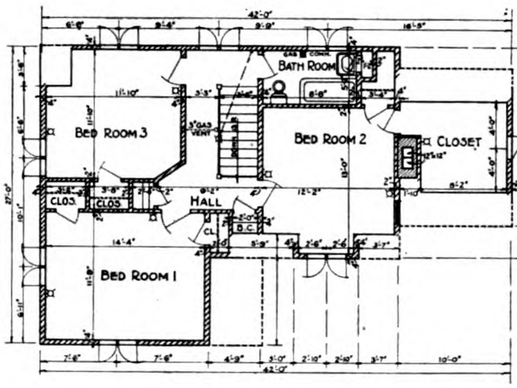
The house itself is of stucco, the roof being of slate. These two materials are associated with the popular conception of the English type of house, and are generally used in this type of design. One enters into a central hall, the stairs being placed directly opposite the entrance. A coat closet at the left of the stairs is a feature that will appeal to many. It is always convenient to have a closet like this for the placing of wraps of visitors as well as those of the household itself.

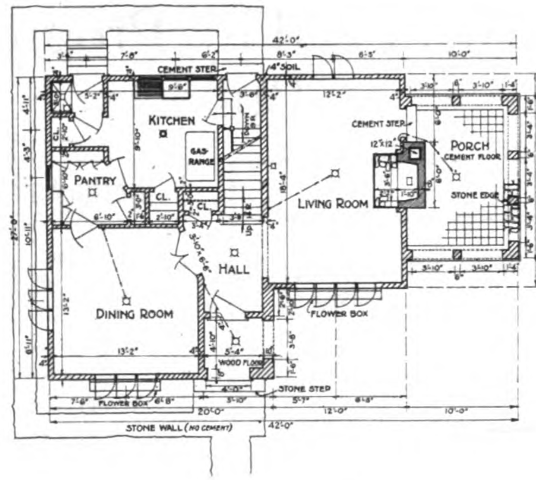
The main feature of the living room is the stucco fireplace, which is simple in design. The trim throughout is of the sanitary type, picture mouldings being placed at junction of wall and ceiling so as to add to the apparent height of the rooms. The windows in this room, as well as in other parts of the house, are placed higher than usual, permitting furniture to be placed beneath them.

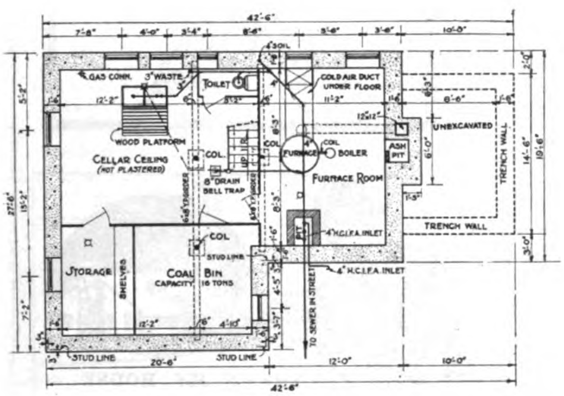
Toward the left of the main hall is the dining room, communication with



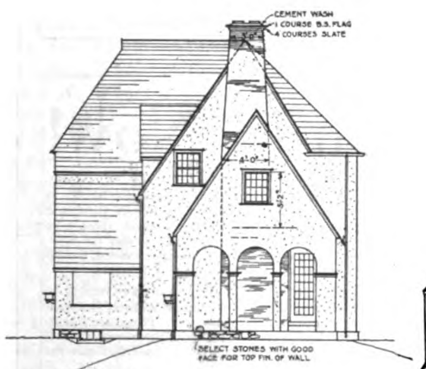
House at Woods of Larchmont, N. Y. Gramatan Homes, Architects and Builders




Floor Plans and Elevations, Scale 1/16" = 1 ft.






the kitchen being through the pantry.

The pantry is provided with spacious dressers and a broom closet. The kitchen sink is 36 in. high, a drain board being on either side of the sink. This arrangement is one that will be appreciated by the housewife. A kitchen closet and refrigerator placed in an entry complete the kitchen equipment. The gas range is vented through the 3-in. vent.

The second story contains three bedrooms, all provided with ample closet space. These closets are sufficiently deep so that a rod can be run lengthwise of them for clothes hangers to be placed hereon. Thus clothing is more readily accessible than is the case when they are hung on hooks around the wall of the closet. Several of the closets have a slipper shelf placed about 6 in. from the floor, so that it is not necessary to stoop so far in picking up footwear.

Over the side porch is a sewing room, which forms a pleasant addition to the bedroom.

Trim on the first floor and second story hall is of cypress, with white wood for the bedrooms on the second floor. Windows throughout are of the casement type. Heating is by means of warm air.

This residence is located in the woods of Larchmont, N. Y., and was built for Edna and Lucille Griffith in accordance with plans and specifications prepared by Lewis Bowman, architect, of Gramatan Homes, 154 E. 1st Street, Mount Vernon, N. Y.

# Ads Used by Progressive Builders


# How I Estimate Brickwork by the Superficial Foot of Wall

## *Method Evolved by Contractor Specializing in This Work*

By D. C. CARSON

IN view of the fact that there are so many excellent books on estimating on the market, it may be presumptuous on my part to have anything further to say on the subject; but, believing that what I have in mind to say may be of benefit to young mechanics just entering the contracting field, I will not withhold my say.

Many contractors on estimating the brickwork on a building, take the outside measurement around the building, and estimate the cubic feet, without making any allowance for openings, or for measuring the corners twice, and then figure 22½ bricks to the foot. I followed this custom for several years myself, but found it unsatisfactory in many ways; the most objectionable one, being that it gave too much material, which is quite an object where competition is close on bids. At last I came to the conclusion there must be a better and more satisfactory system, and after studying the matter carefully, I struck upon the Superficial Foot method, and found it to my liking and adopted it, and I am now going to try and explain how I go about figuring up the material on a building.

The first thing I do when I set out to figure up a building, is to read carefully the specifications, noting everything that is any ways out of the ordinary. I make notes as to the kind of brick; where they are made; cost laid down, if given; composition of the mortar; thickness of the joints, etc.

As the excavation is generally a part of the masonry work, I find out all I can about the site; whether there are difficulties likely to be encountered, such as trees, water, rock, etc. Having satisfied myself on this point, I turn to the plan of the building and study it carefully, so as to get as thorough an understanding as possible what the architect has tried to set forth, and to see if there are any errors in scaling or dimensioning. This settled, I take the basement plan and estimate the excavating, backfilling and grading. Then I begin on the brickwork by taking off the superficial feet of footing at the thickness of wall. Then comes the basement walls at their thickness. I then estimate the superficial feet of openings in basement walls and deduct from the superficial feet already obtained. Thus we proceed until the top of the building has been reached.

I am furnishing with this article a table, which gives the number of brick, feet of mortar, prices, etc., and an example explaining its use; and to illustrate this article I am going to use the same example, and thus they can be used together to complete the estimate.

**Example.**—How much material will it require to erect a storeroom, 20 ft. x 60 ft., two stories, basement and firewall, figuring by the superficial foot? The basement is 7 ft. 5 in. to joist, which are 12 in., and there is a footing of 5 in.; 22-in. wall; first story, 12 ft. to joist, joist 10 in.; second story, 9 ft. to joist, joist 6 in.; firewall, 4 ft. at front and 1 ft. above joist at rear on sides; the front and one side are faced with a mat brick costing $16 per M. on ground; the common brick for backing face brick, and for all the other walls, cost $10 per M. on ground; the size of the face brick are 8¼ in. x 4 in. x 2¼ in., and laid with a ¼-in. joint; the common brick measure 8½ in. x 4½ in. x 2½ in., and laid with a ½-in. joint; the lime for mortar costs $2.10 per barrel; cement, 73 cents per sack; sand, 12½ cents per cubic foot; mason labor is 75 cents per hour; tender labor, 40 cents per hour.

Now having our data on material and labor, we are ready to proceed with our estimate; but before going further, I wish to state that in taking off openings I always allow 6 in. in height and 1 ft. in width, to make up for the extra labor in working around them. So in the estimate of the example the deductions have already been made. Thus, an opening 3 ft. 4 in. x 7 ft. 2 in., including frame, is figured 2 ft. 4 in. x 6 ft. 8 in.

We will now take off our excavating, backfilling and grading. The specifications say that the excavating is to be 6 in. larger than dimensions of the building, so we will figure our excavating as *20 ft. 6 in. x 61 ft. x 7 ft. 5 in., as there is no grading, and we must estimate from grade line.

Excavating—20 ft. 6 in. x 61 ft. x 7 ft. 5 in. = 9274.5416 cu. ft. = 343.5 cu. yd. of excavating; 61 ft. + 40 ft. x 6 in. x 7 ft. 5 in. = 13.872 cu. yd. of backfilling. As there is no grading, this finishes the excavating.

*Joins another building.

### *Brickwork*

Footing—60 ft. 4 in. + 60 ft. 4 in. + 16 ft. 8¼ in. + 16 ft. 8¼ in. = 154 ft. × 5 in. = 64.184 ft. of 22-in. wall, minus .9783 = 63.205 superficial feet of 22-in. wall in footing.

Basement Walls—60 ft. + 60 ft. + 17 ft. 11 in. + 17 ft. 11 in. × 7 ft. = 1,090.833 superficial feet of 18-in. wall. Add to this sum 155.833 superficial feet for wall between joist, making 1246.6666 ft. in basement walls. From this we must deduct eight openings, 2 ft. 8 in. x 2 ft. 11 in.; one opening 2 ft. 4 in. x 6 ft., 79 ft. 8 in. lineal, 10 in. x 5 in. stone water-table, and 80 ft. lineal of face brickwork. The water-table and face brickwork equal 20.7638 superficial feet of 18-in. wall. The openings contain 77.3611 ft. plus 20.7638, equal 98.125 1246.6666 minus 98.1249 leaves 1148.5416 superficial feet of 18-in. wall in basement.

Basement, footing, 22-in. wall 63.205
Basement, wall, 18-in. wall... 1148.5416
Basement, stone water-table,
10 in. x 5 in. lineal feet....79 ft. 10 in.
Basement, face brick, 4 in.
wall ..................... 80 ft.

First Story—60 ft. + 60 ft. + 17 ft. 11 in. + 17 ft. 11 in. = 155.10 x 12 ft. 10 in. to top of joist, equal 1999.8611 superficial feet of 13-in. wall. From this must be deducted four openings 7 ft. x 3 ft. 6 in.; one opening 6 ft. x 12 ft.; two openings 2 ft. 6 in. x 5 ft. 10 in.; one opening 2 ft. 4 in. x 8 ft. 8 in.; one opening 17 ft. 2½ in. x 12 ft. equals 425.9 superficial feet of 13-in. wall; 1999.8611 minus 425.9 equals 1573.9611 superficial feet. Now from this must be deducted 63 ft. 2¼ in. x 12 ft. plus 60 ft. 8 in. x 10 in. face brick; also 19 ft. 4 in. x 10 in. I-beam on front; four stone sills, 5 in. x 7 in. x 8 ft. 6 in.; two stone sills, 5 in. x 7 in. x 3 ft. 10 in.; one stone sill, 6 in. x 14 in. x 3 ft. 10 in. These equal, with deductions for openings in face work, 272.8333 superficial feet of 13-in. wall; 1573.9611 minus 272.8333 equals

TABLE FOR ESTIMATING BRICKWORK BY THE SUPERFICIAL

| Items Entering Into the Estimate, and the Symbols Employed to Represent Materials:<br>⊙ Bbl. Lime<br>⊡ Cubic Foot Sand<br>◬ Sack Cement | SIZE OF BRICK 8¼"x4"x2¼"<br>No. 1<br>Number of Brick and Cost, at $1 per M to Superficial Foot of Wall of 4", 9", 12" | Thickness of Bed Joint in Inches to Superficial Foot of Wall the Cubic Feet<br>¼" | Thickness of Cross Joint in Inches to Superficial Foot of Wall the Cubic Feet<br>¼" | Thickness of Fill Between Brick in Inches, to Superficial Foot of Wall the Cubic Feet<br>¼" | No. 2<br>Number of Brick and Cost, at $1 per M, to Superficial Foot of Wall of 4", 9", 12" | Thickness of Bed Joint in Inches, to Superficial Foot of Wall the Cubic Feet<br>⅜" | Thickness of Cross Joint in Inches, to Superficial Foot of Wall the Cubic Feet<br>¼" | Thickness of Fill Between Brick in Inches, to Superficial Foot of Wall the Cubic Feet<br>¼" | SIZE OF BRICK 8⅜"x4"x2⅜"<br>No. 3<br>Number of Brick and Cost, at $1 per M, to Superficial Foot of Wall of 4", 9", 12" | Thickness of Bed Joint in Inches, to Superficial Foot of Wall the Cubic Feet<br>⅜" | Thickness of Cross Joint in Inches, to Superficial Foot of Wall the Cubic Feet<br>⅜" | Thickness of Fill Between Brick in Inches, to Superficial Foot of Wall the Cubic Feet<br>⅜" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of brick in superficial foot 4 in. wall<br>Cost, at $1 per M | 6.77647<br>¢0.677647 | ....... | ....... | ....... | 6.4507<br>¢0.64507 | ....... | ....... | ....... | 5.9844<br>¢0.59844 | ....... | ....... | ....... |
| Cubic feet of mortar, superficial foot 4 in. wall 1⊙, 1◬, 15⊡ proportions Cost | ....... | 0.03333<br>¢0.18888 | 0.00882<br>¢0.04998 | ....... | ....... | 0.04761<br>¢0.269[illegible]2 | 0.00882<br>¢0.05025 | ....... | ....... | 0.04545<br>¢0.25755 | 0.0329<br>¢0.1864 | ....... |
| Cost of mason labor per ft. superficial 4 in wall | ¢0.90353 | ....... | ....... | ....... | ¢0.64507 | ....... | ....... | ....... | ¢0.59844 | ....... | ....... | ....... |
| Cost of tender labor per ft. superficl. 4 in. wall | ¢0.90353 | ....... | ....... | ....... | ¢0.64507 | ....... | ....... | ....... | ¢0.59844 | ....... | ....... | ....... |
| Number of brick in superficial foot 9 in. wall<br>Cost, at $1 per M | 13.55294<br>¢1.355294 | ....... | ....... | ....... | 12.[illegible]0 4<br>¢1.29014 | ....... | ....... | ....... | 11.9688<br>¢1.19688 | ....... | ....... | ....... |
| Cu. Ft. of Mortar, superficial foot 9 in. wall. 1⊙, 1◬, 15⊡ proportions Cost | ....... | 0.06666<br>¢0.37777 | 0.01764<br>¢0.09996 | 0.02083<br>¢0.11803 | ....... | 0.09522<br>¢0.53944 | 0.01764<br>¢0.10050 | 0.02083<br>¢0.11803 | ....... | 0.09090<br>¢0.51510 | 0.0658<br>¢0.3728 | 0.031134<br>¢0.176417 |
| Mason labor, cost of superficial foot 9 in. wall | ¢1.26923 | ....... | ....... | ....... | ¢0.8601 | ....... | ....... | ....... | ¢0.800 | ....... | ....... | ....... |
| Cost of tender labor, per foot, super. 9 in. wall | ¢1.26923 | ....... | ....... | ....... | ¢0.8601 | ....... | ....... | ....... | ¢0.800 | ....... | ....... | ....... |
| Number of brick in superficial foot 13 in. wall<br>Cost, at $1 per M | 20.32941<br>¢2.032941 | ....... | ....... | ....... | 19.3521<br>¢1.93521 | ....... | ....... | ....... | 16.9532<br>¢1.69532 | ....... | ....... | ....... |
| Cubic feet of mortar, super. foot 13. in. wall 1⊙, 1◬, 15⊡ proportions Cost | ....... | 0.09999<br>¢0.56666 | 0.02646<br>¢0.14994 | 0.04166<br>¢0.23606 | ....... | 0.14283<br>¢0.80916 | 0.02646<br>¢0.15075 | 0.04166<br>¢0.23606 | ....... | 0.13635<br>¢0.77265 | 0.0987<br>¢0.5592 | 0.062268<br>¢0.3528[illegible]4 |
| Cost of mason labor, per foot, super. 13 in. wall | ¢1.49023 | ....... | ....... | ....... | ¢1.0349 | ....... | ....... | ....... | ¢0.96 | ....... | ....... | ....... |
| Cost of tender labor per super. foot 13 in. wall | ¢1.49023 | ....... | ....... | ....... | ¢1.0349 | ....... | ....... | ....... | ¢0.96 | ....... | ....... | ....... |

1301.1278 superficial feet of 13-in. wall in first story; 808.805 superficial feet of 4 in. face brick wall.

4 stone sills, 5 in. x 7 in. x 8 ft. 6 in.
2 stone sills, 5 in. x 7 in. x 3 ft. 10 in.
1 stone sill, 6 in. x 14 in. x 3 ft. 10 in.
2 I-beams......... 10 in. x 19 ft. 4 in.

Second Story—60 ft. plus 60 ft. plus 18 ft. 7½ in. plus 18 ft. 7½ in. equals 157 ft. 3 in., x 9 ft. 6 in., 1493.875 superficial feet. Take from this 10 openings 2 ft. 4 in. x 5 ft. 8 in., 132.6666 super. feet.; 1493.875 minus 132.6666 leaves 1361.2084. The face brick and sills, which measure 313.6666 with openings, 1361.2084 minus 313.6666 equals 1047.5418 super. feet of 9-in. wall.

Face brick, 4 in. wall..........614.1388
10 stone sills, 5 in. x 7 in. x 3 ft. 4 in.

Firewall—60 ft. plus 45 ft. plus 30 ft. plus 15 ft. times 1 ft. equals 150 ft. plus 19 ft. 4 in. x 4 ft. equals 227.3333, plus 59 ft. 4 in. x 2 ft. 6 in. gives 375.6666 superficial feet of 9 in. wall. From this we take the face brick work 123.6666, leaving 252 superficial feet of 9 in. wall.

Face brick, 4 in. wall..........227.3333
Tile wall-coping ............... 80.00

### *Recapitulation*

Excavation .......... 374.5416 cu. yds.
Backfilling .......... 13.872 cu. yds.
Footing, 22 in. wall... 63.205 super. ft.
Basement walls, 18 in. 1148.5416 super. ft.
Basement walls, face work, 4 in. wall.... 17.00 super. ft.
First story, 13 in. walls ............1301.1278 super. ft.
First story, face work. 808.805 super. ft.
Stone sills, 4, 5 in. x 7 in. x 8 ft. 6 in.
Stone sills, 2, 5 in. x 7 in. x 3 ft. 10 in.
Stone sills, 1, 6 in. x 14 in. x 3 ft. 10 in.
I-beams..........2, 10 in. x 19 ft. 4 in.
Second story, 9 in. walls ............1047.5418 super. ft.
Second story, face brick, 4 in. wall.... 614.1388 super. ft.
Stone sills, 10, 5 in. x 7 in. x 3 ft. 4 in.
Firewall, 9 in. walls.. 252.00 super. ft.
Face brick in fire wall 227.3333 super. ft.
Tile wall-coping, 9 in. 80 lineal ft.

This ends our estimate of materials; now to get the cost of same in the wall we refer you to the table, from which you may obtain the amount of brick needed, amount of mortar, cost of labor, etc.

Believing no one will have trouble in estimating by the superficial foot if they will but give the matter a little thought, I leave the subject with you.

### *Bill of Materials*

Face brick .................... 11,488
Common brick, basement, footing 1,734
Common brick, basement, walls.. 25,202
Common brick, first story....... 21,413
Common brick, second story..... 11,493
Common brick, fire wall......... 2,765

Total common brick........... 62,607
854.7 cu. ft. of mortar, requiring
57 bbl. lime,
57 sacks cement,
855 cu. ft. of sand.

4 stone sills, 5 in. x 7 in. x 8 ft. 6 in.
2 stone sills, 5 in. x 7 in. x 3 ft. 10 in.
1 stone sill, 6 in. x 14 in. x 3 ft. 10 in.
10 stone sills, 5 in. x 7 in. x 3 ft. 4 in.

Two I-beams and separator, 10 in. x 19 ft. 4 in.

Eighty lineal feet of tile wall coping, 9 in.

**Example**—What will be the cost of the brickwork on a storeroom 20 ft. 0 in. x 60 ft. 0 in., basement 7 ft. 5 in. to joist, joist 12 in.; first story 12 ft. 0 in. to joist, joist 10 in.; second story 9 ft. 0 in. to joist, joist 6 in.; firewall 4 ft. 0 in. to top of wall at front above joist, and 1 ft. 0 in. above joist at rear on sides, one side divided into four sections of 15 ft. 0 in. each; roof slopes ½ in. to the foot; 5 in. of the 7 ft. 5 in. is footing; 22 in. wall, the basement walls being 18 in.?

The first-story walls are 13 in., the second-story walls 9 in., the firewalls 9 in., covered with 9 in. tile wall coping. One side and front are faced with a mat brick costing $16 per M., and measuring 8¼ in. x 4 in. x 2¼ in. and are laid with a ¼ in. joint. The common brick for backing up face brick and for all other walls cost $10 per M., and measure 8½ in. x 4 in. x 2½ in., and are laid with a ½ in. joint. The lime for mortar costs $2.10 per bbl.; cement, 73c per sack; sand, 12½c per cu. ft; tender labor, 1 hr., 40c. A mason will lay about 75 brick per hr. on face brick with spread joint, and about 47 with buttered joint; common brick, 150 on a 9 in. wall; 187 on a 13 in. wall; 200 on an 18 in. wall; 250 on a 22 in. wall, but to expedite matters we will take the figures in our table for 9 in. and 13 in. walls. As our table only gives us data on 4 in., 9 in. and 13 in. walls, for 18 in. walls we will take two 9 in.

FOOT OF WALL, WITH AN EXPLANATORY EXAMPLE

| SIZE OF BRICK—Continued 8 3/8"x4"x2 3/8"—Continued No. 4 | | | | SIZE OF BRICK 8½"x4⅛"x2½" No. 5 | | | | No. 6 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Brick and Cost, at $1 per M, to Superficial Foot of Wall of 4", 9", 12" | Thickness of Bed Joint in Inches, to Superficial Foot of Wall the Cubic Feet ½" | Thickness of Cross Joint in Inches, to Superficial Foot of Wall the Cubic Feet 3/8" | Thickness of Fill Between Brick in Inches, to Superficial Foot of Wall the Cubic Foot 3/8" | Number of Brick and Cost, at $1 per M, to Superficial Foot of Wall of 4", 9", 12" | Thickness of Bed Joint in Inches, to Superficial Foot of Wall the Cubic Feet 3/8" | Thickness of Cross Joint in Inches, to Superficial Foot of Wall the Cubic Feet ¼" | Thickness of Fill Between Brick in Inches, to Superficial Foot of Wall the Cubic Feet ¼" | Number of Brick and Cost, at $1 per M, to Superficial Foot of Wall of 4", 9", 12" | Thickness of Bed Joint in Inches, to Superficial Foot of Wall the Cubic Feet ½" | Thickness of Cross Joint in Inches, to Superficial Foot of Wall the Cubic Feet ¼" | Thickness of Fill Between Brick in Inches, to Superficial Foot of Wall the Cubic Feet ¼" | Lime ⊙ 50 Cts. per Bbl. of 200 Lbs. Cost per Cubic Foot of Mortar | Cement △ per Sack, 10 Cts., 94 Lbs. Cost per Cubic Foot of Mortar | Sand ⊡ 1 Ct. per Foot, 100 Lbs. Cost per Cubic Foot of Mortar | Mason Labor, Face Brick, 10 Cents per Hour Number Brick per Hour | Mason Labor, Com. Brick, 10 Cts. per Hour Number Brick per Hour | Tender Labor, Face Brick, 10 Cts. per Hour Number Brick per Hour | Tender Labor, Com. Brick, 10 Cts. per Hour Number Brick per Hour |
| 5.7242<br>¢0.57242 | .... | .... | .... | 5.7242<br>¢0.57242 | .... | .... | .... | 5.4857<br>¢0.54857 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | .... | .... |
| .... | 0.058<br>¢0.329 | 0.0329<br>¢0.1864 | .... | .... | 0.0448<br>¢0.2539 | 0.00854<br>¢0.04839 | .... | .... | 0.05729<br>¢0.32464 | 0.00854<br>¢0.04839 | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | .... | .... |
| ¢0.57242 | .... | .... | .... | ¢0.57242 | .... | .... | .... | ¢0.54857 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | 75 | 100 | .... | .... |
| ¢0.57242 | .... | .... | .... | ¢0.57242 | .... | .... | .... | ¢0.54877 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | 150 | 200 |
| 11.4484<br>¢1.14484 | .... | .... | .... | 11.4484<br>¢1.14484 | .... | .... | .... | 10.9714<br>¢1.09714 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | .... | .... |
| .... | 0.116<br>¢0.658 | 0.0658<br>¢0.3728 | 0.031134<br>¢0.176417 | .... | 0.0896<br>¢0.5078 | 0.01708<br>¢0.09678 | 0.02083<br>¢0.11803 | .... | 0.11458<br>¢0.64928 | 0.01708<br>¢0.09678 | 0.02083<br>¢0.11803 | 3.66¢ | 0.66¢ | 1¢ | .... | .... | .... | .... |
| ¢0.76322 | .... | .... | .... | ¢0.76322 | .... | .... | .... | ¢0.7314 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | 75 | 150 | .... | .... |
| ¢0.76322 | .... | .... | .... | ¢0.76322 | .... | .... | .... | ¢0.7314 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | 150 | 360 |
| 17.1726<br>¢1.71726 | .... | .... | .... | 17.1726<br>¢1.71726 | .... | .... | .... | 16.4571<br>¢1.64571 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | .... | .... |
| .... | 0.174<br>¢0.987 | 0.0987<br>¢0.5592 | 0.052268<br>¢0.352834 | .... | 0.1344<br>¢0.7647 | 0.02562<br>¢0.14517 | 0.04166<br>¢0.23606 | .... | 0.17187<br>¢0.97392 | 0.02562<br>¢0.14517 | 0.04166<br>¢0.23606 | 3.66¢ | 0.66¢ | 1¢ | .... | .... | .... | .... |
| ¢0.91872 | .... | .... | .... | ¢0.91872 | .... | .... | .... | ¢0.88 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | 75 | 187 | .... | .... |
| ¢0.91872 | .... | .... | .... | ¢0.91872 | .... | .... | .... | ¢0.88 | .... | .... | .... | 3.66¢ | 0.66¢ | 1¢ | .... | .... | 150 | 374 |

walls for brick, and for a 22 in. wall a 9 in. and a 13 in. wall. For mortar we will take two 9 in. walls and an extra fill, and for a 22 in. wall take a 9 in. wall and a 13 in. wall and an extra fill. Mason labor is 75c per hr. Tender labor is 40c per hr.

The face work is taken from No. 1, the common from No. 6.

The brick in a 9 in. wall are 10.9714; in a 13 in. wall, 16.4571; in an 18 in. wall, 9 in. wall x 2, equals 21.9428; in a 22 in. wall, a 9 in. wall and a 13 in. wall is 10.9714 and 16.4571 equal 27.4285. The cost is: 9 in. wall, 1.09714c; 13 in. wall, 1.645c; in an 18 in. wall, 1.09714c x 2 equal 2.74285c. The amount of mortar for a 9 in. wall is .15249; for a 13 in. wall, .23915; for an 18 in. wall, .1524 and .1524 and .02083 equal 1.32581; for a 22 in. wall, .15249 and .23915 and .02083 equal .41247. Price of mortar: 9 in. wall, .86409c; 13 in. wall, 1.05515c; 18 in. wall, 9 in. wall, .86409c and .86409c equal 1.72818c; 22 in. wall, .86409c and 1.35515c equal 2.21924c. Mason labor: 9 in. wall, .7314c; 13 in. wall, .88c; 18 in. wall, .7314c and .7314c equal 1.72818c; 22 in. wall, .7314c and .88c equal 1.6114c. Tender labor: 9 in. wall, .7314c; 13 in. wall, .88c; 18 in. wall, .7314c and .7314c equals 1.4628c; 22 in. wall, .7314c and .88c equal 1.64114c. These are the data given in the table. Now for our prices. The cost of a 9 in. wall is: 1.09714c x 10 equals 10.9714c; 13 in. wall, 1.64571c x 10 equals 16.4571c; 18 in. wall, 2.19424c x 10 equals 21.9424c; 22 in. wall, 2.74285c x 10 equals 27.4285c. These are the prices for common brick. The mortar cost is: 9 in. wall, .86409c x 6, as our price is approximately six times that given in table, or 5.18454c; 13 in. wall, 1.35515 x 6 is 8.1309c; 18 in. wall, .86409 x 6 and .86409 x 6 equals 10.36908c; 22 in. wall, .86409 and 1.35515 x 6 equals 13.31544c. Mason labor: 9 in. wall, .7314c x 7½ is 5.4855c; 13 in. wall, .88 x 7½ equal 6.60c; 18 in. wall, .7314c plus .7314c x 6 equals 8.7768c; 22 in. wall, .7314c plus .88 x 7½ equal 11.3355c. Tender labor: 9 in. wall, .7314c x 4 equals 2.9256c; 13 in. wall, 88c x 4 equals 3.52c; 18 wall, .7314c plus .7314c x 4 is 5.8512c; 22 in. wall, .7314c and .88 x 4 equals 6.4456c. Brick 10.9714c, mortar 5.18454c, mason labor 5.4855c, tender labor 2.9256c, equal to 24.567c per superficial foot of 9 in. wall; brick 16.4571c, mortar 8.1309c, mason labor 6.60c, tender labor 3.52c, equal 34.71c; 18 in. wall, 24.567 x 2 equal 49.134c; 22 in. wall, 24.567c plus 34.71c equals 59.277c. Now as we have our prices for the different thickness, we will proceed with our estimate.

In the footing there are 63.205 superficial ft. of 22 in. wall at 59.277 equals $37.47. Basement walls, 1148.5416 ft. x 49.134c equals $564.32. First story, 1301.1272 ft. at 34.71c equals $451.62. Second story, 1047.5418 x 24.567c equals $257.35. In the firewall there are 252 superficial ft. at 24.567 equals $61.91. Face brickwork, 10.842352; mortar, 1.43478c; mason labor, 6.77647c; tender labor, 3.61412c; total, 22.66772c per superficial ft. of 4 in. wall. There are in the basement walls 17 ft. of face work; in the first story 808.805; in the second story, 614.1388 ft.; firewall, 227.3333; total, 1667.2771 superficial ft., at 22.66772c, equals $377.93. Footing, $37.46; basement walls, $564.32; first story, $451.60; second story, $257.35; firewall, $61.91; face work, $377.93; total, $17,750.56. Now these are net measurements, as the openings, stone sills and I-beams have been deducted. Let me say here that in deducting openings I always allow 6 in. on the height, and 1 ft. 0 in. in the width to make up for the extra labor in working around same. Thus if an opening between brick is 3 ft. 4 in. x 7 ft. 0 in., figure as 2 ft. 4 in. x 6 ft. 0 in.

Errors may have crept in in taking off quantities and prices, or in figuring; for my object has been to explain the working of the table. I would suggest that it would be wise to make out a table from your local prices and size of bricks. To get the number of brick to the foot, multiply the length of brick plus the thickness of cross joint by the thickness of brick plus the thickness of bed joint and divide a square foot in inches (144) by this result, which gives you the number of brick to the foot. To get the amount of mortar, multiply the length of brick plus the cross joint by the width of the brick, and divide by the thickness of joint, and add to this the sum from multiplying the width of brick by thickness of brick divided by thickness of cross joint, and divide by 1728, the number of cu. in. in a cu. ft., and you have the cu. ft. or decimal of a ft. of mortar in a 4 in. wall. For a 9 in. wall double and add the fill between, which will be 144 in. divided by the thickness of cross joint.

# Concrete Used to Repair Wooden Posts

## *Method of Making Rotted Posts Good as New*

By L. M. PANNELL

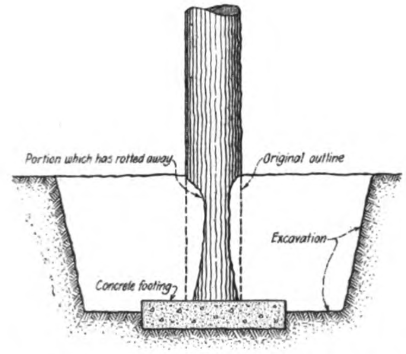



Fig. 1. Condition of the post to be repaired

It often occurs that the wooden posts which support a structure (such as a building, a trestle, a pipe bent, a mining headframe, or a tank) will rot away at or near the ground line, as shown in Fig. 1, while the balance of the structure remains sound. A method whereby such timbers may be effectively reinforced with concrete without rendering the structure inoperative is shown in Figs. 2 and 3. The process consists merely in excavating around the bottom of the post from the ground line down to the old footing and cutting out all of the decayed wood, as shown in Fig. 1, and then pouring a new concrete reinforcing pier about the timber, as indicated in Fig. 2. If old steel rods or lengths of pipe are available they may be used for reinforcing the new pier. The top face of the pier should be pitched (Fig. 2) so that the water which runs down the timber will tend to drain away and not creep down around the wood of the inside of the pier and thereby cause their decay. A case is on record where the timbers supporting a rope-transmission sheave frame were reinforced as suggested on Saturday afternoon and were sufficiently hard so that the sheave frame could be used on Monday morning. In this case a 1:2:4 concrete, which was mixed rather dry so that it would set promptly, was used. In very moist climates it may be desirable to arrange a flash ring of galvanized iron or zinc around each timber at the top of the reinforcing pier (Fig. 3) to prevent any possibility of water creeping down into the pier around the timber. As indicated in the picture (Fig. 3) a shallow groove is cut aruond the timber at the top of the pier and into this groove the flange of the flash ring is fastened. With this arrangement, all of the moisture or water that runs down the timber will fall on the flash ring and be deflected thereby to the sloping upper surface of the pier. Thereby the possibility of the moisture draining to the inside of the pier is eliminated.

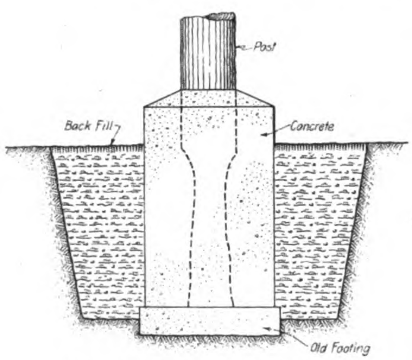



Fig. 2. The completed job

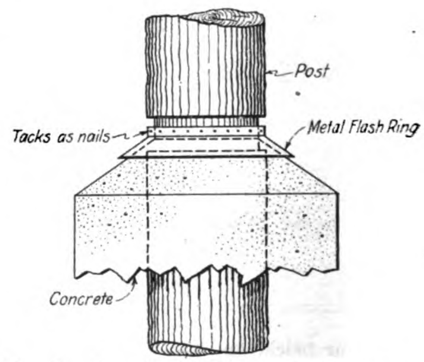



Fig. 3. Detail of flashing which prevents water from seeping down between post and concrete

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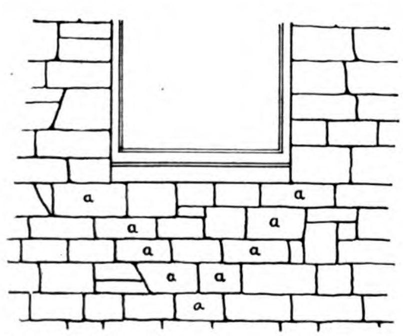
## Preventing Cracks Under Openings in Masonry Walls

When placing openings in a stone foundation wall, it is advisable to step the stones from each side of the opening as shown in the illustration. This stepping down of the stones carries the weight of the wall down underneath the opening, so that settlement will be uniform.

If the weight on the wall is considerable, it is advisable to use a slip sill, that is, a sill which does not extend into the wall, but is flush with the jambs. This will prevent the sill from cracking due to the settlement on the ends being greater than that under the middle.




Construction of masonry wall under window

## How Can a Good Estimating System be Developed

(*Continued from page* 219)

material therefor, labor for mixing concrete, labor for placing concrete, labor for removing forms, and so on throughout the entire building. Then, these figures are carefully checked up as the job progresses, and corrected as occasion requires.

Thus, the first job will yield valuable data, which is especially worth while because it is thoroughly adapted to local conditions. When the next estimate is prepared, this corrected data forms the basis for estimating on, and the estimate is again checked up as the work progresses. Of course, labor and material are estimated separately, in as small sections as possible so that they can be readily checked up. This is the only thoroughly reliable method of making sure that your estimates are correct.

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### The Only Way

If you toot your little tooter
And then lay away your horn,
Within a week there's not a soul
Will know that you were born.

The man who tries to advertise
By short and sudden jerks,
Is the man who's always kicking
Because it never works.

The fellow who is on the job
A-humpin' every day,
And keeps forever at it—
He's the one who makes it pay.

*Wood Construction*

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### A Brotherly Act

Mrs. Newhouse—I wonder why the carpenter left so many nails sticking out everywhere?

Mr. Newhouse—I don't know, unless it is because his brother is a clothier.

# Mixing and Placing Concrete

## *How to Obtain Maximum Strength from the Mixture*

By ERNEST IRVING FREESE

**CONCRETE has often been defined as a combination of cement, sand and rock. As a general definition this is passable. But as a particular definition of good concrete it is entirely inadequate, since it takes no account of three very necessary and important ingredients.**

Good concrete is no more dependent upon proportionate amounts of Portland cement, clean sand and hard stone than it is upon the proportions of pure water, hard work and intelligent supervision that enter into its make-up. Nor is it less so. Not one of the above "ingredients" can be considered of greater significance than another in the production of good concrete.

What else, then, other than the determination of the proper proportions of the cement and aggregate remains to be accomplished?

First: The materials must be measured accurately.

Second: They must be mixed thoroughly.

Third: The mixture must be placed quickly and carefully.

Fourth: The placed concrete must be protected from rapid drying.

I

### *Measurement of Materials*

The unit of measurement must be invariable, that is to say, it must neither be a shovel nor a wheelbarrow, but a cubic foot. At five o'clock in the afternoon shovels and wheelbarrows have, strangely enough, considerably less capacity than they possess at eight o'clock in the morning. But a cubic foot remains a cubic foot all day long.

A sack of cement, when measured loose, will amount to just about one cubic foot in volume. Hence, since the sand and rock are always measured loose, a standard sack of packed cement may be considered as a cubic foot, loose measurement. This greatly simplifies the work of proportioning the sand and rock. For instance, if a 1:2:4 concrete were specified, the proportionate parts would be as follows:

1 sack of cement,
2 cubic feet of sand,
4 cubic feet of rock.

Similarly, a 1:7 gravel concrete would call for the proportions of

1 sack of cement,
7 cubic feet of gravel.

These parts can be multiplied or divided to obtain any size batch, so long as the multiplier or divider is the same for each part. To illustrate, if a two-bag batch of a 1:2:4 mixture could be conveniently handled, this would call for:

$2 \times 1 = 2$ sacks of cement,
$2 \times 2 = 4$ cubic feet of sand,
$2 \times 4 = 8$ cubic feet of rock.

Or, say a half-bag batch of 1:7 gravel concrete were needed. Then the amount of materials would be as follows:

½ of 1 = ½ sack of cement,
½ of 7 = 3½ cubic feet of gravel.

Bottomless boxes, a foot square and a foot deep, inside measurement, offer the most convenient and practical means of measuring the aggregate accurately. They should be substantially made, of 1-inch lumber, well nailed and braced at the angles, as suggested in the accompanying sketch at *A*. The projecting sides serve to stiffen the box and provide it with handles. Horizontal marks extending entirely around the inside of the box should be made at each quarter of the height so that, if necessary, a fraction of a cubic foot may also be accurately measured. It is often necessary to mix a quarter or half-bag batch of concrete; in which case the graduated measuring box can also be used for the cement, since the box is of the same capacity as a cement sack—one cubic foot.

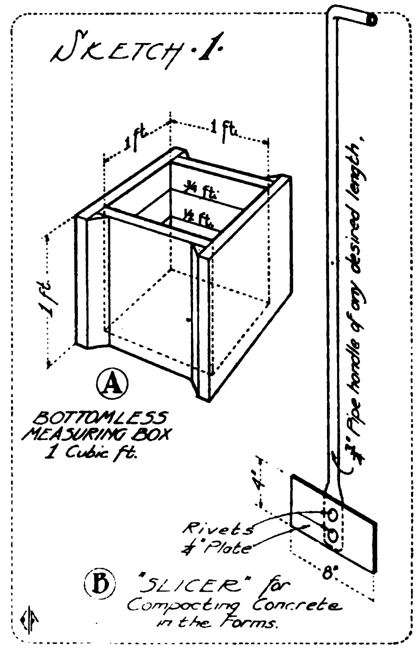
One measuring box should be provided to each wheelbarrow. The box should be filled only "level full," then lifted, and the top of the deposited pile leveled off (by using the box as a scraper) before the next cubic foot is measured. The measuring boxes can be used over and over again on different works.

There's enough "guesswork" on the average job of concrete without guessing at proportions; measure them.

II

### *Mixing*

Water plays an exceedingly important part in the production of concrete. Lack of enough water results in a dry and "mealy" mixture that is unfit for use in building construction; it is liable to become dried out before being placed, requires heavy ramming and tamping in the forms and cannot be made watertight. On the other hand, an excess of water produces a "soupy" mixture in which the rock will gravitate toward the bottom of the forms and the "soup" will run out of every crevice, carrying the greater part of the cement with it. Moreover, drowned concrete decomposes the cement, which then forms a milk-like scum that is devoid of any capacity to "set," but, instead, merely dries into a chalky substance on the surface of the concrete and destroys the bond, or adhesion, between successive layers.




It is evident that both of the above extremes should be avoided. The mixture should neither be meal nor soup. Instead, it should be more like a stiff jelly, just plastic enough to flow easily and smoothly into place without causing a separation of the aggregate. It is just right when it is of such consistency that it cannot be tamped without "quaking." It is impossible to determine, beforehand, the exact amount of water required to produce this "just right" consistency. It must be found by trial. This is where the experienced concrete worker is "worthy of his hire": he knows the proper consistency.

Not alone should the water be of the right amount, but it also should be fresh, clean and pure. Sea water or "brackish" water greatly retards the setting of the cement. Water in which foreign matter is held in suspension is unfit for use, since the cement cannot bind the sand and rock together if particles of dirt intervene. (The same caution as to cleanliness applies also to the sand and rock.) Water from mineral or hot springs should be avoided, for the surcharged salts attack concrete and reduce its strength. Swamp water is especially injurious in its effects. Use fresh, pure, clean water from wells, lakes, streams or city mains.

Hand mixing, except on small work, is neither advisable nor economical. Concrete mixed by machinery, even though it be leaner in cement than the hand-mixed product, will usually be the stronger and denser of the two. It would be irrelevant to here enter into a description of the immense array of highly perfected concrete machinery that is now on the market. It is sufficient to state that a portable mixer can be found to fit the needs of even the smallest job. Of the two general types on the market, the "continuous" and the "batch" mixers, preference should be given to the latter because the mixture is proportioned outside the machine and can, therefore, be more accurately controlled.

Where hand mixing is resorted to, the following method will produce the best possible result:

First: Prepare a rigid, level and water-tight mixing platform large enough for the manipulation of one batch.

Second: Prepare a "mortar-box," alongside of the mixing platform, large enough to accommodate the cement and sand of the above batch.

Third: Place the measured sand and cement in the mortar-box and thoroughly mix them, dry. Add water and work the mass into a plastic mortar of uniform color.

Fourth: Spread the measured rock in about a 6-inch layer upon the mixing platform. Thoroughly drench the rock with water. Then shovel the mortar from the mortar-box onto the rock and work the whole mass into a plastic concrete of uniform color and consistency. This usually requires about three turns with the shovels, if the laborers have acquired the effective "twist of the wrist" that should be used in dumping the shovels.

The above method is productive of about two cubic yards per man per day.

Cautions: Don't apply the water by violently throwing, squirting or dumping it onto the mixture. It will wash away the cement. Use a lawn-sprinkler nozzle on the hose, or gently pour the water into a depression in the mass and allow it to be absorbed. Don't mix concrete in places exposed to wind, or in a rain. Wind blows away the finest and best part of the cement. Rain prevents proper dry mixing of the cement and sand. Don't allow the cement grout to run off the mixing platform; keep it in the mass. See that no shavings, mud, clay, paper or cement sacks go into the mixture.

### III

### *Placing*

Concrete should be in the forms not later than thirty minutes after being mixed. The exact method of getting it there is of no consequence, so long as the forms are left free of jar and shock.

Forms must be well wetted before placing the concrete. This is important. It tightens the joints in the forms and prevents the timber from robbing the fresh concrete of its necessary moisture.

If the mixture is of the proper proportions and consistency, it will not "settle" in the wheelbarrows or carts during transportation to the forms. But if this settling occurs, the mixture should be "turned over" in the barrows before being dumped. In succeeding batches the sand and water should be gradually and slightly reduced until an inseparable mixture is procured. A small amount of hydrated lime, mixed with the dry sand and cement, will often make a mixture more workable, and can do no harm. The amount of added hydrate for this purpose should be limited to about 15 per cent of the volume of the cement.

Concrete of the right consistency cannot be tamped. It will "quake" or tremble under a direct blow like stiff jelly. Hence it should be compacted and the contained air expelled by working a straight spade, or a "slicer," up and down in the body of the mass and next to the forms. Excessive face spading, however, should be avoided; it brings water from the mass below and washes the cement from the face. A practical and easily made "slicer" is suggested at *B* in the accompanying sketch.

If the concrete is found to be too wet after being placed, make the next batch a little drier. Don't bail out the water, as the cement will be carried with it. Water works upward in wet concrete, and it may become advisable and proper to reduce the amount of water near the end of a day's work.

### IV

### *Protection of Fresh Concrete Against Cracking*

Concrete setting in air shrinks.

Concrete setting under water swells.

The greater the proportion of cement, the greater is the proportionate shrinkage or swelling.

Since air causes setting concrete to contract and water causes it to expand, there must of necessity be a certain state of moisture in which setting concrete will neither shrink nor swell. Hence the only sensible method of avoiding shrinkage cracks is to protect the concrete from rapid drying. This does not mean for a day or two, but for two or three weeks.

Keep it wet.

# How to Build and Fireproof with Hollow Tile—XV

## *Protection of Beams and Girders—Special Tile That Cheapens the Work*

By J. J. COSGROVE

THE specifications for fireproofing buildings generally state: "All girders, beams, channels, and all other steel members which show below the under side of the ceilings are to be encased on all sides with at least one-half inch thickness of fireproof tile secured to the steel in the usual manner. If required, special designs must be submitted to the architects."

It was about this very matter—the protecting of beams and girders from fire—that a well-known structural engineer of national reputation recently said: "Should a steel floor beam soften in a fire and fail, the falling tile would no doubt bring down every arch at a lower

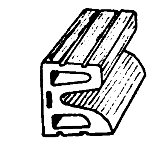


Fig. 121. A heavy semi-porous clip tile for covering flanges

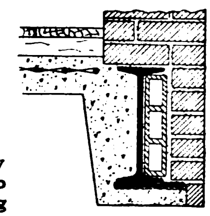


Fig. 120. Protecting girder which spans a wall opening

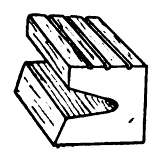


Fig. 122. Solid type of clip block, used for same purpose as Fig. 121

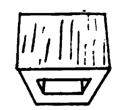


Fig. 123. Hollow soffit tile

level in that bay. Should a girder fail, that is, one of the main girders which support a number of iron beams, the resulting crash of falling material would no doubt wreck the entire interior of the building, if indeed it did not carry with it some of the walls as well."

That is why such care is taken to protect steel beams and girders in skeleton construction by encasing them in hollow tile. As the size of the beams and girders vary, and there are a number of ways in which they may be used in com-

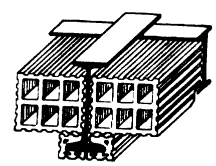


Fig. 124. Hollow soffit tile with ribs on upper surface

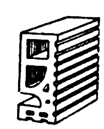


Fig. 125. Combination clip and partition tile used where beams are extra deep

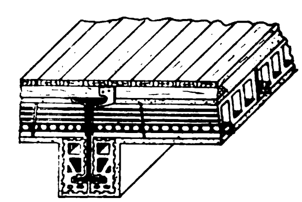


Fig. 126. Tile shown in Fig. 125 used to fireproof an I-beam

bination, there must be a number of designs of hollow tile to take care of all conditions.

The protection of a girder spanning an opening in a wall is shown in Fig. 120. It will be observed that the beam is bedded on all sides with concrete or cement mortar, which protects it from corrosion; and that on all sides are several inches of brick, hollow tile or concrete to protect it from the heat of a fire.

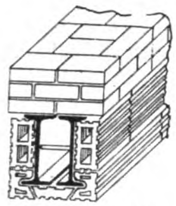


Fig. 127. With double I-beams, soffit tile are used as here shown

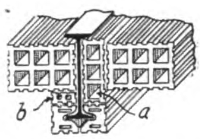



Fig. 129. Partition tile can be used as at A, or a hollow brick or low tile can be used as at B

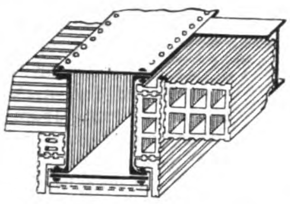


Fig. 128. Where the lower end of the beam is very wide, the soffit tile are hung on metal clips

Girder coverings require special blocks to cover the lower flanges or exposed surfaces, and those special blocks are known as "clip" tile and "soffit" tile. A heavy semi-porous clip tile is shown in Fig. 121. It will be observed that there are cells running through this block. In Fig. 122 is shown a solid porous clip block which has no air cells running through it. In Fig. 123 is shown a hollow soffit tile, and in Fig. 124 a hollow soffit tile with ribs on the upper surface which hold the tile from the under side of the beam flange, thereby providing another air space or cell.

It will be noticed that the soffit tile and clip tile are either porous or semi-porous material. Experience has proven that porous tile is the very best material to use for this purpose, and that next to porous comes semi-porous tile. They are both poor conductors of heat, and are not destroyed by the action of fire, nor by being drenched with water while in a heated condition.

The lower flanges of single beams are usually covered with clip tile. When the beams are extra deep, the webs are protected either by partition tile or extra deep beam tile, which are combination clip and partition tile, as shown in Fig. 125. In Fig. 126 can be seen the way these tile make up on a beam.

Where double beams are used, the soffits are covered by a soffit tile, as shown in Fig. 127, fitting into the bevel of the clip tile. For plate girders and where the space to be spanned is very wide, the soffit should be hung on metal clips, as shown in Fig. 128. The metal clips must be protected from heat or flame, or they will fail in a fire.

The girder coverings may be set at the time the arches are laid, or they may be put in later. If set with the arches, the partition tile, *a*, Fig. 129, which rests on the clip tile, is held in place by the arch. If set lated, the space between the clip tile and the bottom of the arch is filled with a low tile, *b*, or hollow brick. This is important for the builder to note, for it will sometimes be advisable to set the arches and cover the soffits of the beams later.

Channel beams should never be used for supporting hollow tile arches except when they are backed up against a brick or hollow tile wall, for it is almost impossible to properly protect them against fire and corrosion, except at a greater expense than I-beams would cost.

It might seem unnecessary, still at the same time it will be well, to call the reader's attention to the fact that in all the illustrations showing beam and girder covering, the cross beams between which the arches are sprung are at right angles to the beams and girders. That is indicated by the cross section of the blocks. It will be remembered that end construction is the type commonly used at the present time, so that the sections shown indicate a line cut through a row of lengtheners. It follows as a natural course, therefore, that there is no thrust against the sides of the beams or girders; and that explains why a row of partition blocks of hollow tile can be used alongside of a plate girder, as shown in Fig. 128, to protect the web. There is no crushing thrust against it whatsoever. It serves simply and solely as a filler and protection for the girder against fire. As was explained in a former installment, whenever an arch is sprung between two beams, skewbacks are used. If simply set in between two partition tiles, as shown in Fig. 128, the arch would fall of its own weight.

When hollow tile arches are built, the keys are set in place, thus strongly wedging the span; and when all the arches are in position in the several floors, they make the building perfectly rigid. Any form of composition flooring which would shrink more or less upon drying or seasoning would not only load the frame with an inert mass, but would add nothing to its stiffness.

The net weights of hollow tile arches of various thicknesses can be found in the following table:

Weight of ordinary 4-inch solid brick segmental arch, 38 pounds per sq. ft.

Weight of ordinary 8-inch solid brick segmental arch, 80 pounds per sq. ft.

Weight of ordinary 4-inch H. H. B. segmental arch, 31 pounds per sq. ft.

Weight of ordinary 8-inch H. H. B. segmental arch, 65 pounds per sq. ft.

Weight of ordinary 6-inch hollow tile segmental arch, 27 pounds per sq. ft.

Weight of ordinary 8-inch hollow tile segmental arch, 35 pounds per sq. ft.

It might be interesting to close the installment with an illustration and description of a system of fireproofing which is about the highest type of a thoroughly fireproof building that has ever been designed. Several details grouped together are shown in Fig. 130. These details combine in their total the principle features which have been treated in these columns for the past several months. They take in floor construction, column covering, beam and girder protection, and ceiling protection for the steel reinforcement which supplies the tensile strength for the floors.

An outside bay has been selected, as it shows how the floor rests on the wall. The inner surface of the wall is corbelled out to form a ledge on which the end of the floor can rest. There is no thrust against the wall at this point, as the floor rests like a beam, not being of arch construction. The corbels must be deep enough, of course, to supply the necessary strength to safely carry the load and wide enough to provide a good rest for the end of the slab.

The column is completely enclosed in round hollow tile column covering, which is enlarged at the top to form a cap. Soffit tile protect the lower flanges of the double girders, while clip tile and spe-

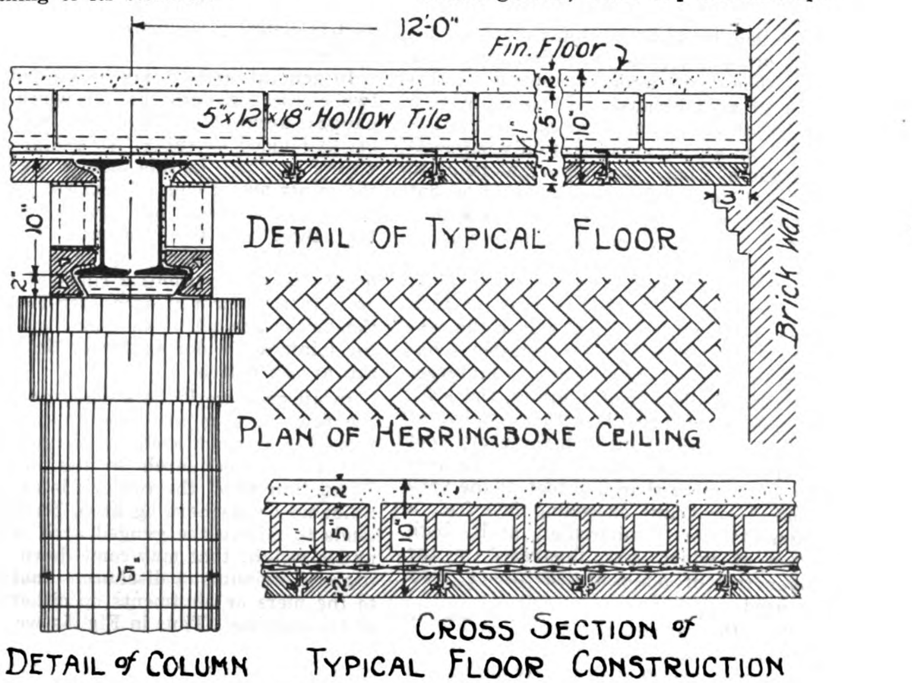



Fig. 130. Type of construction used with long span segmental arches

cial side tile take care of the webs of the girders.

The most unique part of the entire construction is the herringbone ceiling of 2-inch solid tile blocks laid underneath the 1-inch layer of concrete. This floor is dependent for its strength, as the detail shows, on a reinforcement of steel rods and wire mesh bedded in the cement concrete underneath the hollow tile blocks. If in any way this steel reinforcement, which is embedded only about a half inch in the concrete, should become exposed to the heat of a fire, the entire floor slab would be liable to fail. The prevent the possibility of such a contingency, the special ceiling of herringbone tile is provided.

Altogether this makes the most complete cover for steel skeleton and steel reinforcing one could wish for.

The type of construction shown in Fig. 130 is used with long-span segmental arches. The double beams or girders in this form of construction extend clear across the building, spaced certain equal distances apart. At right angles to the beams or girders, two 7 inch channel beams are placed back to back and riveted to the girders. These are to take the place of I-beams, and are spaced the distance the arches are to span. This divides the floor up into what is called "bays," and the channel irons act as stays, or ties for the beams or girders. Arches are sprung between these channel irons, which are stayed with stay rods, with the exception of the outer bays on all sides of the floor. These bays generally have flat reinforced arches or floors to withstand the thrust of the segmental arches in the interior of the building, and they act at the same time as stiffeners for the entire floor.

*(To be continued.)*

# Country House Details

## *Laying Out and Building the Masonry Arch*

By A. BENTON GREENBERG, Architect

OPENINGS in a wall are spanned by a beam of wood, stone or iron, or by an arch. An arch is a combination of stone, brick or terra cotta so arranged that they are supported by mutual pressure.

Arches are designated either according to the curve they assume, as semicircular, elliptical, etc., or according to the number of centers required to construct them, as one-centered, two-centered, etc. The latter classification has been followed in Fig. 1.

The upper row of one-centered arches illustrates various forms of flat arches, so called because the "intrados" or inner curve of the arch is flat, or nearly so. The term arch is applied to this type of arch because it is made up of a series of wedge-shape pieces, all radiating from a center and mutually supporting one another. An important point to be kept in mind when building a flat arch is to see that it is provided with a rise or "camber," on the under side or soffit of the arch. It should be remembered that an arch must sag, and even if it should be built theoretically perfect, a flat arch will appear to sag in the center. To overcome this inevitable tendency of sagging, as well as to counteract the optical illusion of sagging, the soffit of a flat arch is built with a camber of say one-eighth of an inch for every foot of span. Flat arches should not be used for spans more than five feet at the very most. For spans exceeding five feet, a segmental or semicircular arch, both types of which are illustrated in the lower row of one-centered arches, may be used.

The other arches illustrated in Fig. 1 have two or more centers. Their method of construction is so clearly delineated that after having studied them carefully, the carpenter or mason should have little difficulty laying them out. He may at first be rather confused as to just where to use a particular form of arch, but with a little experience and further study he will find that the flat and segmental arches are used for buildings of the ordinary design; the stilted arch, for buildings designed in the Moorish or Arabic style of architecture; the two-centered arches, for buildings of Gothic design, etc.

Before proceeding very much further with this subject, it may be well for the reader to glance at Fig. 2 and review hastily some of the more common terms used in connection with arches.

In general, arches may be divided into two classes—gauged and rowlock. A gauged arch is one which is built of bricks molded or rubbed on radial lines. (See Fig. 3b.) In this form of arch all the joints are of equal thickness, but the bricks themselves are wider at the top than at the bottom. A rowlock arch is made up of common bricks, laid in concentric rings of headers. In this form of arch (see Fig. 3a) the bricks are all of the same size, but the joints are wider at the top than they are at the bottom.

In all good work the gauged arch and the rowlock arch are used in combination—the gauged arch on the exterior and the rowlock arch in the interior. When thus used, the rowlock is called a relieving or discharging arch, because it tends to relieve the gauged arch of any undue weight that may come down upon it and distributes or discharges that load to the piers or abutments on either side of the opening. Thus in Fig. 5a we have an example of a gauged arch. This arch has really very little structural value, being more or less ornamental. The main load of the wall is carried by the relieving arch in back. Similarly with a stone lintel, which not infrequently appears over an opening. If the weight were to rest directly on this lintel, it would unquestionably crack; hence the necessity of building a rowlock arch in the interior of the wall.

All arches should be built on centers, which are wooden structures devised to temporarily support an arch during its construction. One method of forming these centers is to set two timbers, each about 2-in. thick, the required distance apart and connecting their upper edges, which have been previously cut to exactly fit the curve of the proposed arch, with narrow wooden strips or "lags" to support the bricks of the arch. (See Fig. 4.) These lags are from one to two inches wide, about one inch thick, and are placed about ¾ in. apart. Centers for semicircular or elliptical arches of wide span are built up of two thicknesses of 1 in. curved "ribs," nailed together, with overlapping joints. The horizontal plank ties at the bottom and the braces at the joints between the ribs, tend to make the entire framework rigid.

Centers should be made strong enough not only to support the weight of the arch, but also a considerable amount of the superimposed wall. This precaution is necessary to prevent any undue load coming down prematurely upon the arch before the mortar in the joints has thoroughly hardened. After the mortar has set, the center may be removed and used elsewhere in the building. To facilitate the removal of the center, wedges are inserted between the lower ends of the center and the upper ends of the supporting vertical pieces.

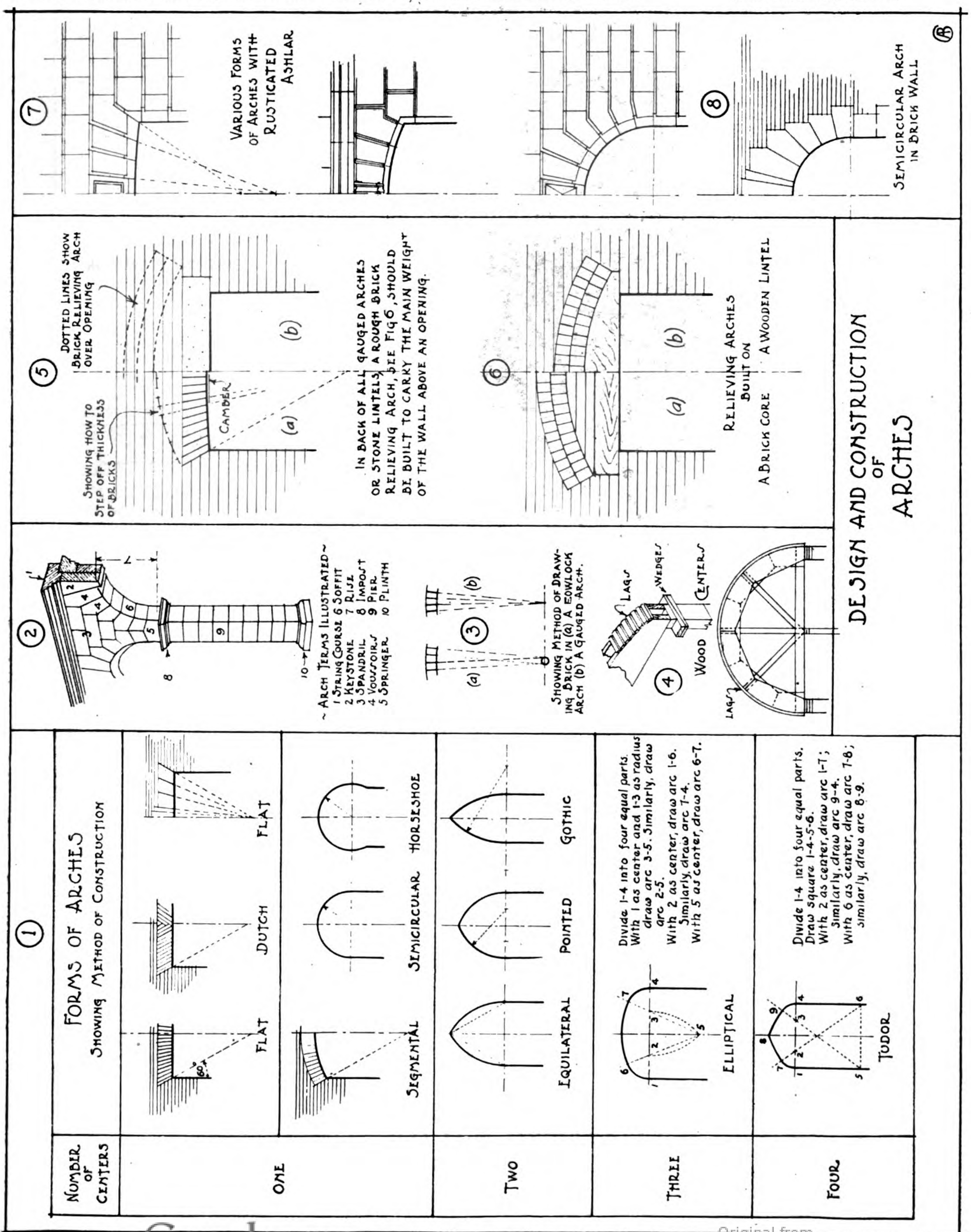
The movable or temporary wooden centers just described, are used for gauged arches. Centers for relieving arches remain in place permanently and are constructed in either one of the following ways: A wooden lintel, of the required strength, is put across the opening; on this a brick core is built; and on top of this core a relieving arch, of one or more rings, is turned. (See Fig. 6a.) Or, a wooden lintel with the upper edges shaped to the required curvature is placed across the opening and the relieving arch is turned over the lintel. (See Fig. 6b.) In either case the lintel should have at least a 4 in. bearing on the wall, at each side of the opening. In the first method, where the brick core is used, it is most important to spring the arch from the extreme ends of the lintel, as shown in Fig. 6, and not from a point directly over the opening. If the arch is made the same width as the opening and a fire should occur, it would burn the lintel and cause the arch to collapse, carrying with it the entire wall above. On the other hand, if the arch is made of the same span as the lintel then, in case of fire, the lintel would burn and the core would fall, but the arch would remain intact and it would continue its function of supporting the weight above.

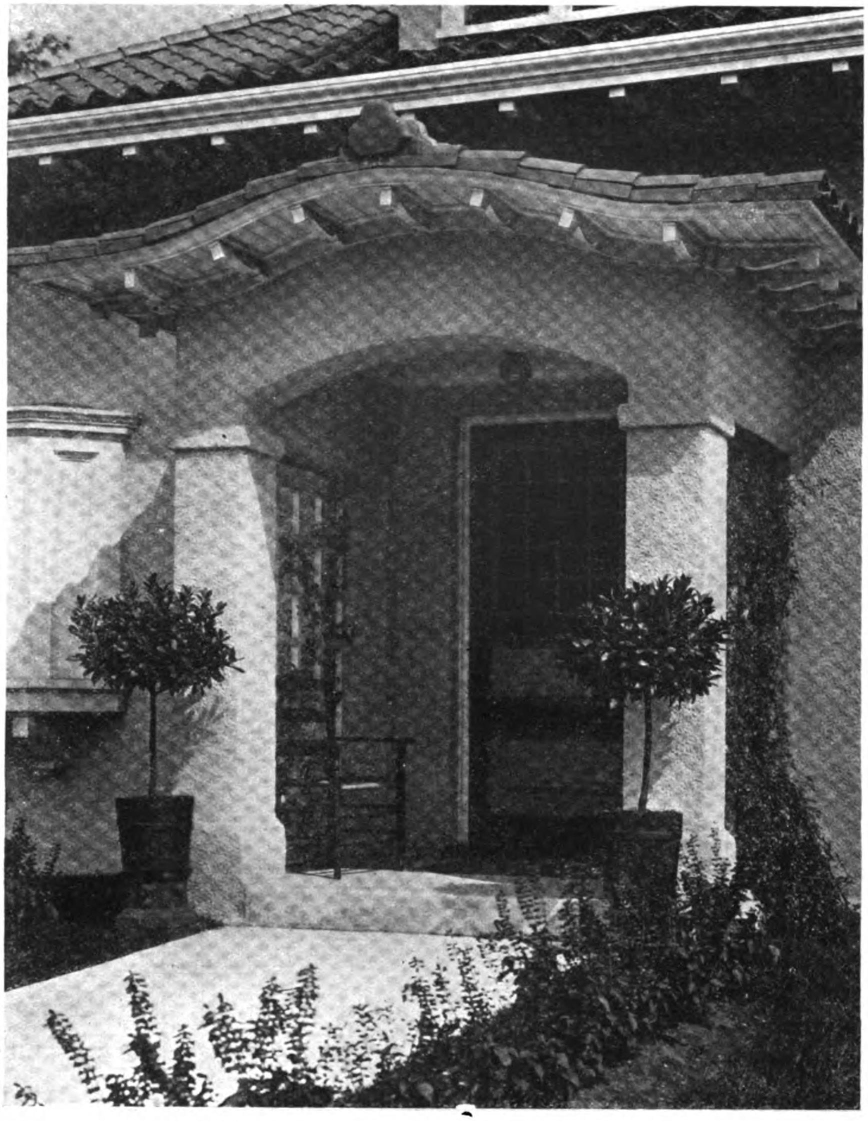
This being the case, it is readily seen that neither the lintel nor the core affects the strength of the discharging arch. The latter should, therefore, be made strong enough to carry any weight coming down upon the opening. The object of the lintel is simply to provide a nailing surface for the trim; while the core only acts as a turning piece for the arch and fills up the space between the arch and the lintel.

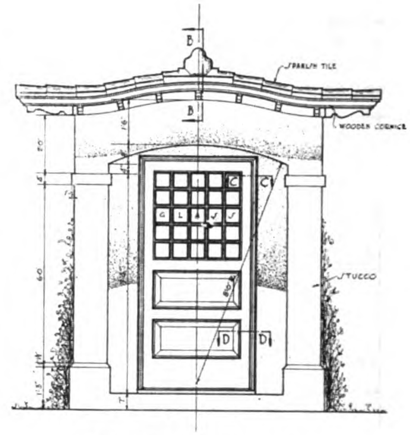
The question of how many rowlocks to use for an opening is often a puzzling one to the builder. A simple rule and one that gives very satisfactory results, is to allow one rowlock for each 18 in. or fraction thereof in the width of the door or window opening.

In Fig. 7 we have examples of the flat, the segmental and the semicircular

(*Concluded on page 246*)





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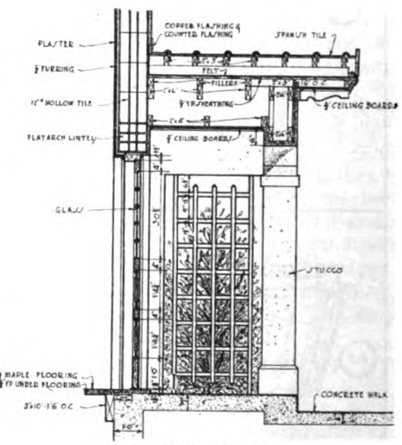


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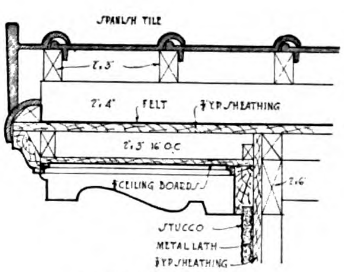


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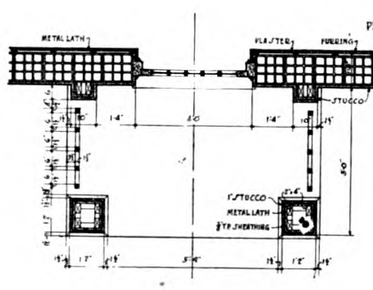
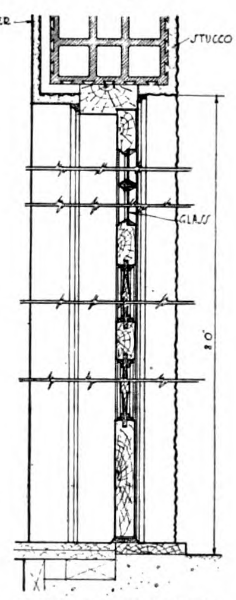



• PLAN •

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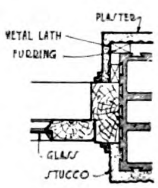


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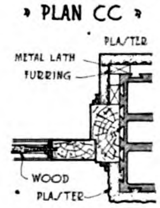


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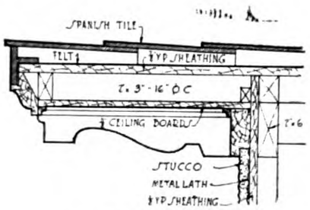


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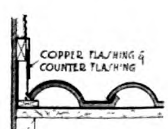



• FLASHING •

*Entrance Detail to a Bungalow at Medford, Mass. Charles B. Dunham, Architect.*

# THE EDITOR'S PAGE

### *More Bathrooms Provided in Up-to-date Homes*

The tendency of today is toward more bathrooms in the home. No longer is the modern house provided with one bathroom on the second floor and a maid's toilet in the basement. Other and more adequate accommodations are being provided.

The better class of six-room house today has a private bath for the master's bedroom and another bath to serve the other two bedrooms. When these two bathrooms are placed side by side, considerable economy of plumbing can be effected.

The eight or nine room house that is planned with due consideration for the family's comfort will not only have the two bathrooms on the second floor, but a toilet and lavatory on the first floor, readily accessible by guests who desire to wash up before or after dinner. In a house of this size, a maid is usually employed; her quarters are kept separate from the rest of the house as much as possible and she is provided with a private bathroom. This not only is a decided help in retaining her services, but also encourages a cleanliness that reflects credit on the entire household. The maid's room and bath may either be placed alongside the kitchen, which is the most convenient arrangement, or may be placed on the second floor, being reached by a private stairway.

This tendency for more bathrooms in a house is merely the reflection of the tendency of hotels to provide each room with a private bath. Hotels as well as houses that are planned with due regard for this tendency are successful. And the comfort obtained is well worth the extra cost.

### *What Makes for Success*

When Garfield, our former president, was in college, he was regularly classed second to a student really no brighter than he. In spite of attentive study during his study period, Garfield found himself unable to surpass the young man.

One night, after he had closed his books, Garfield let up his shade and looked over at the window of his rival. The light was still burning. Garfield watched, seeking to find out just how much time his rival spent in preparing for the next day. In fifteen minutes the light was put out.

"So," said Garfield, "that is his margin. I shall put in an extra fifteen minutes and wipe out that fellow's advantage."

And the results were gratifying, for never again was Garfield classed second.

Life is decided by just such small margins as that, margins which in spite of their individual insignificance, decide success and failure. For after all, it is not latent ability but developed ability that marks a man for success.

And success results largely from contact with the best thought of the ages, from books whose pages contribute a wealth of information that broadens the mind and enables one to cope with perplexing daily problems, reinforced by the knowledge of what has successfully been done before.

To no one is the need for good books more urgent than to the builder, books that will show him what has been done before and how to solve the most difficult problems through a thorough knowledge of the fundamentals of construction.

Many questions come into this office. Most of them could have been answered by the inquirers themselves, merely by reference to a builder's handbook or an estimating guide. Such books represent the practice and experience of others, men who have gathered the best methods into a form that will convey that knowledge to those who may earnestly seek it.

A man can start a library, the right kind of library, with one book, rightly chosen. And as he reads and extends his knowledge of construction, he can add to his meager store of books just those that will give him the right kind of service. They'll be friends, the kind ever ready to lend a bit of help or throw light on a vexing problem that simply seems impossible to solve.

So if you haven't got the right kind of library, start one—to-day.

### *Costs Cut By Greater Use of Stock Trim*

It is certainly good practice in the average moderate cost house to make use of stock sizes of doors, windows and trim as much as possible. When such work is made to order it costs considerably more than will ordinary stock stuff, besides often delaying the operation considerably.

There are so many attractive stock patterns now being manufactured that a wide choice is offered to the discriminating architect or builder. Many of the designs specially detailed are so little different from what can be bought ready made that it seems as if no purpose were furthered by the detailing of the new design.

Very often an architect will use windows in various parts of a house that may vary only 1 inch or so in width, one from the other. Not only must such sash and trim often be made to order, but considerable added expense is incurred at the building due to the necessity for making sure that the exact size detailed is put into proper place. Architects who work in close touch with builders realize this and so conform to more logical practice.

# Building Activity in the United States

CONTINUED improvement in the building field is shown in reports received from city building departments. Optimism is prevalent, the typical expression being "substantial boom in building all along the line."

Material is high, yet contractors and architects report little holding back of clients on account of high prices. The feeling among those about to build is that it is cheaper to erect the required structure under present conditions rather than to wait and pay ever increasing rents in anticipation of a lower price level that probably will never come.

Activity is widespread for the whole country. Not only is an increase of 130 per cent reported for the month of May, 1919, as compared with May, 1918, but 156 out of 182 cities report gains. Only 26 report a loss. The total value of construction for which permits were filed during May, 1919, totalled $105,911,192 as against $49,858,900 for May, 1918.

All sections of the country show substantial gains. Eastern states show a gain of 153 per cent, 56 out of 67 cities showing increases; middle state cities 111 per cent, 43 out of 50 showing increases; southern cities 110 per cent, 37 out of 41 cities showing increases, and western cities, 29 per cent, 20 out of 24 cities showing increases.

CITIES IN EASTERN STATES

| | May, 1919 | | | | May, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Albany, N. Y. | 24 | $92,000 | 199 | $66,370 | 12 | $20,450 | 190 | $76,140 |
| *Allentown, Pa. | 55 | 151,090 | 21 | 24,560 | 12 | 66,850 | 16 | 6,450 |
| *Altoona, Pa. | 25 | 126,944 | 86 | 29,074 | 8 | 31,250 | 54 | 13,173 |
| Atlantic City, N. J. | 16 | 16,972 | 91 | 46,146 | 9 | 28,375 | 99 | 48,916 |
| *Auburn, N. Y. | 30 | 46,610 | ... | ... | 18 | 16,429 | ... | ... |
| *Binghamton, N. Y. | 93 | 68,027 | 209 | 63,349 | 99 | 33,017 | 95 | 12,167 |
| *Bayonne, N. J. | 41 | 99,685 | ... | ... | 20 | 75,955 | ... | ... |
| *Boston, Mass. | 133 | 1,625,395 | 443 | 552,698 | 66 | 533,152 | 411 | 377,446 |
| Bridgeport, Conn. | 161 | 428,068 | ... | ... | 164 | 780,003 | ... | ... |
| *Brockton, Mass. | 47 | 68,035 | 30 | 21,620 | 17 | 9,170 | 15 | 12,450 |
| *Buffalo, N. Y. | 434 | 838,500 | 165 | 202,500 | 483 | 815,000 | ... | ... |
| *Cambridge, Mass. | 81 | 265,395 | ... | ... | 64 | 146,741 | ... | ... |
| *Camden, N. J. | 114 | 426,624 | ... | ... | 48 | 66,971 | ... | ... |
| Chelsea, Mass. | 20 | 27,460 | ... | ... | 14 | 37,425 | ... | ... |
| Easton, Pa. | 6 | 6,109 | 25 | 19,760 | 11 | 34,300 | 10 | 5,225 |
| *Erie, Pa. | 127 | 184,039 | 103 | 86,416 | 81 | 96,580 | 85 | 95,358 |
| *Fall River, Mass. | 25 | 111,650 | 34 | 22,175 | 29 | 44,596 | 25 | 50,015 |
| Fitchburg, Mass. | 22 | 36,465 | 15 | 15,775 | 16 | 40,460 | 14 | 11,987 |
| *Harrisburg, Pa. | 52 | 173,275 | ... | ... | 27 | 29,250 | ... | ... |
| *Hartford, Conn. | 101 | 489,213 | 56 | 94,335 | 57 | 389,870 | 18 | 32,250 |
| *Hoboken, N. J. | 5 | 138,050 | 15 | 15,445 | 8 | 56,900 | 16 | 18,120 |
| *Holyoke, Mass. | 31 | 41,550 | 16 | 18,675 | 9 | 12,775 | 4 | 3,200 |
| *Jersey City, N. J. | 42 | 294,028 | 56 | 109,720 | 42 | 259,717 | 56 | 244,527 |
| *East Orange, N. J. | 85 | 610,120 | ... | ... | 29 | 17,542 | ... | ... |
| *Lancaster, Pa. | 14 | 103,900 | 15 | 13,860 | 9 | 16,225 | 18 | 39,305 |
| *Lawrence, Mass. | 32 | 62,820 | 15 | 22,800 | 12 | 14,025 | 8 | 13,630 |
| *Lowell, Mass. | 57 | 82,580 | 72 | 74,100 | 39 | 29,200 | 50 | 24,026 |
| *Lynn, Mass. | 66 | 76,950 | ... | ... | 30 | 9,120 | ... | ... |
| *Manchester, N. H. | 45 | 92,285 | 51 | 20,370 | 31 | 28,950 | 58 | 11,536 |
| *Mount Vernon, N. Y. | 52 | 548,720 | 16 | 5,750 | 21 | 23,235 | 6 | 5,475 |
| *Newark, N. J. | 308 | 1,327,717 | ... | ... | 204 | 677,828 | ... | ... |
| *New Bedford, Mass. | 66 | 359,300 | ... | ... | 38 | 81,950 | ... | ... |
| *New Britain, Conn. | 46 | 122,090 | 43 | 11,325 | 30 | 25,320 | 26 | 9,362 |
| New Haven, Conn. | 193 | 575,554 | ... | ... | 118 | 255,199 | ... | ... |
| New York: | | | | | | | | |
| *Manhattan | 35 | 2,648,750 | 403 | 2,340,377 | 16 | 982,850 | 298 | 1,012,623 |
| *Bronx | 67 | 1,798,050 | 308 | 365,038 | 31 | 488,350 | 237 | 109,985 |
| *Brooklyn | 667 | 5,867,600 | 723 | 997,948 | 255 | 2,323,220 | 813 | 463,823 |
| *Queens | 1358 | 5,857,940 | ... | ... | 813 | 1,730,172 | ... | ... |
| *Richmond | 221 | 358,123 | 84 | 61,088 | 81 | 149,469 | 55 | 76,458 |
| Niagara Falls, N. Y. | ... | ... | ... | ... | ... | ... | ... | ... |
| *Nutley, N. J. | 16 | 21,055 | 8 | 1,642 | 8 | 8,850 | 15 | 495 |
| Elizabeth, N. J. | 81 | 204,068 | ... | ... | 26 | 627,683 | ... | ... |
| *McKeesport, Pa. | 36 | 44,345 | ... | ... | ... | ... | ... | ... |
| *Medford, Mass. | 44 | 113,495 | ... | ... | 16 | 18,525 | ... | ... |
| *Passaic, N. J. | 22 | 194,275 | 18 | 12,025 | 13 | 33,475 | 14 | 42,650 |
| *Paterson, N. J. | 148 | 352,690 | ... | ... | 102 | 230,870 | ... | ... |
| *Philadelphia, Pa. | 1888 | 5,960,140 | ... | ... | 762 | 1,672,050 | ... | ... |
| *Pittsburgh, Pa. | 362 | 1,052,998 | 212 | 473,216 | 195 | 401,169 | 149 | 181,781 |
| *Portland, Me. | 39 | 18,861 | 31 | 33,645 | 20 | 16,687 | 22 | 73,040 |
| Quincy, Mass. | 113 | 110,300 | ... | ... | 89 | 143,693 | ... | ... |
| Reading, Pa. | 66 | 82,550 | ... | ... | 34 | 96,475 | ... | ... |
| *Rochester, N. Y. | 202 | 471,210 | 168 | 251,668 | 116 | 103,619 | 92 | 74,111 |
| Salem, Mass. | 53 | 38,170 | ... | ... | ... | 46,969 | ... | ... |
| Schenectady, N. Y. | 89 | 156,020 | 27 | 14,800 | 41 | 140,590 | 44 | 12,604 |
| *Scranton, Pa. | 40 | 66,575 | ... | ... | 31 | 61,245 | ... | ... |
| Somerville, Mass. | 53 | 64,010 | ... | ... | 20 | 66,075 | ... | ... |
| *Springfield, Mass. | 180 | 521,056 | ... | ... | 101 | 172,760 | ... | ... |
| *Stamford, Conn. | 47 | 172,142 | ... | ... | 32 | 34,600 | ... | ... |
| *Syracuse, N. Y. | 144 | 260,090 | 155 | 353,464 | 104 | 195,415 | 123 | 117,690 |
| *Trenton, N. J. | 91 | 279,964 | ... | ... | 40 | 58,129 | ... | ... |
| *Troy, N. Y. | 3 | 29,700 | 46 | 15,989 | 26 | 43,250 | ... | ... |
| *Utica, N. Y. | 61 | 265,185 | 26 | 38,765 | 38 | 56,430 | 27 | 41,400 |
| *West Hoboken, N. J. | 17 | 17,755 | ... | ... | 7 | 12,360 | ... | ... |
| *Wilkes-Barre, Pa. | 53 | 81,199 | ... | ... | 82 | 57,869 | ... | ... |
| *Woonsocket, R. I. | 63 | 336,905 | ... | ... | 46 | 153,143 | ... | ... |
| *Worcester, Mass. | 158 | 406,060 | 97 | 105,945 | 91 | 99,582 | 85 | 64,476 |
| *York, Pa. | 20 | 33,420 | 57 | 32,565 | 11 | 14,180 | 11 | 6,904 |
| Yonkers, N. Y. | 37 | 140,400 | ... | ... | 23 | 199,100 | ... | ... |
| | 9149 | $38,009,671 | 4139 | $6,634,998 | 5115 | $14,242,684 | 3249 | $3,388,798 |

CITIES IN WESTERN STATES

| | May, 1919 | | | | May, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Berkeley, Cal. | 39 | $147,254 | 77 | $21,322 | 11 | $32,000 | 46 | $22,500 |
| *Butte, Mont. | 70 | 75,000 | 66 | 42,000 | ... | ... | ... | ... |
| *Boise, Idaho | 9 | 28,000 | 49 | 17,887 | ... | ... | 17 | 5,830 |
| *Colo. Spgs., Col. | 14 | 4,395 | 47 | 27,978 | 11 | 8,225 | 18 | 5,663 |
| *Denver, Col. | 213 | 820,880 | 153 | 107,300 | 108 | 476,550 | 130 | 65,350 |
| *Eureka, Cal. | 3 | 3,000 | 7 | 4,000 | 1 | 2,700 | 1 | 100 |
| *Fresno, Cal. | 77 | 219,289 | 63 | 32,950 | 70 | 124,680 | 51 | 78,510 |
| *Long Beach, Cal. | 374 | 711,896 | ... | ... | 188 | 327,622 | ... | ... |
| *Los Angeles, Cal. | 623 | 1,876,922 | 339 | 201,373 | 361 | 1,112,720 | 278 | 193,126 |
| *Oakland, Cal. | 250 | 495,154 | 74 | 56,238 | 180 | 347,576 | 79 | 30,367 |
| *Pasadena, Cal. | 30 | 77,267 | 78 | 43,291 | 17 | 39,040 | 43 | 14,715 |
| Portland, Ore. | 478 | 642,515 | 477 | 171,030 | 275 | 2,212,970 | 239 | 97,260 |
| *Pueblo, Col. | 74 | 91,521 | ... | ... | 44 | 27,675 | ... | ... |
| Salt Lake City, Utah | 109 | 320,825 | 32 | 33,100 | 60 | 390,875 | 45 | 29,975 |
| *Sacramento, Cal. | 77 | 99,675 | ... | ... | 57 | 56,647 | ... | ... |
| *San Diego, Cal. | 50 | 1,013,900 | 42 | 31,115 | 43 | 55,204 | 48 | 19,335 |
| *San Francisco, Cal. | 127 | 721,667 | 342 | 229,152 | 76 | 634,024 | 331 | 171,250 |
| *San Jose, Cal. | 16 | 52,205 | ... | ... | 18 | 20,507 | ... | ... |
| *Seattle, Wash. | 1419 | 1,407,090 | ... | ... | 1119 | 863,760 | ... | ... |
| *Spokane, Wash. | 73 | 60,227 | 68 | 41,480 | 45 | 44,058 | 30 | 14,930 |
| Stockton, Cal. | 93 | 174,710 | ... | ... | 89 | 230,897 | ... | ... |
| Tacoma, Wash. | 206 | 67,471 | 208 | 212,669 | 170 | 366,989 | 90 | 91,830 |
| *Missoula, Mont. | 9 | 7,123 | ... | ... | 6 | ... | ... | ... |
| *Phoenix, Ariz. | 49 | 269,760 | 30 | 23,835 | 26 | 41,057 | 13 | 5,770 |
| | 4482 | $9,387,746 | 2152 | $1,296,64[illegible] | 2975 | $7,415,776 | 1459 | $846,871 |

*Indicates increase.

CITIES IN MIDDLE STATES

| | May, 1919 | | | | May, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Akron, Ohio | 651 | $2,538,605 | 141 | $387,485 | 225 | $480,385 | 87 | $59,850 |
| *Bay City, Mich. | 109 | 84,500 | ... | ... | ... | ... | ... | ... |
| *Canton, Ohio | 230 | 577,021 | ... | ... | 134 | 332,725 | ... | ... |
| *Cedar Rapids, Ia. | 22 | 112,000 | 27 | 35,000 | 6 | 17,000 | 12 | 11,000 |
| *Chicago, Ill. | 827 | 7,190,200 | ... | ... | 379 | 3,752,500 | ... | ... |
| *Cincinnati, Ohio | 1029 | 1,539,855 | ... | ... | 959 | 800,815 | ... | ... |
| *Cleveland, Ohio | 1286 | 3,378,375 | 910 | 421,675 | 1115 | 1,546,760 | 931 | 295,160 |
| *Columbus, Ohio | 243 | 414,010 | 122 | 95,365 | 137 | 165,030 | 102 | 75,245 |
| Council Bluffs, Ia. | ... | ... | ... | ... | ... | ... | ... | ... |
| *Davenport, Ia. | 153 | 275,760 | ... | ... | 148 | 262,960 | ... | ... |
| *Dayton, Ohio | 346 | 992,040 | ... | ... | 158 | 329,961 | ... | ... |
| *Decatur, Ill. | 55 | 721,300 | 21 | 24,450 | 38 | 117,000 | 8 | 4,005 |
| Des Moines, Ia. | 128 | 243,900 | ... | ... | 106 | 461,550 | ... | ... |
| *Dubuque, Ia. | 29 | 100,164 | ... | ... | 15 | 37,390 | ... | ... |
| *Duluth, Minn. | 280 | 455,165 | ... | ... | 162 | 340,970 | ... | ... |
| East St. Louis, Ill. | 40 | 71,170 | ... | ... | 35 | 124,792 | ... | ... |
| *Evansville, Ind. | 116 | 46,275 | ... | ... | 75 | 29,323 | ... | ... |
| *Ft. Wayne, Ind. | 118 | 271,478 | ... | ... | 49 | 74,650 | ... | ... |
| *Fargo, N. D. | 29 | 140,000 | 18 | 15,500 | 17 | 71,000 | 12 | 13,000 |
| *Grand Rapids, Mich. | 231 | 328,624 | ... | ... | 147 | 92,712 | ... | ... |
| Hamilton, Ohio | 32 | 83,530 | 18 | 13,446 | 17 | 124,362 | 18 | 9,105 |
| *Indianapolis, Ind. | 800 | 1,156,091 | ... | ... | 468 | 315,522 | ... | ... |
| *Jackson, Mich. | 116 | 241,949 | 40 | 18,875 | 36 | 21,645 | 24 | 10,853 |
| *Joplin, Mo. | 13 | 63,435 | 17 | 9,850 | 16 | 14,115 | 10 | 4,210 |
| Joliet, Ill. | ... | ... | ... | ... | ... | ... | ... | ... |
| *Kalamazoo, Mich. | 22 | 58,750 | 12 | 10,500 | 7 | 23,800 | 8 | 41,143 |
| *Kansas City, Kan. | 24 | 70,750 | 37 | 26,330 | 38 | 65,450 | ... | ... |
| *Kansas City, Mo. | 494 | 883,665 | ... | ... | 284 | 589,900 | ... | ... |
| *Lansing, Mich. | 176 | 406,155 | 22 | 19,875 | 20 | 29,300 | 3 | 550 |
| *Lincoln, Neb. | 85 | 221,330 | ... | ... | 77 | 91,811 | ... | ... |
| *Milwaukee, Wis. | 610 | 2,024,640 | ... | ... | 389 | 552,934 | ... | ... |
| *Minneapolis, Minn. | 831 | 1,370,750 | ... | ... | 510 | 630,155 | ... | ... |
| Peoria, Ill. | 50 | 125,716 | 45 | 23,900 | 51 | 122,628 | 42 | 34,258 |
| Quincy, Ill. | 2 | 15,000 | ... | ... | 6 | 59,500 | ... | ... |
| *Richmond, Ind. | 16 | 76,850 | 27 | 12,490 | 15 | 6,135 | 10 | 4,598 |
| *Saginaw, Mich. | 236 | 467,157 | ... | ... | 32 | 22,165 | ... | ... |
| *St. Louis, Mo. | 320 | 909,295 | 416 | 315,030 | 281 | 520,110 | 380 | 272,861 |
| *St. Paul, Minn. | 367 | 1,713,234 | ... | ... | 183 | 1,280,397 | ... | ... |
| *Sioux City, Ia. | 104 | 441,900 | ... | ... | 66 | 415,360 | ... | ... |
| *South Bend, Ind. | 218 | 1,127,713 | ... | ... | 97 | 75,095 | ... | ... |
| *Springfield, Ill. | 30 | 72,413 | 51 | 33,335 | 25 | 43,965 | 41 | 36,535 |
| *Springfield, Mo. | 8 | 7,575 | 37 | 34,250 | 4 | 525 | 16 | 5,900 |
| *Springfield, Ohio | 74 | 119,775 | ... | ... | 30 | 12,495 | ... | ... |
| *Toledo, Ohio | 467 | 729,875 | ... | ... | 218 | 454,517 | ... | ... |
| *Topeka, Kan. | 35 | 79,257 | 22 | 11,855 | 12 | 17,715 | 10 | 5,285 |
| *Wichita, Kan. | 114 | 274,780 | ... | ... | ... | ... | ... | ... |
| Youngstown, Ohio | 156 | 317,915 | 41 | 50,783 | 212 | 457,050 | 40 | 312,530 |
| *Zanesville, Ohio | 11 | 214,800 | 10 | 705 | 1 | 7,930 | 3 | 175 |
| *Terre Haute, Ind. | 32 | 41,530 | 43 | 12,309 | 41 | 28,213 | 38 | 17,765 |
| *Omaha, Neb. | 215 | 1,042,220 | ... | ... | 133 | 504,205 | ... | ... |
| *St. Joseph, Mo. | 64 | 77,690 | ... | ... | 43 | 34,900 | ... | ... |
| Superior, Wis. | 148 | 83,980 | ... | ... | 133 | 149,900 | ... | ... |
| | 11,792 | $34,000,162 | 2077 | $1,573,008 | 7350 | $15,619,322 | 1795 | $1,214,028 |

CITIES IN SOUTHERN STATES

| | May, 1919 | | | | May, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Atlanta, Ga. | 214 | $1,092,465 | 105 | $79,113 | 96 | $359,344 | 138 | $79,079 |
| *Augusta, Ga. | 24 | 171,380 | 174 | 31,909 | 11 | 82,500 | 98 | 8,604 |
| *Baltimore, Md. | 525 | 1,002,077 | 1072 | 321,600 | 168 | 237,094 | 663 | 132,600 |
| *Birmingham, Ala. | 106 | 157,115 | 223 | 65,901 | 49 | 48,625 | 231 | 41,974 |
| *Charleston, S. C. | 23 | 42,410 | 12 | 15,540 | 11 | 12,010 | 18 | 8,160 |
| Charlotte, N. C. | 28 | 86,000 | 14 | 27,000 | 25 | 221,692 | ... | 27,000 |
| *Chattanooga, Tenn. | 188 | 134,986 | ... | ... | 171 | 29,695 | ... | ... |
| *Corpus Christi, Tex. | 23 | 18,890 | ... | ... | 6 | 350 | ... | ... |
| *Dallas, Tex. | 100 | 512,450 | 50 | 44,095 | 14 | 41,555 | 35 | 49,715 |
| *El Paso, Tex. | 110 | 159,080 | ... | ... | 166 | 73,500 | ... | ... |
| Fort Worth, Tex. | 128 | 425,938 | 89 | 60,948 | 54 | 447,219 | 44 | 128,760 |
| *Galveston, Tex. | 31 | 31,265 | 502 | 11,131 | ... | ... | ... | ... |
| *Jacksonville, Fla. | 42 | 133,150 | 22 | 25,690 | 16 | 32,565 | 19 | 10,945 |
| *Houston, Tex. | 150 | 524,400 | 179 | 46,647 | 98 | 156,222 | 112 | 17,366 |
| *Huntington, W. Va. | 94 | 174,695 | ... | ... | 38 | 45,080 | ... | ... |
| *Knoxville, Tenn. | 32 | 281,475 | 85 | 82,274 | 6 | 9,750 | 67 | 25,912 |
| *Louisville, Ky. | 71 | 259,175 | 217 | 143,370 | 31 | 329,002 | 144 | 87,717 |
| *Memphis, Tenn. | 210 | 768,950 | ... | ... | 175 | 245,465 | ... | ... |
| *Miami, Fla. | 80 | 567,800 | ... | ... | 51 | 202,850 | ... | ... |
| *Lexington, Ky. | 74 | 146,265 | ... | ... | 50 | 23,535 | ... | ... |
| *Covington, Ky. | 31 | 64,170 | ... | ... | 32 | 30,750 | ... | ... |
| *Montgomery, Ala. | 101 | 35,793 | ... | ... | 117 | 31,647 | ... | ... |
| *Muskogee, Okla. | 27 | 74,020 | ... | ... | 5 | 9,915 | ... | ... |
| *Nashville, Tenn. | 31 | 98,500 | 365 | 70,000 | 1 | 2,500 | 341 | 68,608 |
| *New Orleans, La. | 42 | 558,025 | 43 | 94,084 | 37 | 123,649 | 20 | 13,820 |
| *Norfolk, Va. | 187 | 999,277 | ... | ... | 59 | 273,530 | ... | ... |
| *Oklahoma City, Okla. | 141 | 717,877 | 53 | 28,235 | 75 | 349,450 | 40 | 21,575 |
| *Pensacola, Fla. | 9 | 17,200 | 128 | 16,103 | 5 | 8,000 | 112 | 19,800 |
| *Pine Bluff, Ark. | 24 | 56,450 | ... | ... | 9 | 33,000 | 5 | 4,300 |
| *Richmond, Va. | 76 | 742,688 | 95 | 73,222 | 24 | 49,875 | 64 | 43,280 |
| *Roanoke, Va. | 164 | 142,640 | ... | ... | 30 | 53,925 | ... | ... |
| San Antonio, Tex. | 265 | 285,658 | ... | ... | 246 | 773,880 | ... | ... |
| *Savannah, Ga. | 55 | 72,575 | 14 | 18,159 | 12 | 13,835 | 6 | 2,000 |
| *Shreveport, La. | 44 | 156,081 | 81 | 29,436 | 17 | 79,950 | 31 | 6,790 |
| *Sioux Falls, S. D. | 35 | 114,415 | 20 | 75,000 | 12 | 100,000 | 11 | 775 |
| *Tampa, Fla. | 20 | 62,090 | 77 | 23,615 | 14 | 33,660 | 64 | 16,355 |
| *Tulsa, Okla. | 191 | 627,260 | 51 | 36,475 | 146 | 503,180 | 35 | 13,320 |
| *Washington, D. C. | 367 | 1,370,800 | 492 | 277,809 | 142 | 580,785 | 292 | 189,312 |
| *Wheeling, W. Va. | 25 | 72,248 | 58 | 19,450 | 10 | 23,525 | 53 | 19,428 |
| Wilmington, Del. | 121 | 143,806 | ... | ... | 111 | 340,080 | ... | ... |
| *Little Rock, Ark. | 67 | 189,714 | ... | ... | 67 | 72,137 | ... | ... |
| | 4276 | $13,292,153 | 4221 | $1,716,806 | 2107 | $6,094,226 | 2643 | $1,037,195 |

# New Goods

### *New Development in Timber Framing*

A new and labor saving idea in the manufacturing of lumber for frame buildings has been evolved by the E. A. Laughlin Lumber Co., Port Arthur, Tex. This material is known as "Enterlock" and is a standardized cut-to-length lumber, finished ready for hammer and nails and to be marketed through the ordinary lumber dealer channels. In using this lumber, it is merely necessary for the designer to keep in mind the sizes in which it can be furnished and to plan the house accordingly. This is entirely feasible, and permits of worthwhile reduction in erection costs.

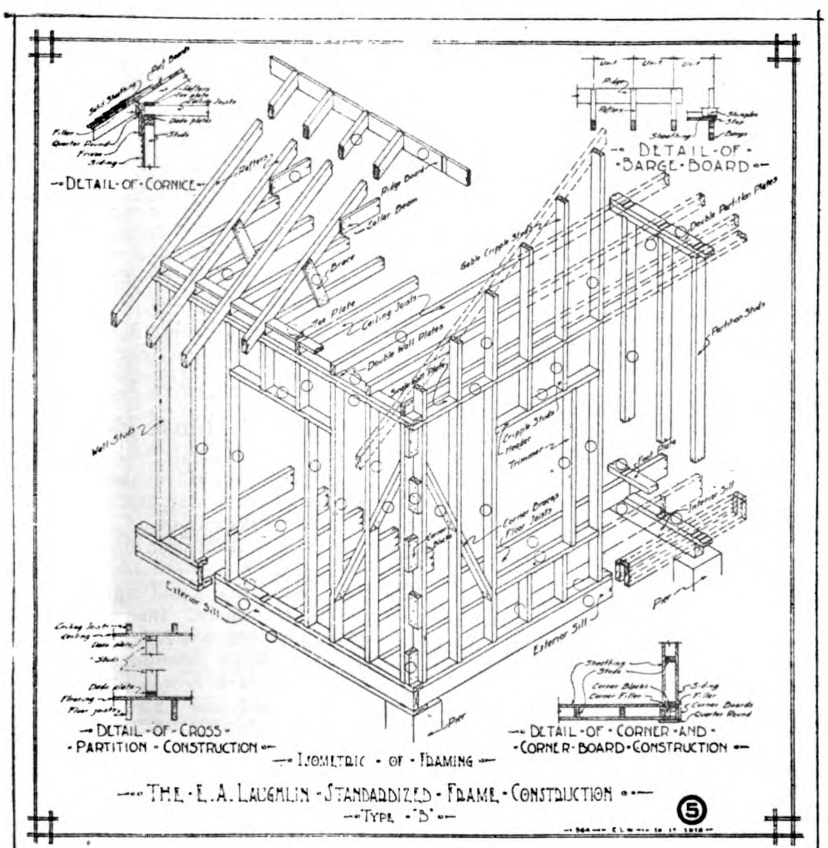
The idea is similar to that in steel construction, where the steel companies have determined on a limited number of steel members which could be standardized and produced cheaply in immense quantities by special machinery; steel structures are designed to fit these standards, which cover all ordinary requirements.

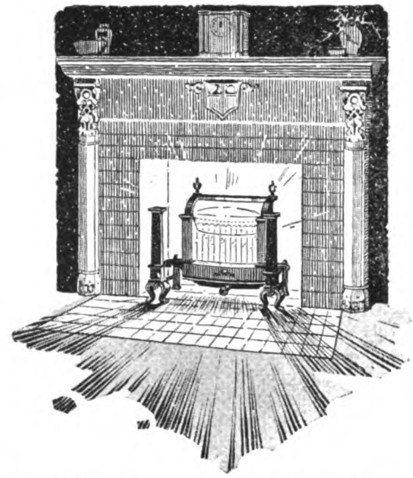
In order to simplify assembling and construction as well as to further quantity production, the pitch of the roof has been standardized as well as stud lengths, which are all of one length for both outside walls and inside partitions. The size of door and window openings has been standardized, allowing windows to be placed or combined without affecting the multiple position of studding or the use of the cut-to-length lumber.

Sizes, grades and patterns of lumber are in accordance with modern wood frame house construction. Method of construction at building sites is shown by working drawings which can be furnished with the material.

This solution of lowering building costs is typical of regular house construction and does not conflict with architectural and building practice. It is merely a fixed principle of construction which permits of the wholesale production by special machinery at the sawmills of a standardized ready-cut, ready-to-use building lumber, cut to multiple lengths from regular yard stock such as manufactured by all sawmills and sold by retail lumber merchants everywhere. This type of lumber should not be confused with the ordinary machine-cut lumber used in the erection of mail order houses, as its object is to fit all designs rather than one design only.

The company confines itself to the remanufacture and cutting to standardized, read-to-use lengths of sills, joists, plates, studs, ceiling joists, rafters, braces, bridging, sheeting boards, siding, flooring, ceiling, shiplap, etc. Porches, bay windows, dormers, etc., are considered as accessories so that they may be treated in accordance with local architectural ideas. The lumber used in such accessories being merely nominal, it is cheaper to cut it to proper sizes at the building sites. Sash and doors, mill work, etc., are not furnished, as these are carried in stock by the retail lumber yards.



The Radiantfire, a new type of gas heater

Multiplicity of parts has been reduced to a minimum. Where possible, the parts have been made interchangeable in order to simplify quantity production and to facilitate the use of the material in ordinary building operations.

As shown in the illustration the lumber is mortised and tenoned, provision being made for studding at either 16 or 24 inch centers. Upon receiving a rough sketch of any house which it is desired to build, the company will quote prices on the lumber needed.

### *New Type of Fireplace Heater for the Economically Designed Home*

Radiantfire, a new type of gas heater making use of the principle of radiant heat, has been placed upon the market by the General Gas Light Co., New York City.

The heating parts of this apparatus are called radiants, being lace-like in shape. These radiants are of special composition, and each is placed over a burner with a sawed bar tip. The flame from the burner is conducted up into the radiant, which may be likened to a chimney. The radiant becomes incandescent and gives off a glowing heat. Due to the fact that the flame and gas pass up through the incandescent radiant, combustion is exceptionally good, there being practically no odor. The flame may be turned high or low; when low the flame still burns blue. Turned on full force, the Radiantfire burns about 40 cu. ft. of gas per hour; after the radiants are incandescent it can be turned down till it burns about 25 cu. ft. per hour, still giving as much heat as when first turned on full force.

The radiants are disposed so that all heat is reflected into the room. Although the Radiantfire can be used as a portable heater, yet it is recommended that a flue be provided. This flue can be either ordinary tile or sheet metal. As it serves merely as a ventilating flue, it can open into a garret or be carried to the roof.

Radiantfires may be used in ordinary fireplaces in houses already built or may be installed in new homes. This heater is made in several sizes and designs.

# New Catalogs of Interest to the Trade

89. **Beaver Board Sample.** The Beaver Board Companies, 73 Beaver Road, Buffalo, N. Y.—Sample enclosed in cover giving in colors attractive rooms furnished with beaver board.

90. **Wiring Chart for Country Home Lighting.** Engineering Department, National Lamp Works of General Electric Co., Cleveland, Ohio.—Chart for determining the proper wire sizes for 110 to 125 volt country home lighting circuits. Also chart for securing sizes of copper wire for 28 to 32 volt installations.

91. **Andes Stoves and Ranges.** Phillips & Clark Stove Co., Inc., Geneva, N. Y.—Illustrated catalog describing the various types of ranges manufactured by this company.

92. **Better Homes.** The Rocbond Co., Van Wert, Ohio.—Booklet showing numerous homes on which Rocbond stucco has been used.

93. **Phonographic Parts.** The Associated Phonograph Supply Co., Cincinnati, Ohio.—Illustrations of phonograph supply parts together with blueprint of a phonograph cabinet.

94. **Painting and Finishing Wood Buildings.** National Lumber Manufacturers' Assn., 925 Lumber Exchange, Chicago, Ill.—Folder describing lumber and its relation to paint, together with preparation of the wood for paint and varnish finish.

95. **Better Heating with the Majestic Duplex Register.** The Majestic Co., Huntington, Ind.—Illustrated booklet describing various types of duplex registers, showing them as installed in homes.

96. **The Cutler Mail Chute.** Cutler Mail Chute Co., Rochester, N. Y.—Describes and illustrates various types of mail chutes for installation in buildings.

97. **Refrigerators for Residences.** Catalog No. 94. McCray Refrigerator Co., 964 Lake Street, Kendallville, Ind.—Illustrated booklet describing various methods of refrigerator installation together with a description of the various types manufactured by this company. Also gives pictures of homes in which the refrigerators have been used.

98. **Additions to Catalog No. 25.** Lawson Mfg. Co., Chicago, Ill.—Describes construction of "Universal" pivot spring hinge for lavatory doors and office gates.

99. **What Is Lumber?** General Lumber Co., Milwaukee, Wis.—Handsomely illustrated booklet showing method of conducting lumbering operations in the forest.

100. **Data on Waterproofings, Dampproofings and Technical Paints.** The General Fireproofing Co., Youngstown, Ohio.—Valuable data in specification form on these subjects. Methods of meeting difficult conditions that may be encountered are described.

101. **Concrete Mixers.** Catalog No. 103. The Yaeger Machine Co., 216 West Rich Street, Columbus, Ohio.—Illustrated catalog describing the various types of concrete mixers manufactured by this concern together with pictures showing them in actual operation on the job.

102. **Sargent Noiseless Screen Door Closer.** Sargent & Co., 53 Water Street, New Haven, Conn.—Colored folder describing this screen door closer, stated to avoid slamming of screen doors.

103. **Forstner Bits.** The Progressive Mfg. Co., Torrington, Conn.—Gives sizes and prices of machine bits together with description and illustrations.

104. **Pennies for Paint Means Dollars Saved in Repairs.** Bird & Son, Inc., Dept. B., East Walpole, Mass.—Folder describing Neponset roofing paint, stated to be especially suitable for roll roofings of all kinds as well as tin, galvanized iron and steel roofs.

**These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the number of any catalogs on a postal and mail it to Building Age, 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.**

105. **Improved Circular Sawing Machine with Boring Attachment.** R. E. Kidder Co., 35 Hermon Street, Worcester, Mass.—Leaflets describing this and other types of woodworking machines designed for ripping, cross cutting and boring.

106. **Speidel's Elevators and Hoisting Machinery.** Catalog B. J. G. Speidel, Reading, Pa. Illustrated booklet describing various types of builders' hoists and similar equipment, traveling cranes, dumbwaiter equipment, etc., together with drawings showing how they may be installed.

107. **Wallace Bench Planer.** J. D. Wallace & Co., 1419 Jackson Blvd., Chicago, Ill.—Folder describing construction of this type of planer.

108. **Barrett's Everlastic "Rubber" Roofing.** The Barrett Co., New York City.—Illustrated booklet describing construction, etc., of this roll roofing.

109. **Mounted Grindstones and Hardware Specialties.** Richards-Wilcox Mfg. Co., Aurora, Ill.—Illustrated booklet describing various types of grindstones, fence stretchers, door bolts and gravity latches, toggle bolts, etc.

110. **Alteneder's Draftsman's Pen-Filling Inkstand.** Thos. Alteneder & Sons, Philadelphia. Pa.—Folder describing this time-saving inkstand, which permits ruling pen to be filled with one hand by placing of end on lever which raises ink nib of cork from bottle, ruling pen then being touched to nib.

111. **National Garage Hardware.** National Mfg. Co., Sterling, Ill.—Illustrated booklet describing various types of garage hardware suitable for private garages, together with line drawings showing manner of installation with various door sets.

112. **Standard Spring Loop Snow Guard.** Wm. Cromley, Lewisburg, Pa.—Folder describing this spring snow guard which is stated to have sufficient elasticity to avoid breaking under sudden shock of sliding snow and ice.

113. **Catalog No. 31.** Waterloo Cement Machinery Corporation, 217 Vinton Street, Waterloo, Iowa.—Illustrated catalog describing concrete mixers manufactured by this company, together with details of construction and dimension data, also table of output of "Wonder" mixers together with various accessories such as loaders, distributing chutes, etc. Also describes various types of builders' hoists.

114. **Sample of Neponset Twin Shingles.** Bird & Son, Inc., Dept. B., East Walpole, Mass.—Folder containing sample of this slate surfaced shingle roofing together with description.

115. **Office Equipment That Works with You.** General Fireproofing Co., Youngstown, Ohio.—Folder describing steel files and other office equipment manufactured by this company.

116. **Neponset Black Waterproofing Building Paper.** Bird & Son, Inc., Dept. B., East Walpole, Mass.—Folder describing this building paper.

117. **The New Humphrey Radiantfire.** General Gas Light Co., 44 West Broadway, New York City.—Catalog illustrated in colors, describing construction and operation of this type of gas heater, designs in which it is furnished.

118. **Trailers.** Martin Rocking Fifth Wheel Co., Springfield, Mass.—Catalog describing trailers that can be attached to autos or trucks.

## Country House Details

*(Concluded from page 241)*

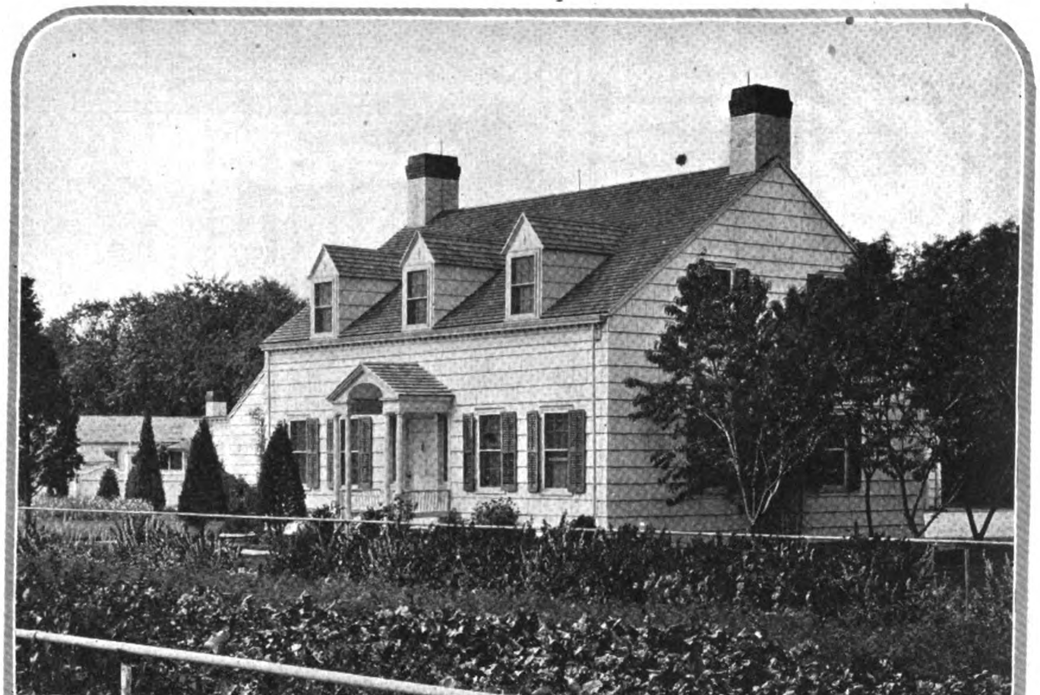
arch, respectively, all finished with various styles of rusticated ashlar. Fig. 8 is an effective illustration of a stone arch used in combination with brick.

A stone arch has its advantages. It is easily constructed and admits of highly artistic treatment. But from a structural standpoint, it is inferior to a brick arch; for, being composed of large pieces, the bond is not so strong as in a brick arch and the liability to settlement is therefore much greater. As a general rule a stone arch is from 6 in. to 8 in. thick and is backed with a brick arch, which should be of the same shape as the stone arch and securely tied to it with galvanized iron clamps.

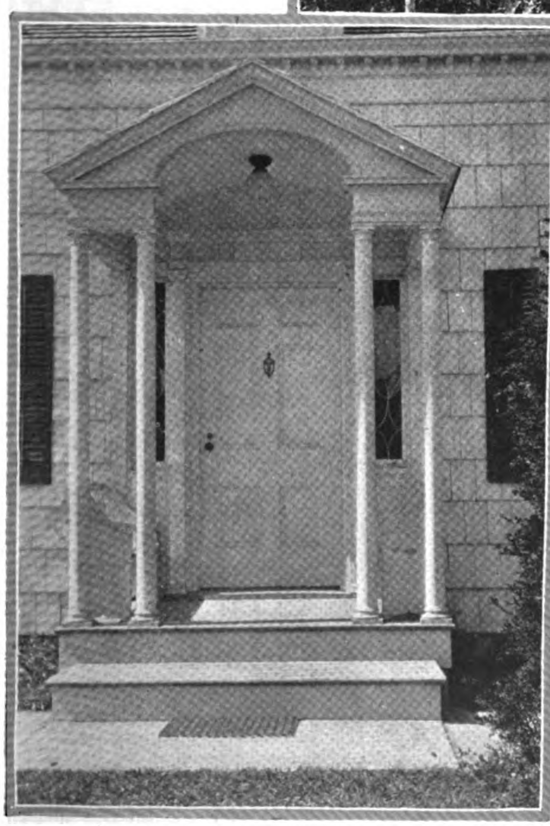
# BUILDING AGE

NEW YORK, AUGUST, 1919

## A Farm Cottage With Seven Rooms



Note the well proportioned dormers and the black capped chimneys



Detail of the doorway. Note the proportions of columns and hood

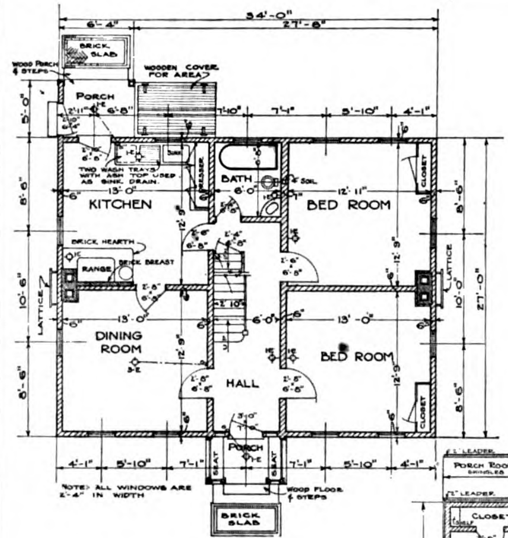
The lattice between the cottage and one of the farm buildings

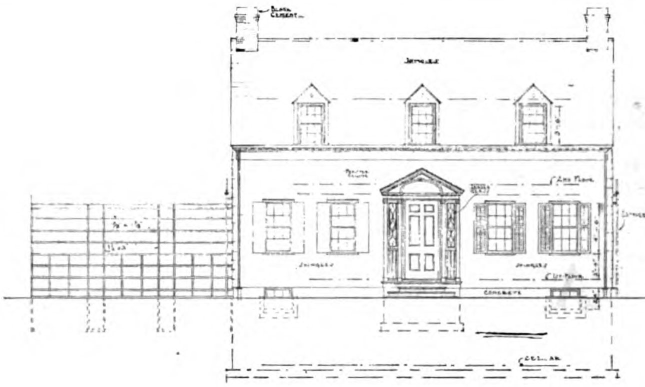
Side view of the cottage

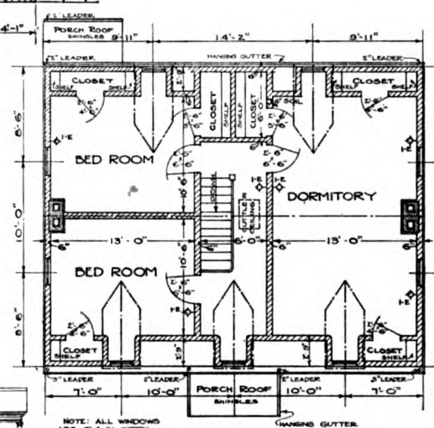
THE Colonial type of architecture seems especially suitable to farm buildings. When well handled, it certainly fits into the scheme perhaps better than any other style.

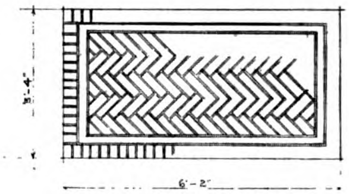
The house illustrated, although simple in design, is attractive by reason of the proportioning of windows and dormers, together with their respective placing. The absence of heavy overhang is not only in keeping with the spirit of this little farm house, but also keeps down the cost. Lack of overhang emphasizes the space between the first story windows and the eaves, giving a touch of individuality not often rendered in this exact manner. The placing of the brackets under the eaves is an ornate note well in keeping with the spirit of the design.

The center of interest of the front facade is quite properly the entrance porch, with its slender, well proportioned columns

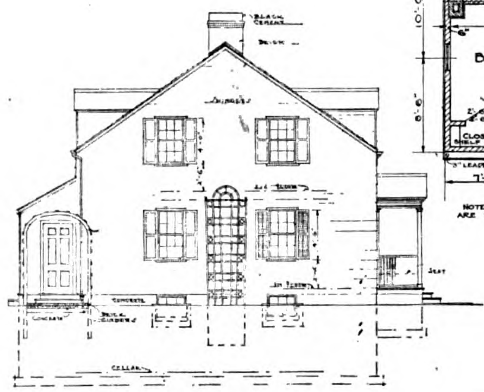


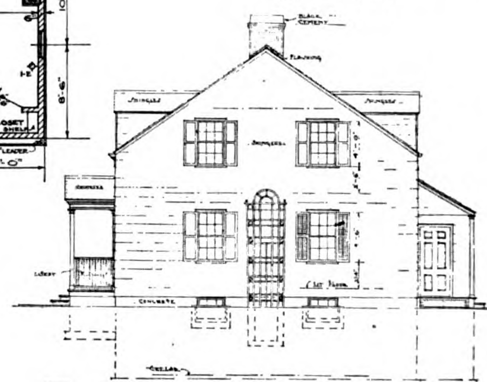



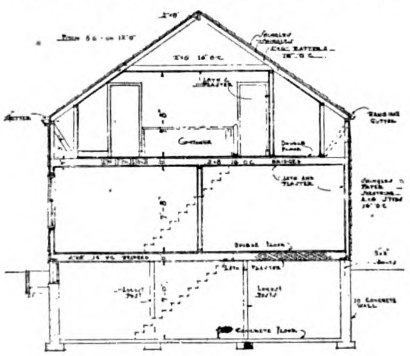



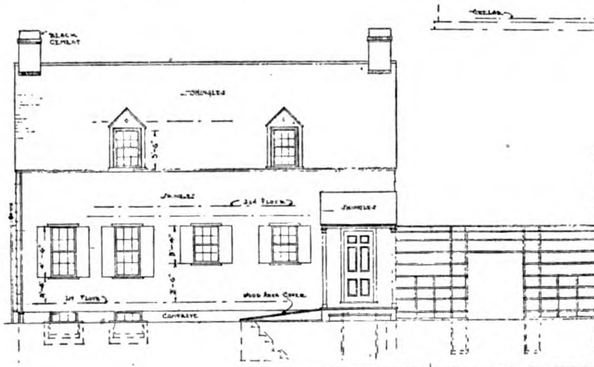

Detail of brick slab at entrance porch, scale 1/4" = 1 ft.

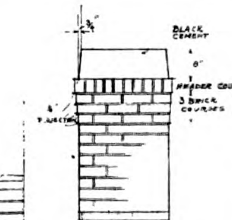


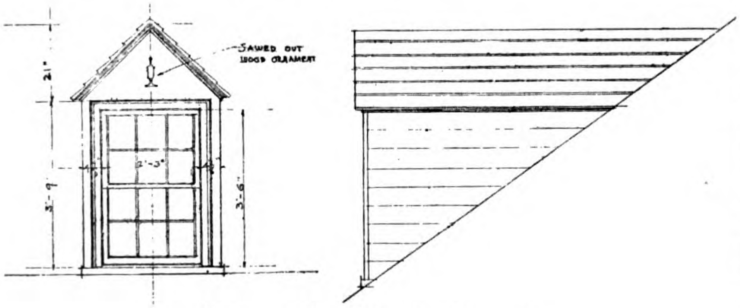

Floor Plans, elevations and cross section, scale 1/16" = 1 ft.



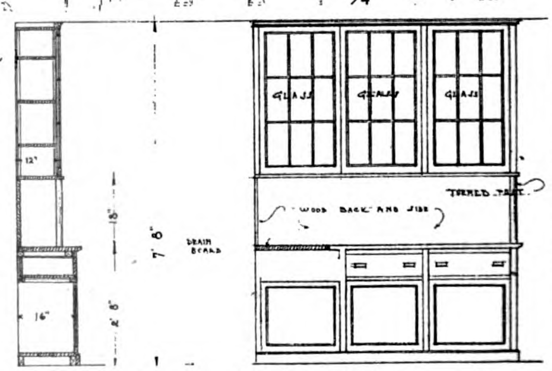



Detail of chimney cap, scale 1/4" = 1 ft.

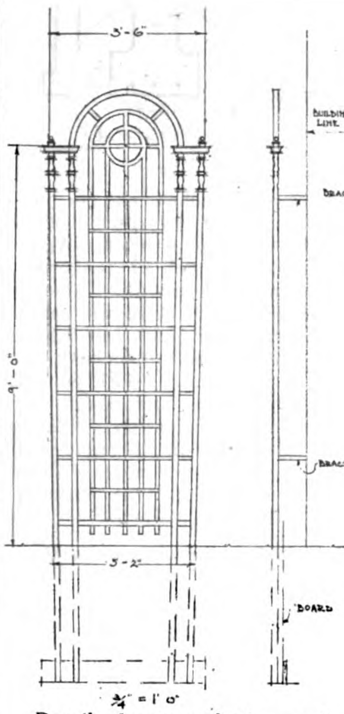



Front and side elevation of dormer, scale 1/4" = 1 ft.

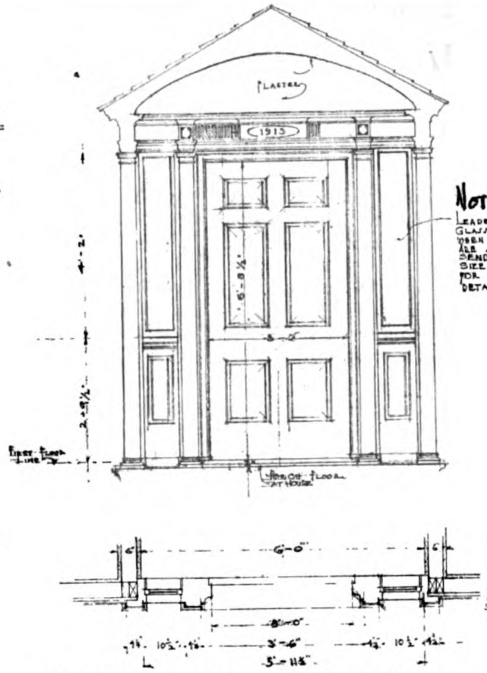



Detail of kitchen dresser, scale 1/4" = 1 ft.

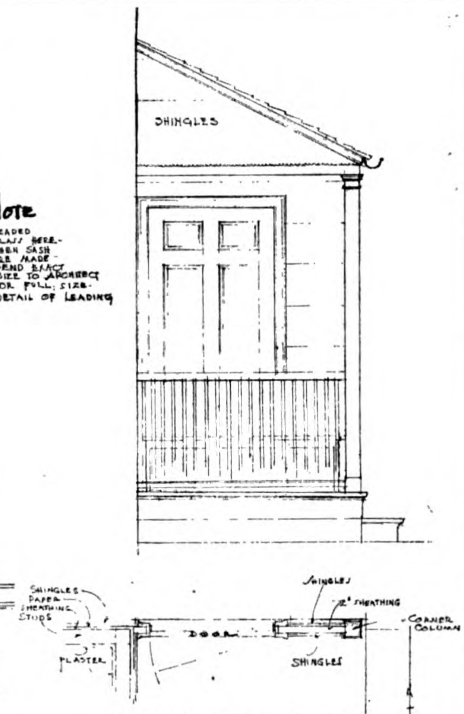
and porch seats. The simple moulding for base and cap and the leaded side lights scaled in harmony with the columns are interesting features. The hood is rendered with a delicate hand, being kept in proportion to the columns and not appearing too heavy for them.



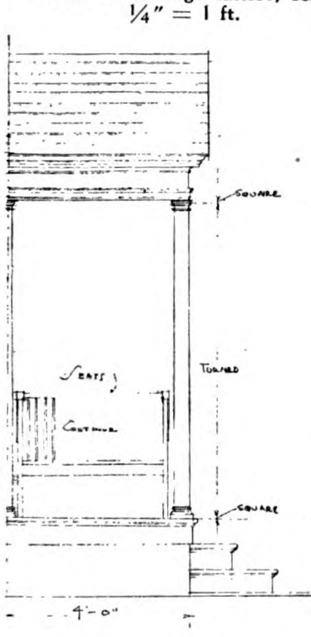
Detail of cottage lattice, scale 1/4" = 1 ft.

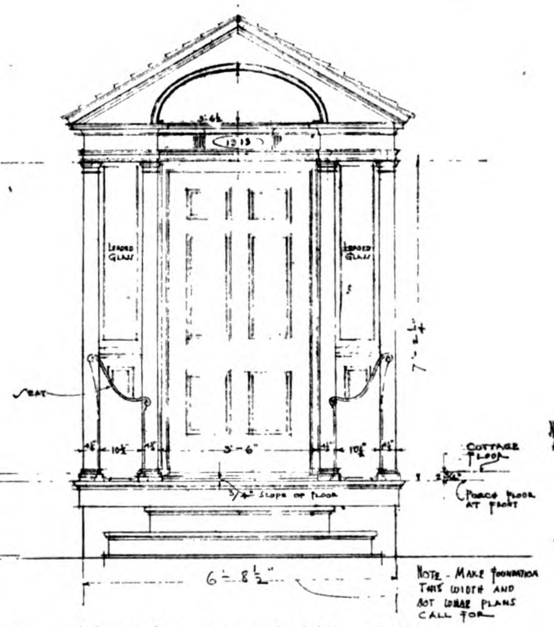


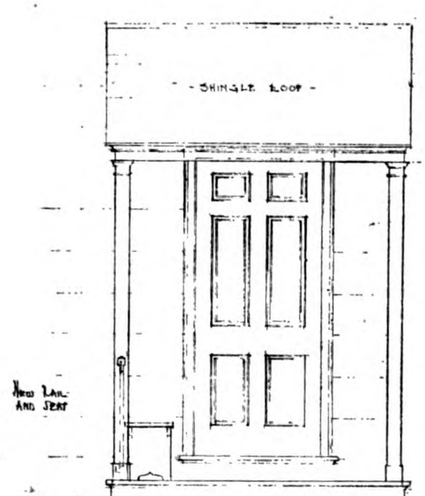
Elevation and section of front doorway under hood, scale 1/4" = 1 ft.



North elevation of rear doorway with plan, scale 1/4" = 1 ft. West elevation below.







Side and front elevations of front doorway, scale 1/4" = 1 ft.

The house is connected with one of the farm buildings by a lattice passage, a detail picture of which is shown. The placing of lattice on the two side elevators form a center of interest.

The manner in which the chimneys are treated should be noticed. The caps are slightly corbeled, the corbel and top being painted black, thus giving an interesting accent to these features.

One enters directly into the hall at the left of which is a dining room leading into the kitchen without any intervening pantry.

At the right of the hall are two bed rooms, these being placed on the first floor and replacing the living room due to the nature of the cottage. Ordinarily these two rooms would be combined into one, perhaps the partition between each bed room and hall being torn out so that entrance could be had directly into the living room, as is the popular custom.

The second floor contains two bed rooms provided with ample closet space, and a large dormitory in which several of the help sleep. This dormitory has three large closets, so that ample storage space is provided for the inmates.

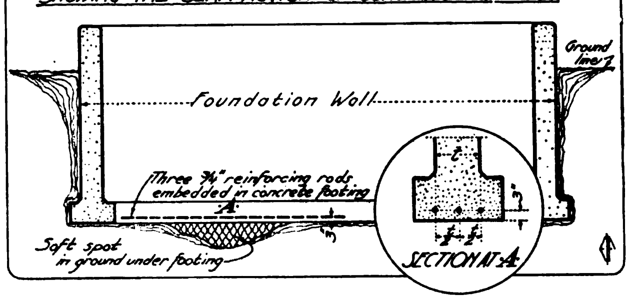
This farm cottage was erected at Bayshore, Long Island, N. Y., with other buildings for J. Adolph Mullenhauer. The plans and specifications were prepared by Alfred Hopkins, architect, 101 Park Avenue, New York City.

# Building Concrete Foundations

## *How to Make Them Waterproof—Proper Proportions of Mix*

By ERNEST IRVING FREESE

FIG·1·
SHOWING THE "BEAM ACTION" OF CONCRETE FOOTINGS.




TO try to convince the average owner or, indeed, the average builder, of the fact that "least cost" does not always mean "greatest economy," is a useless and thankless task. The average owner merely views it as an attempt to "talk him out of his money," and the average builder regards it as a plot to "talk him out of a job." It is therefore fortunate, as regards the material under consideration, that its *cost* may be mentioned first as one of its numerous advantages; concrete, even under the most adverse conditions, being no more expensive than first-class brickwork or stonework, while, under favorable conditions, it is less expensive than either. In proof of this, it is only necessary to point out the fact that concrete as a constructive material for foundation walls and footings is rapidly replacing "jointed" masonry. Hence, the question of cost not being a governing factor, the greater and more important merits of concrete can safely be discussed without seeming to talk the owner out of his money, or the builder out of his job!

### *Why Concrete Is a Good Material*

Concrete, being absolutely flexible in handling, yet eventually becoming as solid as rock, combines lasting endurance with complete adaptability to any structural conditions. The great convenience of a building material that can be "poured," rather than "laid," needs no emphasis.

Wall footings invariably should be of concrete, whatever be the material of the wall above. The big advantage here is that the concrete "flows" into absolute contact with the ground at all points, and thereby accommodates itself to any unevenness of bed. Moreover, after the footing has hardened, it becomes one solid continuous slab that will act as a beam under the superimposed wall and thereby prevent any local settlement by "bridging" the soft or yielding places in the ground. This "beam action" of concrete footings is illustrated in Fig. 1. It is always a wise precaution, in cases of this kind, to embed a few steel rods in the bottom of the footing, as is shown, so as to relieve the concrete of all tensile stress resultant upon this "beam action."

It is possible, as well as entirely practical and economical, to construct concrete foundations in the manner shown at "A," in Fig. 2, that is to say, with widely-separated footings. The walls, reinforced at the bottom as indicated, act as beams in precisely the same manner as the sides of a box would act as beams if the box were set upon four spools, one at each corner. This method of constructing foundations is a common one in high buildings and is termed "skeleton" construction. It requires, of course, careful calculation of the loads so as to properly proportion the footings and reinforcement. At "B," in the same figure, is shown a section of a foundation in which steel reinforcement has been placed in the cross wall, and the footing thereby rendered unnecessary since the wall has become a "beam." The possibilities above suggested would be impossible in brick or stone, but they are particularly and solely adapted to concrete and will, no doubt, come into more general use as the adaptability of concrete becomes more appreciated, and its economy more evident.

### *Thickness of Concrete Walls Flexible*

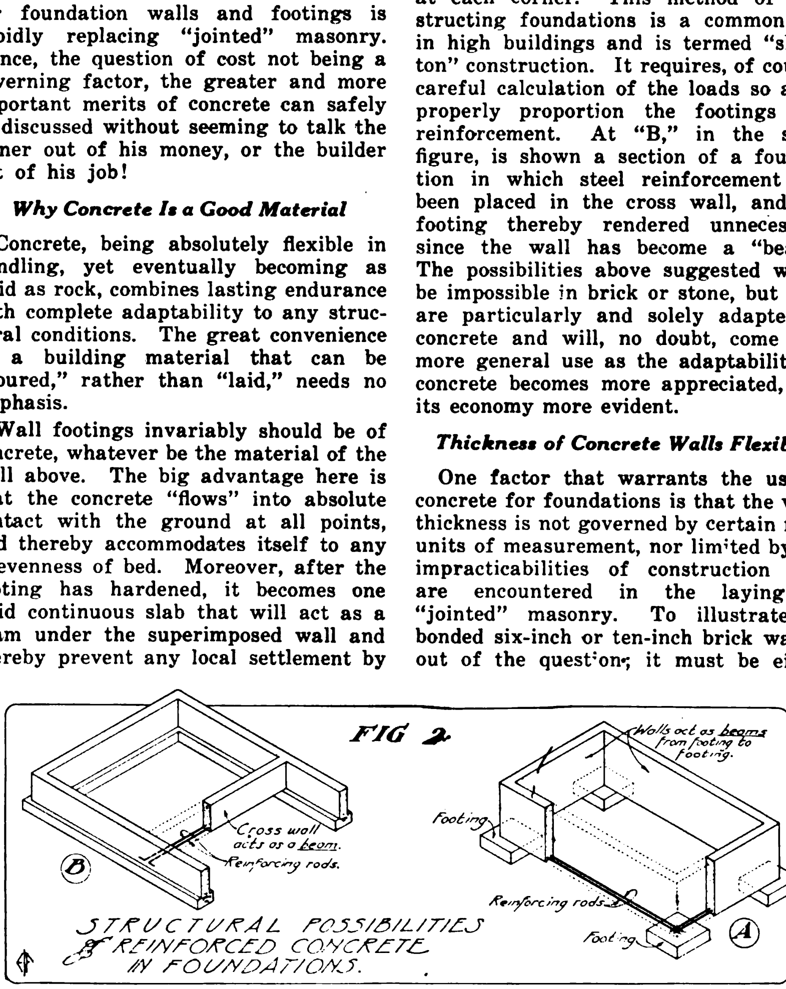
One factor that warrants the use of concrete for foundations is that the wall-thickness is not governed by certain fixed units of measurement, nor limited by the impracticabilities of construction that are encountered in the laying of "jointed" masonry. To illustrate: a bonded six-inch or ten-inch brick wall is out of the question; it must be either eight or twelve inches, and so on—the thickness varying by units of four inches, the width of a brick. Again, it is impractical, as well as dangerous, to build a stone wall less than about sixteen inches thick. Moreover, each of these walls, being made up of small pieces, must be well "bonded" or instability is the result. With monolithic concrete, the above limitations do not exist; the wall becomes *one solid rock*, and its thickness can be made exactly what the conditions of the case demand. Hence, concrete makes for economy of space as well as of material.

### *Jointed Masonry Always Settles*

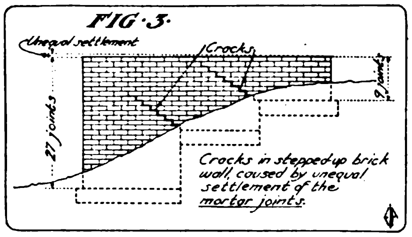
All jointed masonry is subject to inherent settlement, that is to say, settlement within the wall itself. Each of the horizontal mortar joints will compress a certain definite amount, dependent upon the quality of the mortar and the superimposed load. If each joint compresses a hundredth of an inch, and if there are a hundred horizontal joints, then the total inherent settlement will amount to one inch. Now, the point is this: if the wall is of the same height throughout its length, this settlement will be uniform and would probably do no harm. But if the wall were of variable height, as is the case of a stepped-up wall on a side hill, the settlement will be *unequal* and will cause the wall to become cracked, somewhat as shown in Fig. 3. The same cracking occurs where a shallow cross wall joins a deeper main wall. In concrete walls, however, this cracking and disruption cannot occur; for the obvious reason that there are no joints within the wall and, therefore, no inherent settlement.

In concrete, expensive arch construction to span basement openings is eliminated. A "flat arch," in concrete, merely calls for a few steel rods embedded in the bottom of the lintel that spans the opening. Such an "arch" is illustrated in Fig. 4, across the basement window head.

Fig. 4 also depicts an excellent and entirely practical method of constructing basement window areas where the main wall is of concrete. In brick or stone, the areas cannot be built until the main wall is finished and the trench fill brought up to the required level. The result is that the area walls, being built upon the trench "fill," invariably settle and pull away from the main wall. In concrete, however, the area walls can be




STRUCTURAL POSSIBILITIES OF REINFORCED CONCRETE IN FOUNDATIONS.




formed and "poured" with the main wall. In effect, this results in the areas becoming overhanging "balconies." They thus become monolithic with the main wall, and independent settlement cannot occur. As shown in Fig. 4, the footings are eliminated, for the side walls of the area act as brackets, or "cantilevers," while the area wall that parallels the main wall acts as a beam between these cantilevers. The reinforcing rods "a" are provided to take the tension resulting from this "cantilever" and "beam" action of the area walls, while the vertical rods "b" are embedded in the main wall, at the points shown, to reinforce the latter against the "kick" and "pull" of the overhanging walls of the area. In all cases the floor of the area should be of brick laid in sand joints upon a sand bed or, simpler yet, merely a 3 in. or 4 in. bed of sand. This allows free seepage to the drain below, and also relieves the area walls of a possible upthrust resultant upon foundation settlement of the main wall. In other words, whatever be the floor of area, it should *never* be rigidly connected with the walls.

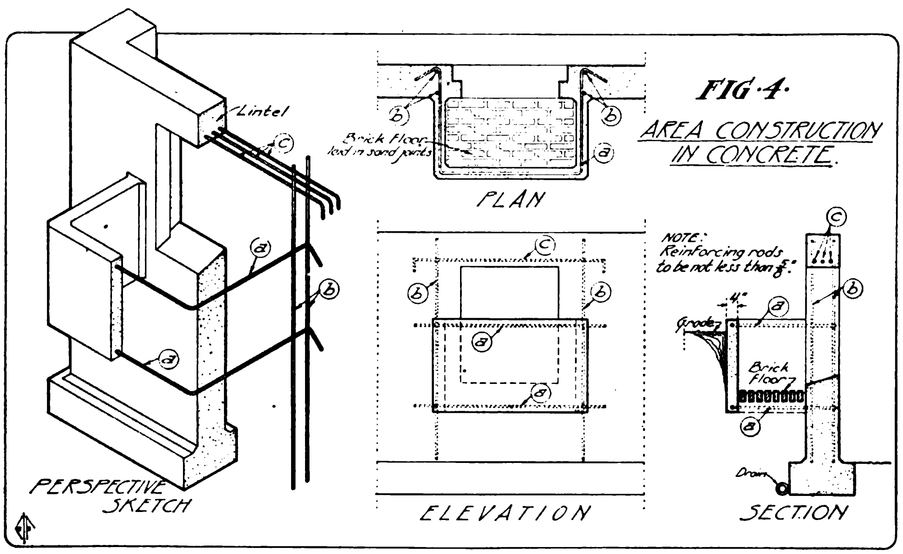



Fig. 5 shows the simple manner in which concrete basement walls can be faced or "veneered" above grade with brick or stone, overcoming the objection sometimes made to the appearance of plastered or unplastered concrete.

Finally, another big advantage of a concrete basement wall, as against a wall of brick or stone, is that the former *can* be made watertight without applying waterproofing compounds to the outside face of the wall. Perhaps the simplest method of doing this is by thoroughly mixing hydrated lime with the dry Portland cement in the proportion of 1 part lime to 4 parts cement, by volume, the lime being *in addition* to the cement rather than in substitution of it. Under ordinary conditions, concrete in which the above amount of hydrated lime has been mixed with the cement will be impervious to water, for the function of the added lime is the purely mechanical one of filling the voids in the concrete. However, if the concrete is properly and scientifically proportioned there will be no voids to fill. Hence, the most logical procedure to procure the most impervious as well as the strongest concrete is to determine what proportions of the given materials will result in the densest possible mixtures, which can readily be done with but small expense, as follows:

Suppose, for example, that the concrete is to be composed of 1 part cement and 7 parts aggregate, which is as lean a mixture as should be used in foundation walls. This mixture, then, is made up of 8 parts, 1 of which is cement. The problem is to determine the number of parts of sand and rock, or sand and gravel, that will make up the 7 parts aggregate and, at the same time, produce the densest mixture. First, procure, or have made, a sheet iron cylinder about 6 in. in diameter and a foot long, closed at one end. (A piece of stove pipe, plugged at one end, would do very well.) Mark on a stick the inside clear depth of this cylinder, and divide this length into as many equal divisions as the required number of parts in the mixture—in this case 8, since there are 1 of cement and 7 of aggregate. Then divide each division in half. Now make a table of trial mixtures, each of which will total 8 parts, the cement always equaling 1 part and the sand and rock making up the remaining 7 parts. Calling the sand the *fine* aggregate, and the crushed rock, or gravel, the *coarse* aggregate, the table of trial mixtures would appear somewhat as follows:

1 part cem., 1½ parts fine agg., 5½ parts coarse agg.

1 part cem., 2 parts fine agg., 5 parts coarse agg.

1 part cem., 2½ parts fine agg., 4½ parts coarse agg.

1 part cem., 3 parts fine agg., 4 parts coarse agg.

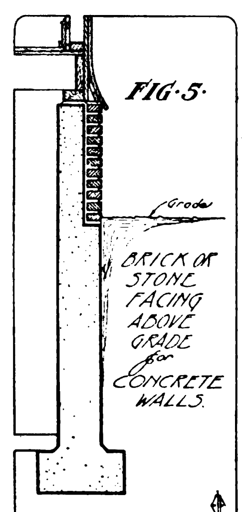
1 part cem., 3½ parts fine agg., 3½ parts coarse agg.

Next, by means of the stick and cylinder, measure the proportions of the first trial mixture. Then in a dish-pan, or any tight receptacle, mix this trial batch into a plastic concrete and ram it into the cylinder. Level the top of the mass and carefully measure its height above the *bottom* of the cylinder. Make a note of this height in the table opposite the mixture used. Proceed in the above way for each of the trial mixtures, taking pains to thoroughly cleanse the cylinder after each trial. Then, that mixture that gives the *least height* in the cylinder, that is to say, the mixture that results in the *least volume* of concrete, will be the correct mixture to use, since it will result in the densest, and therefore the strongest and most impervious concrete that can be made with the given materials in the proportions given.

## Is Lime Good for Chimney Construction?

A SURVEY of building codes by the Lime Association shows that some of the codes bar the use of lime products for mortar for building brick chimneys, the reason, as set forth by the codes, being that lime disintegrates in time, due to its inability to resist the action of heat and flue gases, and is liable to fall out of the joints thus producing a hole through which fire is likely to penetrate. For this reason lime is specifically barred from use in cement mortars.

In running this matter down to a conclusion, it has been learned that the large factory chimney constructors of the country specify and use a mortar composed of one part cement, two parts lime and five parts sand, it being their opinion, based upon many years of experience, that a chimney built with this mortar exhibits a decidedly less tendency to crack than when any other kind of mortar is used. In addition to this they have found lime a better resister of heat.

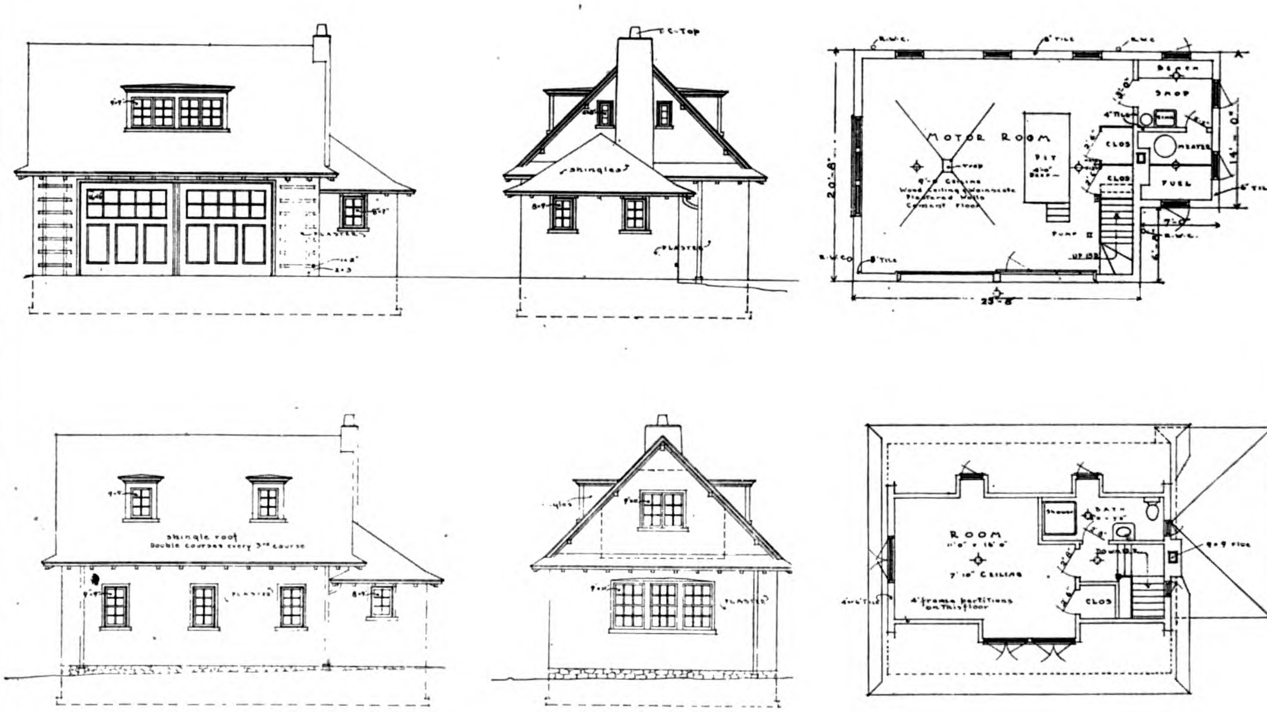



If you are a man, and planning a new home, you will save suffering by giving up the idea of a closet for your clothes now.

# Two-Car Garage with Chauffeur's Living Quarters

*Good example of what can be done with smallest type of building. Note lattice and doubling of shingle butts every third course.*

Heacock and Hoknason
Architects




Floor Plans and Elevations, Scale 1/16" = 1 ft.

# Door Hardware for the Modern Home

## *Obtaining Harmony—Proper Selection Gives Finishing Touch*

By W. R. Hill

SOME time ago I saw a quotation in one of Mr. Rudyard Kipling's latter day poems, wherein he almost convinces one

"How very little, since things were made,
Things have altered in the building trade."

It is very natural now that the cry goes up all over the land for homes, homes and more homes, that there should be a lively interest in everything that goes to make the home comfortable and cheerful.

What is the predominant thought of this home owner? It is the "sense of possession," the "pride of ownership." The home and everything in it belongs to them.

Now, this "pride of ownership" takes in the hardware because it is necessary.

First, that the doors shall be hung so that they shall at all times swing freely and easily, without creaking, or scraping upon the sill, and so that the hinges shall be sightly as regards those parts that show.

Second, that the fastenings of all openings shall operate smoothly, quietly and with entire security and convenience to the occupants of the home.

Third, that the surface of the knobs and escutcheons, the cremone bolts, etc., shall be ornamented, or the outline of such shape that will harmonize with the spirit of the style in which the room or building was created.

Fig. 4. An English coxhead design that goes well with the half-timbered house.

Fig. 5. The thumb latch type for what may be called the "American" or colonial house

Fourth, that the color of all of the exposed hardware shall, by contrast or by harmony, agree with the color scheme plan for the room.

All of these things are very important indeed to the home-builder, and should receive his careful and studious interest, as no materials in the home will be more annoying if unwisely selected or more comfortable and pleasing if well selected.

In order to assist those who are contemplating building in the selection of their hardware, we suggest the following:

**Entrance Doors**

Generally the front entrance door of the average home is a single paneled door.

For the colonial, or what we like to term "the American home type," that is, a composite type or the kind of house that looks homey, the best treatment is the use of the thumb-latch type on the outside, with cylinder lock above, the latch bolt being operated on the inside by a knob, and the deadbolt by a thumb turn.

Fig. 3. A Dutch door equipped with strap hinges, often used instead of the plainer hardware

A door knocker, of a design to harmonize with the style of the door, or the handle, adds a great deal to the general attractiveness of the hardware trim.

The old-fashioned large, four or five inches high by three inches wide push button has gone out of fashion. Its place is taken by the small midget, mother-of-pearl push, which is not obtrusive and yet "does the work."

We show in the illustration a handle of the type mentioned above, which was copied from a very old, Southern-colonial home and which is very beautiful. With the knocker, it trims the door handsomely and yet with good taste.

Such a door should always have solid brass butts of the very best type, with self-retaining pins so that the pin will not ride above the knuckle of the butts.

The best finish to have on a trim of this kind is the natural brass, but, if a softer color is desired instead of the bright brass, a dull brass or brush brass can be used, which will prove to be very satisfactory.

Fig. 1. This design, with its Tudor Rose, is well suited to the Tudor Gothic house

Fig. 2. For the Georgian type of house this design is suitable

Should the doors be double, then of course it is necessary to double the quantity of the butts, to place what are called lever flush bolts on the edge of the standing leaf of the doors and what is called "dummy trim" on the standing leaf, so as to match the active leaf.

Quite often the front door or the side door is made in what is called the "Dutch door;" that is, there is an upper half and a lower half of the single door.

These two halves are equipped with hardware that bolt the two together, so that it will operate as a single door, or so that when the upper half is unlatched from the lower half, it will swing in or out (generally in), while the lower half remains closed.

In olden times, the observing housewife or the neighborly inclined housewife would open the upper half of the door, lean her elbows on the top of the lower half and see what was going on in the street or have a chat with her neighbors.

In later years, the Dutch door has been used because of its architectural value and because it closes the lower half of the opening while still allowing fresh air to enter.

When the entrance door is made as a Dutch door, it is necessary to use two pairs of butts, one pair for the lower half and one pair for the upper half.

The meeting style of the upper and lower half is rabbeted so as to provide a stop.

The upper and the lower half can be fastened together in either one of three ways.

First, by a bolt in the face of the door, set in the upper half and with the bolt shooting down into a striker in the lower half.

Second, by what is called a quadrant. This is similar to the old-fashioned quadrant and when operated draws the two halves together and fastens them.

Third, and what is generally termed the most convenient way, by means of a rabbeted, mortise knob latch, mortised into the upper half and operated by a small knob on the inside only. The use of this enables one to slam the upper half shut and automatically combine the two halves into one door. At one time it was considered quite proper to equip these Dptch doors with strap hinges, similar to those shown in the illustration, but of late years these have not been used as much.

In all other ways, except those described above, a Dutch door is trimmed the same as a regular single entrance door, except that the deadbolt of the lock is generally entirely separate and set in the upper half, the latch being in the lower half only.

In this type of door great care should be used in getting solid cast brass or bronze hinges of the self-lubricated type, made by a reputable house, as, if this is not done, the lateral strain on the hinges causes the doors to sag.

#### Hardware for Bungalow Doors

The entrance doors to bungalows are, in general, treated very much the same as the entrance doors described above, except that the shape of the handles is more apt to be on the craftsman line, such as the plates are hexagonal shape and the grip, or handle, more full instead of the colonial pitcher type. The thumb piece is also apt to be different.

In many cases in place of bright brass or dull brass an old bronze is used with very beautiful effect, particularly when the door is of oak. If fumed oak is used, a very handsome finish is called "half polished iron."

In half-timbered and English types of homes, the so-called "sectional handle" type of front door trim is not used so often as it is easier to obtain a design which will work in with the style to the use of a knob and an escutcheon. For instance, if the house is Tudor Gothic, it is not so difficult to get a design which uses the five petalled rose of the Tudor period. (See Fig. 1.)

If the house is Georgian, a design like Fig. 2 is appropriate.

If the Stratford-on-Avon, or half-timbered, type of house is used, the English coxhead design in Fig. 4 is very appropriate, the knob having a shape very peculiar and comfortable to the hand. With the overlying strip, or band, it is very striking and unusual.

If any of the entrance doors open out (this is very unusual), care should be taken that the latch bolt is equipped with an auxiliary slide, or catch, which will automatically deadlock the bolt so that it cannot be forced back from the outside by the insertion of a tool.

#### Lock for Screen Doors

If screen doors are used outside of the front door, a cylinder pin-tumbler, mortise latch should be specified, the key of which should be made to pass the front door lock.

Entrance doors should always have locks with the center of the knob at least 2¾ in. from the edge of the door in order to prevent scraping of knuckles and, as is possible, serious injury to the back of the hand as is often done when locks of narrower backsets are used.

If a casement window style of door is used, that is, with panels in glass or a large panel of glass, so that a narrow stile is necessary, the stile should not be less than 3 in. wide and the backset of the lock 2 in. If a door of this type be trimmed with either a cylinder or a bit key lock (the cylinder lock is used of course on front entrances and the bit key sometimes on side doors to porches), it would be better to use a lever handle in order to carry the hand well away from the jamb.

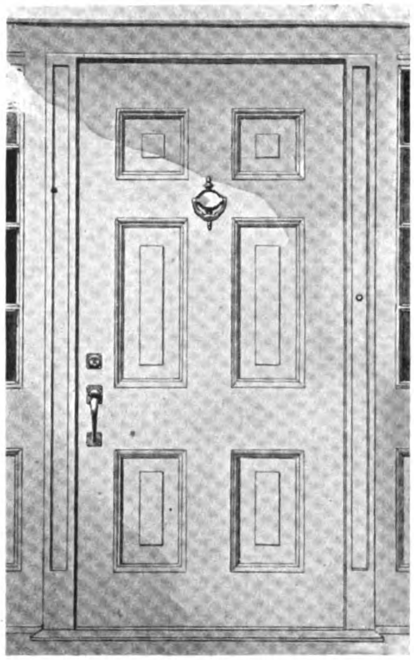


Fig. 6. A colonial door and hardware that make an exceptionally attractive appearance

No lock should be equipped with a lever handle that has not a "gun spring" attachment to the hub of the lock in order to keep the handle in a horizontal position, or at right angles to the vertical casement.

It is never advisable to use a too narrow, backset cylinder, front door lock as it is impossible to obtain the operations that are generally desired with a front door lock in a lock with such a narrow backset and to have all of the parts strong and substantial so that they will be durable. There are many different manufacturers of pin-tumbler cylinder locks and their construction is so little understood by the general public, that it is wise to select one that is made by a well-known manufacturer in order to obtain the best design, the best materials and the best construction. When it is considered that the entrance door is the only protection one has for one's family and valuables, it is readily seen how foolish it is to place a good lock on the front door, a lock of medium security on the side door, and a lock that can be opened with a button-hook on the kitchen door.

Therefore, our advice is that all entrance doors, whether kitchen, or side, or front shall be equipped with pin-tumbler cylinder locks, keeping in mind that locks can be obtained in different shapes such as rim deadlocks and rim night latches, which, at a much lower cost than the mortise pin-tumbler cylinder front door lock, will give exactly the same security.

It will be found to be a great convenience for the owner to have all of the locks of the entrance doors set to his personal key, but each different from the other, so that the servants can only enter the kitchen door. This may sound complicated but it can be done by any of the well-known manufacturers.

# What I Have Learned About Financing Building Operations

## *What to Do and What Not to Do, Gleaned from the Long Experience of a Successful Contractor*

By JAMES R. McAFEE

It is most essential that there be prepared an accurate itemized cost of the lot or parcel of land, preferably an appraisal by a real estate expert together with cost of building operation in case same is called for by Financial Institution or Lender.

Many of our enterprising builders have been driven on the shoals and ruined because they have not properly prepared to secure funds sufficient to meet their obligations for labor, material, taxes and interest when they become due.

The previous business record and character of applicant is always considered in granting a loan and oftentimes helps or retards action, and in a more or less degree, regulates amount of loan made on total investment.

Any person who has sufficient cash to pay outright for free and clear lot and buildings is to be congratulated, for such a one has not only the benefit of lowest prices, but can drive the best bargain where money talks.

The business of such persons is sought by the best concerns in their respective supply lines. Attractive prices are quoted with discounts often given for cash payments. In order not to lose interest when drawing an amount from the bank toward end of interest period, one may go to a National Bank and give his personal note and discount same, often affecting a handsome interest on the money left in the savings bank. However, in country places in some localities as many as ninety per cent of the owners of property carry mortgages on them.

For instance, to give an actual example: A house and property were bought, the purchaser agreeing to pay $8,600. The mortgage on same amounted to $5,000 at five per cent. The contract to buy was made on May 1 and a deposit of $500 was made to bind the bargain, the agreement being to close the contract and take possession providing Title Company policy was produced by June 15 guaranteeing the title. It was, therefore, necessary for the purchaser to produce on June 15 $3,100. This amount he had in the savings bank drawing interest at 4 per cent. Instead of withdrawing the full amount of $3,100 on the 15th, the purchaser applied to the National Bank to discount his note, giving his bank book as collateral, for two weeks. You will, therefore, see in this way the purchaser saved what otherwise would be a loss of interest, amounting to $54, had he withdrawn the money from the savings bank.

No contract should be entered into to buy or sell a piece of property unless vised or approved by a representative of a legitimate Title Company or a real estate attorney, as oftentimes contracts may be construed to different meanings, involving much unnecessary cost to rectify same later.

It is very necessary that in securing a large parcel of land, such as a farm or a small tract, in order that the property may not be misused, thereby depreciating the value placed upon same, that restrictions to a greater or lesser degree be placed upon same for a period, say, 25 years or more. This, therefore, assures the character of the neighborhood unless business warrants and court declares otherwise.

### *Watch Property Restrictions*

It is likewise essential when purchasing a piece of property that one examines carefully into the restrictions on the parcel which he may purchase. Oftentimes these are of such a nature through tax sales, that other conditions often arise to prevent the property from being sold or a loan being made upon it.

For illustration we can call attention to a case of a parcel of land including eight lots which was purchased at a tax sale. This property was afterwards sold to a new purchaser who failed to get the release of a certain individual who claimed a slight equity in same which had not been previously released. This, therefore, made this property unnegotiable and the purchaser has been unable to borrow on same; nor could he sell it and give a clear deed.

Further, there may be clauses therein contained that would unduly involve and bind the purchasers and their assigns for ever; before taking title it is essential to have a title policy issued, and before you pay for this see that same is free of objections, unless the party of the selling part agrees to have same cancelled.

Plans are, of course, necessary if a loan is to be made for a proposed building. Many builders will work hand in hand with a good architect.

After having plans and accurate cost, one should apply to his savings bank, real estate office or the executor of some estate, generally through the attorney of the latter for a building loan, preferably one that could become a permanent mortgage on completion of building according to plans and specifications submitted. In the suburbs, trust companies or banks will oftentimes loan a customer on his note upon producing a statement of his finances, sometimes requiring extra collateral, until such times as he may be able to get a permanent mortgage. A trust company may advance funds when an agreement is produced from some responsible financial institution or estate

**How can a loan be secured?**
**Where is the cheapest place to get it?**
**What pitfalls must one avoid?**
**How can clients be helped?**
**What will make the operation a success?**
**These are a few of the topics touched on in this article. It is worth reading—and remembering.**

agreeing to place a permanent mortgage on property when building is suitably erected, completed, and accepted. The percentage loaned varies in different localities, from 50 to 65 per cent, according to appraisals of selling cost, and this often covers the cost of erecting building by builders themselves. The rate of interest cannot exceed the legal rate of any state, which in New York is 6 per cent. This may be reduced at the offer of the borrower and consent of the lender.

There is most generally a cost attached to securing a loan, if from title company, they have a stated rate. If loan is secured from others than company, the total cost of securing same and including tax and mortgage should be ascertained so that no misunderstanding on this score may arise. Do not hesitate to ascertain cost from more than one source if you deem charges are excessive.

Mortgages may extend for a period of years, or they may be installment, or a mortgage payable so much on each interest date—certain sum—as stipulated or agreed upon. An owner may become a member of a building and loan association securing a certain requisite number of shares in accordance with loan desired and pay for same each month with his dues in accordance with rules and regulations of said institution. This is good information to pass on to a man whom you know is saving for a home.

### *The Mortgage May Prove a Pitfall*

When you obligate yourself to mortgage a piece of property, most generally you are expected to go on a guarantee bond for payment of mortgage. This should be evaded as much as possible by the builder; in case he sells house, he would no longer have the bother of placing a mortgage. A good plan is to get a life insurance policy to cover in case of loss or trouble or death. Your all would not be involved and family would be in a position to carry property and care for same in case mortgage you guaranteed payment of were called for.

It is advisable, too, that mortgages be secured for a long time, preferably for ten years, thereby avoiding the necessity and expense of renewing the same every few years. It is very essential in order to prevent assessments and taxes from accumulating and remaining unpaid, that an owner, have his name recorded with the Title Company who will be glad to notify him of dates when taxes or assessments may be levied or which remain unpaid at the tax office. A small fee only is required. This is advisable in case through any error or mistake the wrong tax bill may have been paid by the owner and also in case there should be any misappliance of funds by the tax collector. It is, therefore, advisable to insist upon and keep for ready reference all paid tax, water and assessment bills. These things should be explained to an owner, who will appreciate your interest.

When mortgages become due or are about to become due, there are two methods to pursue. One is to wait until you are notified of the desire to have the mortgage paid off on behalf of the mortgagee. The other method is to ascertain by correspondence if same is to be extended, which is advisable in many cases should the money market become stringent and money for mortgages hard to secure. Many people, however, have mortgages running for years and years without being disturbed, long past due, simply because they have been particular to pay their interest and tax bills promptly and also to keep the premises or property in first class repair and shape so that, as far as they are concerned, the value has not diminished.

### *How the Payments Are Made*

Usually the payments for building operations are made based upon completion of specification, a certain percentage being paid when foundations are completed, an additional percentage when the frame work and roof are covered, third payment when building is plastered, fourth, when the trim and windows and painting are completed, and fifth, on final completion; last payment is sometimes made 30 or 60 days after completion of the building.

To illustrate: in a larger operation in a suburban town close to one of the big cities, there was no property or safe building in which theatrical performances could be produced. Two enterprising young men of the town realized this and secured a parcel of land for which they paid $12,000. Having secured this land, they proceeded to secure means of financing the erection of a slow-burning

(*Concluded on page* 262)

# *Interior Details of*
## *Fireplaces, China Closets,*

Fireplace with china closets. Savry&Scheetz, architects

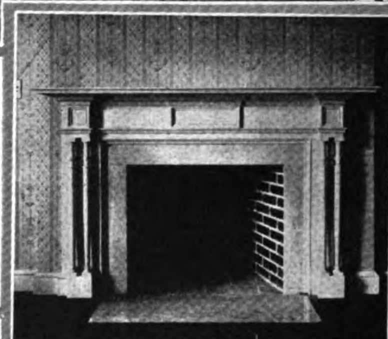
A graceful stairway. Edward C. Dean, architect

Combination of bookcases and window seat.

Stairway for the small home. R. T. Perot architect

Decorative lattice for the porch. James Purdon, architect

Walter H. Thomas, architect



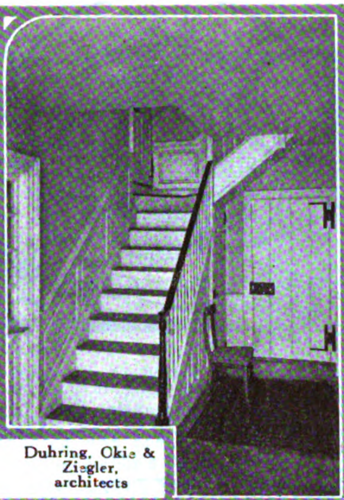
Fireplace suitable for a bedroom

An attractive stairway for the moderate cost home C.E. Schermerhorn, architect

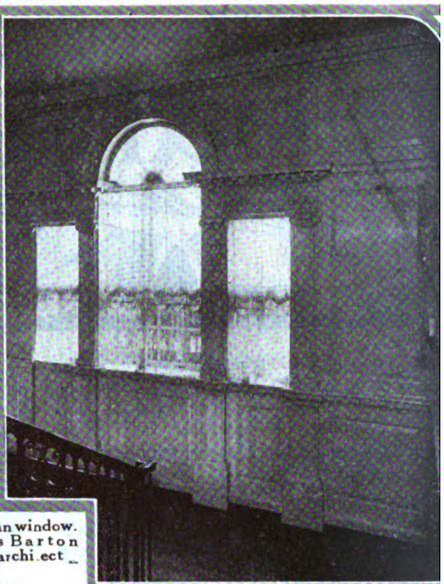
# *Beautiful Homes*

***Stairways, Windows, etc.***

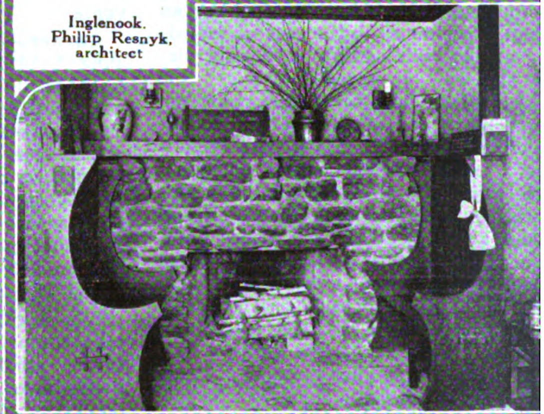
Savry & Scheetz, architects



Duhring, Okie & Ziegler, architects

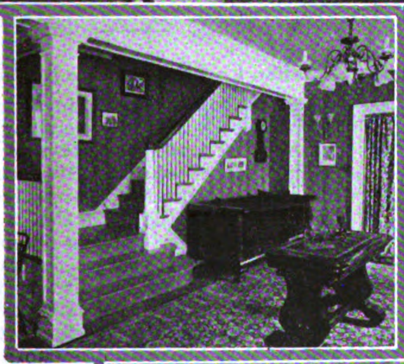


Paladian window. Charles Barton Keen, architect



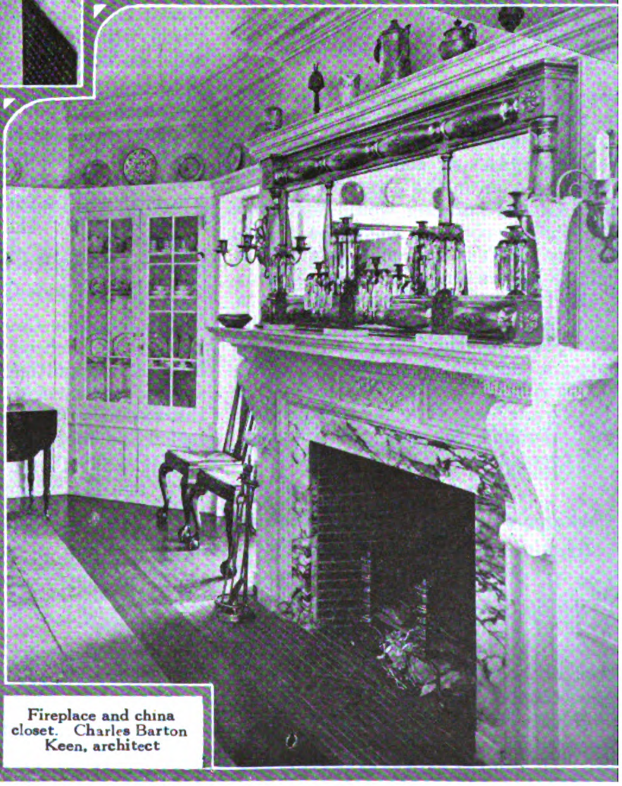
Inglenook. Phillip Resnyk, architect

Interesting vista through hall. E. Headrichson, architect



Novel treatment of stairway. C. E. Schermerhorn, architect

Graceful curve of rail is the distinguishing feature of this stairway. Walter H. Thomas, architect



Fireplace and china closet. Charles Barton Keen, architect

# Legal Department

### When Contractor's Estimate Runs Far Above Architect's, Can Architect Recover for Drawings?

**From G. B., Ohio.**—As an old-time subscriber to BUILDING AGE, I am asking for Legal advice. Have practised architecture for 25 years and have my first experience of a disputed bill.

Some months ago I was asked for an off-hand opinion as to the cost of remodeling an old building into a moving picture theatre. I stated I *thought* the work could be done for $2,500. After I started plans and made a careful examination of old walls and general conditions, I told the owners I could not guarantee any estimates. Plans were approved by state building inspector and owners authorized me to secure bids. These bids ran close to $5,000. Owners were disappointed but did not say much. They tried to borrow sufficient money to cover the additional cost. After failing to secure financial assistance they decided to erect a smaller building and refused to pay for plans furnished by me. I presented a bill for 2½ per cent on original proposed cost, not on bids received. What are my chances of recovery?

**Answer.**—If the facts are as you state them there would seem to be no reason why you should not be paid the amount of your charges. Of course, if the owners retained you on the strength of your advice that the building would cost only $2,500, the proposition would be a different one. Before any one can give you a definite advice on a question of this kind they must be fully conversant with all the facts and circumstances. The only way to get this information from a claimant usually is by asking questions. Why not place the matter in the hands of your local attorney and let him make a demand for you and institute suit if necessary?

### Do Arkansas and Missouri Require Architects to Be Licensed?

**From U. S. B., Mo.**—As a subscriber to BUILDING AGE I am exercising my privilege of asking for information. Is it necessary for an architect to be licensed in Arkansas or in Missouri?

**Answer.**—We have no record of any State statute in either Arkansas or Missouri requiring that architects be licensed. Of course there is always the possibility that a license may be required by some municipal ordinance. The best way to get this information is to inquire from the building department where you wish to practice.

### What Is the Compensation Law in Pa.?

**From C. S., Pa.**—Please explain compensation law of the State of Pennsylvania.

**Answer.**—Act No. 338 was approved June 2, 1915, and became effective Jan. 1, 1916. It was amended by Chapter 57, 359 and 395 of the Laws of 1917. Under it, private employers can elect to take out compensation insurance in either the state fund or regular companies for all employees except farm laboorers, domestic servants or casual employees not in the usual course of employment and outworkers. Public employers are compelled to take compensation insurance.

If a private employer does not elect to take compensation insurance his rights to seek relief from liability by setting up the fellow servant rule, contributory negligence or assumed risks are abrogated. Under this law notice of injury must be given within fourteen days and a claim must be made within one year.

In the limited space allotted to us, we are unable to advise you fully as to the Pennsylvania compensation law. If, however, you write to the Workman's Compensation Board of your state for literature, it will be furnished to you.

### Can Architect Recover When Engaged by Town Committee?

The Supreme Court of Illinois recently held that architects dealing with the building committees of town boards of supervisors must at their peril ascertain the extent of the committees' authority to engage them.

Suit was started by a firm of architects against a county for over $5,000 claimed to be due for professional services rendered. It appeared that the "Public Building Committee" of a town board of supervisors had adopted the following resolution concerning a county court house:

"To build a wing on the south side of the present building three stories high to cost about $50,000. After same is completed to the extent of a temporary occupancy, to move the offices from the center part to the south wing and then demolish the center part and rebuild same to conform with the south wing. After completing the center portions, then remodel the north wing to make it conform with the balance of the building."

The Board gave the committee the necessary authority to engage architects to supervise the remodeling of the court house.

The committee accordingly engaged architects. After the work had been going on for some little time, the committee decided that it wished to have a new building and gave orders for the same. The court decided that as the architects only had a contract with the building committee to make plans for an addition to the court house, they could not recover for plans for a new court house, even though they prepared them pursuant to the instructions of the committee. The court did hold, however, that the architects were entitled to compensation for the reasonable value of their services up to the time the committee without authority interrupted the work and changed the plans by calling for the construction of a new court house. Pauly et al. vs. Madison County, 123 N. E. Illinois 281.

### When Can Builder Sue for Libel?

An interesting case involving two brothers, both of whom were engaged in the building trade, was recently decided in the Kansas courts. Suit was instituted by one brother against the other for damages on the claim that a libelous article had been published concerning him in certain Kansas papers. The brother against whom suit was brought also put in a claim for damages on the ground that the other party to the suit had written libelous letters to a wholesale merchant.

The court decided that although the letter written by the one brother accused the other of dishonesty and insolvency and although it could have been inferred from its language that the writer desired to hurt the business of the one about whom he was writing, the jury refused to find for either party; thus there could be no recovery.

The court pointed out, however, that the general rule of law is that while a retail merchant is privileged to frankly and honestly answer an inquiry of a wholesale merchant concerning another retail merchant, if his letter goes outside the answers to the inquiry and contains other matter which is libelous, an action for damages may be maintained against him by the merchant who is libeled. Kozel vs. Kozel, 180 Pac. (Kansas) 178.

### Some Recent Mechanics' Lien Decisions

*California*

That a notice of a mechanics' lien is properly filed if it is filed within thirty days from the time the owner of a building files a notice of completion of the work is the decision in a recent California case. The court held that as the time for filing a claim for a mechanics' lien does not begin to run from the date the work is completed, if the lien notice is filed within thirty days from the time the owner files his notice that is sufficient.

In this case it was further held that when concrete work is of such a nature as to necessitate the use of forms to hold it in place while it is hardening, such forms are subject to a lien. The forms must be such that the materials from which they are made are consumed in the process, however, to come within the definition of "materials to be used or consumed" in the construction of a building as used in the California Code of Civ. Pro., Par. 1183. Consolidated Lumber Company vs. Bosworth, 180 Pac. (California) 60.

*Missouri*

The courts of this state just lately decided that in order for a party to set up the requirements of Rev. Stat. 1909 Par. 8828 which requires suit to enforce a mechanics' lien to be commenced within ninety days after the lien is filed, such statute must be pleaded as it is the statute of limitation and cannot be taken advantage of unless specifically pleaded by the party who desires to benefit by it. American Radiator Company vs. Connor, 218 S. W. (Missouri) 56.

*Washington*

The Supreme Court of Washington in a late case decided that where a material man furnished all the materials to construct several buildings and was paid certain amounts by the contractor, he need not credit the amounts received to lumber furnished for the particular buildings. In this case the contractor had given the material man checks made by the owner. The material man, however, had received no notice from the owner as to how the checks should be credited. The court therefore decided that the material man was entitled to a mechanics' lien on the owner's property for the unpaid balance, even though the checks received had been applied to the credit of the contractor's account generally. Schwager vs. Carstens, 180 Pac. (Washington) 137.

### Words Defined in Recent Decisions

In Virginia the word "excavate" has been defined as follows: "Excavate, as ordinarily used in a construction contract, covers the removal of solid rock as well as earth and loose material." Rosenberg vs. Kerner, 98 S. E. (Virginia) 763.

The word "architecture" has been defined to mean the art of building, according to certain determined rules. Louisiana Molasses Company vs. La Sassler, 52 La. Ann. (Louisiana) 2070.

### When Limit Payment Is in Contract How Is It Interpreted?

In New York a short time ago a person contracted to do engineering work and to furnish necessary plans at his own expense for 6 per cent of the cost price less part of the wages of certain employees and certain office expenses. It was further provided that the person should not receive more than $6000, the court decided that this latter provision merely limits the balance payable after the deduction of expenses and does not constitute an agreement that the most the person shall receive is $6000 less expenses.

### What Is a Material Man?

According to the Indiana courts one engaged in carpentering, paper hanging and painting who has taken a single contract for building a house, but has no yard, store, supply house, or other place where he keeps building materials, is not a material man. Thus in a transaction wherein such a person contracted to furnish all materials and labor for making complete improvements on land, it was decided that other men who furnished the materials to him were entitled to a lien.

### What Can Contractor Do When Architect Refuses to Act Under Terms of Contract?

That it is a fraud upon a building contractor for an architect to refuse to make an estimate justly due under the terms of the building contract is the decision in a lately decided Nebraska case. The court held that this proposition holds true even though the architect may be designated as the sole arbiter with the power of final decision, saying that a building contractor is not bound when an architect acts unreasonably and arbitrarily. Howard Company vs. Pesha, 172 N. W. (Nebraska) 55.

# Design of Reinforced Concrete Beams and Slabs---I

## *Notation Used—Various Stresses and How to Withstand Them*

By L. GOODMAN, C. E.

**Progressive contractors are undertaking the construction of reinforced concrete structures, for this type of building is one that is rapidly increasing in popularity. There is a real need for elementary articles on this subject, articles that will show builders in a quick, easy manner how to design reinforced concrete columns, slabs, beams, etc. The series that starts in this issue is one that will afford such information.**

**If any points explained are not understood, just write in to Mr. Goodman, care of Building Age, and he will be glad to make the matter clear.**

THE following standard notation is recommended by the Joint Committee on Concrete and Reinforced Concrete.*

*Rectangular Beams*

$f_s$ = tensile unit steel in steel;

$f_c$ = compressive unit stress in concrete;

$E_s$ = modulus of elasticity of steel;

$E_c$ = modulus of elasticity of concrete;

$n = \frac{E_s}{E_c}$, (ratio of moduli of elasticity);

$M$ = moment of resistance, or bending moment in general;

$A_s$ = steel area;

$b$ = breadth of beam;

$d$ = depth of beam to center of steel;

$k$ = ratio of depth of neutral axis to depth, $d$;

$z$ = depth below top to resultant of compressive stresses;

$j$ = ratio of lever arm of resisting couple to depth, $d$;

$jd = d - z$ = arm of resisting couple;

$p$ = steel ratio $= \frac{A_s}{bd}$

$V$ = total shear;

$v$ = shearing unit stress;

$u$ = bond stress per unit area of bar;

$o$ = circumference or perimeter of bar;

$\Sigma_o$ = sum of the perimeters of all bars.

Fig. 1 shows a reinforced concrete beam resting on the supports $R$ and $R^1$, and carrying the vertical loads $P_1$, $P_2$, $P_3$, etc.

When the beam is deflected by the loads placed thereon the fibers in the

*See Trans. Am. Soc. C. E., Vol. LXXVII.

lower part, below the neutral axis, are stretched, while above the neutral axis the fibers are compressed.

We will assume that any section as $A\ B$, which is plane before loading will remain plane after the load is put on and bending takes place, as shown at $A'\ B'$. This assumption is recommended by the joint committee.

Fig. 2 shows the beam with the portion to the right of the section $A\ B$ removed. The compressive stresses in the concrete above the neutral axis $N$ (shown by horizontal lines) vary as the distance from the neutral axis to the extreme fiber $AA''$, where it is equal to $f_c$.

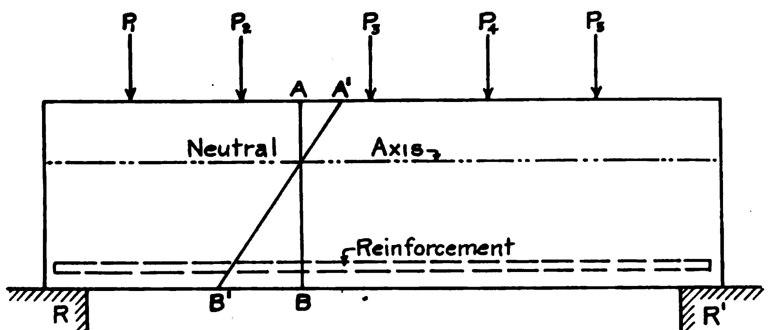



Fig. 1

As concrete is only good for about 50 lbs. per square inch in tension, it is assumed that it will not resist any tension; hence the tensile stresses in the concrete below the neutral axis are neglected, which is on the side of safety.

The unit tensile stress in the steel is represented by $f_s$, and the total tensile stress in the steel by $T$.

The effective depth of the beam $d$ is the distance from the top of the concrete (compression surface) down to the center of the reinforcement.

The neutral axis $N$ is a fractional part of the depth $d$, below the upper surface, and is designated $k$, so that the distance from the top of the beam down to the neutral axis is equal to $kd$.

The sum of the compressive stresses in the concrete above the neutral axis is the area of the shaded triangle multiplied by the breadth of the beam $b$, and is represented by $C$, which will act at the center of gravity of the triangle, or $z = 1/3\ kd$ below the top of the beam. The total tension in the steel, represented by $T$, will act at the center of the reinforcement.

The resisting moment of the beam is equal to the product of $T$ or $C$ by the lever arm of the couple $(jd)$.

Fig. 3 is a cross section of the beam with the width or breadth of beam equal to $b$, and the effective depth equal to $d$. The total area of the steel $A_s$ is equal to sum of the areas of the bars. The concrete below the steel is for the protection of the steel from injury by fire or otherwise. The concrete in compression is shown hatched.

### *Amount of Steel (Steel Ratio)*

For a balanced beam, that is, one which will develop the full working values of the stresses $f_c$ and $f_s$ at the same time, the ratio of the steel area to the area of the concrete is obtained from the following formula,

$$p = \frac{1}{2}\ \frac{1}{\frac{f_s}{f_c}\left(\frac{f_s}{nf_c} + 1\right)}$$

This formula shows that for given working values of $f_s$ (the allowable stress in steel), $f_c$ (the allowable stress in concrete), and $n$ (the ratio of moduli of elasticity), the steel ratio $p$ remains the same for all sizes of beams.

For $f_s = 16,000\ \#/\square''$; $f_c = 650\ \#/\square''$ and $n = 15$, which are the values recommended by the joint committee for a 1:2:4 concrete having a compressive strength of 2000 lbs. per square inch, we have

$$p = \frac{1}{2}\ \frac{1}{\frac{16,000}{650}\left(\frac{16,000}{15 \times 650} + 1\right)} = .0077 \text{ or } .77\%$$

### *Position of Neutral Axis*

The proportionate depth of the neutral axis below the upper or compression surface of the beam is determined by the following formula,

$$k = \sqrt{2\,pn + (pn)^2} - pn$$

This formula shows that with given values of $f_s$, $f_c$ and $n$, the ratio of the depth of the neutral axis to the depth $d$ will be the same for all sizes of beams.

For $f_s = 16,000\ \#/\square''$, $f_c = 650\ \#/\square''$ and $n = 15$

$$k = \sqrt{2 \times .0077 \times 15 + (.0077 \times 15)^2} - .0077 \times 15 = .378 \text{ (approximately } 3/8\text{)}$$

### *Arm of Resisting Couple*

The arm of the resisting couple, $jd$, is equal to $d - z = d - 1/3\ kd$, so that $j = 1 - 1/3\ k$.

This is the same for all sizes of beams as $p$ and $k$ above and for $f_s = 16,000\ \#/\square''$, $f_c = 650\ \#/\square''$ and $n = 15$

$$j = 1 - \frac{.378}{3} = .874 \text{ (approximately } 7/8\text{)}.$$

*Coefficient of Strength* of the beam relative to the steel and the concrete is

$$K = f_s pj \text{ and } K = 1/2\ f_c kj.$$

For $f_s = 16,000\ \#/\square''$, $f_c = 650\ \#/\square''$ and $n = 15$ we have

$$K = 16,000 \times .0077 \times .874 = 107.7$$

and

$$K = 1/2 \times 650 \times .378 \times .874 = 107.4$$

The smaller of these two values (107.4) should be used as the coefficient of strength or moment constant of the beam.

Table I gives the values of the constants for balanced beams, for various working stresses.

The method of designing a reinforced concrete beam will be illustrated by the following example:

To design a reinforced concrete beam having a clear span of 10 ft. and carrying a live load of 200 lbs. per lineal foot. The beam as designed is shown in Fig. 4.

To calculate the bending moment in the beam the dead weight of the beam itself must be taken into account as well as the live load. This dead weight may be as-

TABLE I.—CONSTANTS FOR BALANCED BEAMS

| Working Stresses | | Ratio of Moduli $n=12$ | | | | Ratio of Moduli $n=15$ | | | |
|---|---|---|---|---|---|---|---|---|---|
| $f_s$ | $f_c$ | $k$ | $j$ | $p$ | $K$ | $k$ | $j$ | $p$ | $K$ |
| 12,000 | 500 | 0.332 | 0.889 | 0.0069 | 73.6 | 0.384 | 0.872 | 0.0080 | 83.7 |
| | 550 | 0.354 | 0.882 | 0.0081 | 85.7 | 0.407 | 0.864 | 0.0093 | 96.4 |
| | 600 | 0.375 | 0.875 | 0.0094 | 98.4 | 0.428 | 0.857 | 0.0107 | 110.0 |
| | 650 | 0.394 | 0.869 | 0.0107 | 111.3 | 0.448 | 0.851 | 0.0121 | 123.6 |
| | 700 | 0.412 | 0.863 | 0.0120 | 124.4 | 0.467 | 0.844 | 0.0136 | 138.0 |
| | 800 | 0.444 | 0.852 | 0.0148 | 151.3 | 0.501 | 0.833 | 0.0167 | 166.9 |
| 14,000 | 500 | 0.300 | 0.900 | 0.0054 | 67.5 | 0.348 | 0.884 | 0.0062 | 76.7 |
| | 550 | 0.320 | 0.893 | 0.0063 | 78.6 | 0.372 | 0.876 | 0.0073 | 89.5 |
| | 600 | 0.340 | 0.888 | 0.0073 | 90.6 | 0.391 | 0.870 | 0.0084 | 102.0 |
| | 650 | 0.358 | 0.881 | 0.0083 | 102.5 | 0.410 | 0.863 | 0.0095 | 114.8 |
| | 700 | 0.375 | 0.875 | 0.0094 | 114.8 | 0.428 | 0.857 | 0.0107 | 128.3 |
| | 800 | 0.407 | 0.864 | 0.0116 | 140.4 | 0.462 | 0.846 | 0.0132 | 156.3 |
| 16,000 | 500 | 0.273 | 0.909 | 0.0043 | 62.0 | 0.319 | 0.894 | 0.0050 | 71.3 |
| | 550 | 0.292 | 0.903 | 0.0050 | 72.2 | 0.339 | 0.887 | 0.0058 | 82.3 |
| | 600 | 0.310 | 0.897 | 0.0058 | 83.2 | 0.358 | 0.881 | 0.0067 | 94.4 |
| | 650 | 0.328 | 0.891 | 0.0067 | 95.0 | 0.378 | 0.874 | 0.0077 | 107.4 |
| | 700 | 0.344 | 0.885 | 0.0075 | 106.2 | 0.397 | 0.868 | 0.0087 | 120.6 |
| | 800 | 0.375 | 0.875 | 0.0094 | 131.3 | 0.429 | 0.857 | 0.0107 | 146.7 |
| 20,000 | 500 | 0.230 | 0.923 | 0.0029 | 53.1 | 0.272 | 0.909 | 0.0034 | 61.8 |
| | 550 | 0.248 | 0.917 | 0.0034 | 62.4 | 0.292 | 0.903 | 0.0040 | 72.2 |
| | 600 | 0.264 | 0.912 | 0.0040 | 72.2 | 0.311 | 0.897 | 0.0047 | 83.7 |
| | 650 | 0.280 | 0.907 | 0.0046 | 82.4 | 0.328 | 0.891 | 0.0053 | 94.4 |
| | 700 | 0.295 | 0.902 | 0.0052 | 93.3 | 0.344 | 0.885 | 0.0060 | 106.2 |
| | 800 | 0.324 | 0.892 | 0.0065 | 115.6 | 0.374 | 0.875 | 0.0075 | 130.9 |

sumed at about 10 per cent of the live load or a trial section of the beam may be assumed, based on the following considerations.

An economical cross section for a uniformly loaded beam is one in which the effective depth is about one-twelfth of the span and the breadth is from one-half to three-quarters of the depth.

In our problem, therefore, we will assume the effective depth of the beam as 10 in., giving a total depth, including protection for the reinforcing steel of 12 in., and we will assume the width of the beam as 6 in.

The weight of the beam is equal to 1.0 ft. $\times$ 0.5 ft. $\times$ 150 lb. = 75 lb. per lineal foot.

The effective span of simply supported beams is equal to the distance from center to center of supports, but need not be taken to exceed the clear span plus depth of beam, which in our problem is equal to 11 ft.

The bending moment due to the dead load is equal to $M = \dfrac{Wl}{8}$ in which $W$ = total load = 75 lb. $\times$ 11 ft. and $l$ = the span; $M = \dfrac{75 \times 11 \times 11}{8}$

= 1134 ft. lbs. or 13,610 in. lbs.

The bending moment due to the live load is equal to

$$M = \frac{Wl}{8} = \frac{200 \times 11 \times 11}{8}$$

$\times$ 12 = 36,300 in. lbs.

The total bending moment due to the dead and live loads will therefore be $M$ = 13,610 + 36,300 = 49,910 in. lbs. For a beam subjected to a given bending moment the required cross section is given by the following equation,

$$bd^2 = \frac{M}{K}$$

in which $M$ = total bending moment
$K$ = coefficient of strength

$$= \frac{49{,}910}{107.4} = 465.$$

That is to say, the beam must be such that if its breadth ($b$) is multiplied by the square of its depth ($d$) the product must be equal to or greater than 465.

As we assumed the beam to have an effective depth of 10 in. and a breadth of 6 in., substituting we have

$$bd^2 = 6 \times 10^2 = 600$$

Hence our assumed dimensions are too

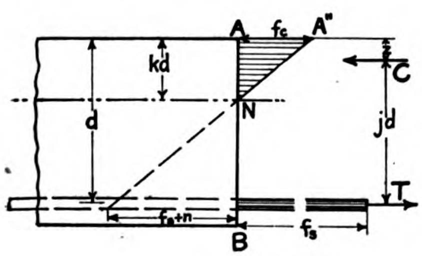



Fig. 2

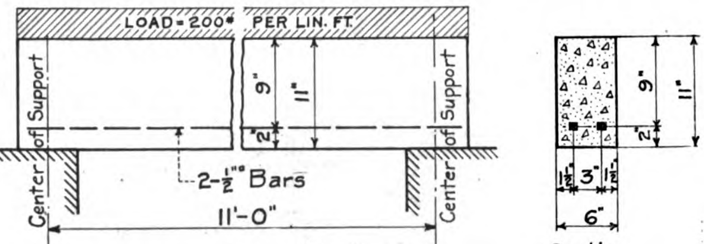



Fig. 4

large. By making the depth 1 in. less, $d = 9$ in. and $b = 6$ in. therefore $bd^2 = 6 \times 9^2 = 486$ which will serve the purpose.

The final dimensions are, therefore, effective depth = 9 in. total depth = 11 in. and width = 6 in. Should these final dimensions differ very much from the assumed dimensions the dead load bending moment should be re-calculated, using the new dimensions. In the present instance the decrease in weight would not

beam and will be equal to one-half of the total load (dead plus live load).

$$\therefore V = \frac{11\,(200 + 75)}{2} = 1512 \text{ lb.}$$

The maximum unit shear in the concrete is obtained from the following formula:

$$v = \frac{V}{bjd}$$

$$= \frac{1512}{6 \times .874 \times 9} = 32 \text{ lb. per sq. in.}$$

TABLE 2.—AREAS, PERIMETERS, AND WEIGHTS OF BARS

Areas in square inches, perimeters in inches, and weights in pounds per lin. ft.

| Size, Inches | Square ■ Bars | | | Round ● Bars | | | Size, Inches |
|---|---|---|---|---|---|---|---|
| | Area | Perim. | Weight | Area | Perim. | Weight | |
| ¼ | 0.062 | 1.000 | 0.213 | 0.049 | 0.785 | 0.167 | ¼ |
| 5/16 | 0.098 | 1.250 | 0.332 | 0.077 | 0.982 | 0.261 | 5/16 |
| ⅜ | 0.141 | 1.500 | 0.478 | 0.110 | 1.178 | 0.376 | ⅜ |
| 7/16 | 0.191 | 1.750 | 0.651 | 0.150 | 1.374 | 0.511 | 7/16 |
| ½ | 0.250 | 2.000 | 0.850 | 0.196 | 1.571 | 0.668 | ½ |
| 9/16 | 0.316 | 2.250 | 1.076 | 0.248 | 1.767 | 0.845 | 9/16 |
| ⅝ | 0.391 | 2.500 | 1.328 | 0.307 | 1.964 | 1.043 | ⅝ |
| 11/16 | 0.473 | 2.750 | 1.607 | 0.371 | 2.160 | 1.262 | 11/16 |
| ¾ | 0.562 | 3.000 | 1.913 | 0.442 | 2.356 | 1.502 | ¾ |
| 13/16 | 0.660 | 3.250 | 2.245 | 0.518 | 2.553 | 1.763 | 13/16 |
| ⅞ | 0.766 | 3.500 | 2.603 | 0.601 | 2.749 | 2.044 | ⅞ |
| 15/16 | 0.879 | 3.750 | 2.988 | 0.690 | 2.945 | 2.347 | 15/16 |
| 1 | 1.000 | 4.000 | 3.400 | 0.785 | 3.142 | 2.670 | 1 |
| 1⅛ | 1.266 | 4.500 | 4.304 | 0.994 | 3.534 | 3.380 | 1⅛ |
| 1¼ | 1.562 | 5.000 | 5.313 | 1.227 | 3.927 | 4.172 | 1¼ |
| 1⅜ | 1.891 | 5.500 | 6.428 | 1.485 | 4.320 | 5.049 | 1⅜ |
| 1½ | 2.250 | 6.000 | 7.650 | 1.767 | 4.712 | 6.008 | 1½ |
| 1⅝ | 2.641 | 6.500 | 8.978 | 2.074 | 5.105 | 7.051 | 1⅝ |
| 1¾ | 3.062 | 7.000 | 10.413 | 2.405 | 5.498 | 8.178 | 1¾ |
| 1⅞ | 3.516 | 7.500 | 11.953 | 2.761 | 5.890 | 9.388 | 1⅞ |
| 2 | 4.000 | 8.000 | 13.600 | 3.142 | 6.283 | 10.681 | 2 |

change the result materially so that it can be accepted as designed.

The *area of steel* required in the beam is obtained from the formula

$$A_s = \frac{M}{f_s jd}$$

in which $f_s = 16{,}000\ ^{\#}/_{\square''}$; $j = .874$

$$= \frac{49{,}910}{16{,}000 \times .874 \times 9} = .397 \text{ sq. in.}$$

2-½ in. sq. deformed bars would have an acre of 0.50 sq. in. and would suffice. Other bars could be used if desired; for example, two ½-in. round bars would have an area of 0.392 sq. in., which would be close enough to be accepted. For sizes, areas and perimeters of bars see Table 2.

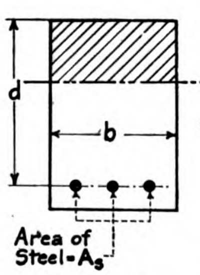



Fig. 3

The maximum shear ($V$) will be at the ends of the

As the allowable shear for concrete is 40 lb. per sq. in., no further provision need be made to take care of the shear. If the value of ($v$) had exceeded 40 lb per sq. in., either stirrups or bent bars would have had to be provided, as will be shown in a later article.

The maximum unit bond stress ($u$) between the steel and the concrete is obtained from the formula

$$u = \frac{V}{\Sigma_o jd}$$

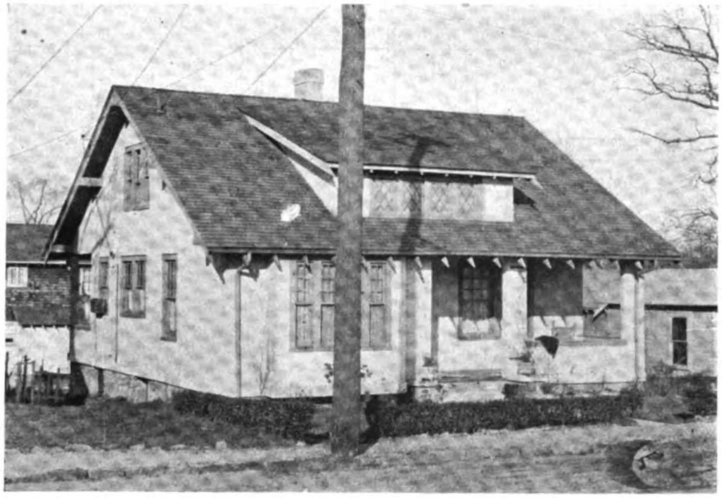
in which $V$ is the total shear and $\Sigma_o$ is the circumferences or perimeters of the bars. For 2-½ in. sq. bars

$$\Sigma_o = 2 \times 4 \times \tfrac{1}{2} \text{ in.} = 4 \text{ in.}$$

$$\therefore u = \frac{1512}{4 \times .874 \times 9} = 48 \text{ lb. per sq. in.}$$

As the allowable bond stress for plain bars is 80 lb. per sq. in., and for approved deformed bars it is 100 lb. per sq. in., the design is amply safe. If the value of ($u$) had been greater than that allowed, a larger number of smaller bars, having the same total area of steel, would have to be used to give a large value for $\Sigma_o$ and therefore reduce the value of $u$.

*(To be continued)*



# A Cozy Bungalow for the Small Family

## *Two Bedrooms Downstairs—Built-In China Closets*

STUCCO for the small home is one of the most attractive exterior wall coverings. There is a certain sense of permanence about it that commends the material to the average home builder. Especially attractive is the material when it is of an attractive tone just off the pure white, as in the case of the house illustrated.

This little dwelling has its main feature of interest in the first story in the disposition of the porch, the dining room extending out. The long windows on the dining room and living room side break up the wall surface effectively and help to add a sense of home comfort to the design. The use of exceptionally narrow windows in the two bays is well in keeping with the rest of the house, with which they scale in excellently.

The diamond panes in the dormer are a rather interesting feature and form a striking note in that part of the design.

The rafters are carried down in points projecting from under the roof proper.

One enters directly into the living room, which has a beamed ceiling and a large brick fireplace laid up in a rather unusual pattern. At the right are the stairs leading to the second story, these stories also being reached from a rear chamber.

At the left of the living room is the dining room, the two being semi-separated by a cased opening. The dining room also has a beamed ceiling. Between the dining room and kitchen are china closets opening into the two rooms, so that dishes can be placed therein without the necessity for walking around the partition. A dresser at the left of the china closets opens into the kitchen.

A large pantry adjoins the kitchen and opens on to the small porch.

A central hall opens on to the two bedrooms and bathroom. This hall space is very economical, waste room being kept at a minimum.

The second story contains two bedrooms and a store room which is unfinished, but which could be turned to good pose by the addition of a dormer at the rear.

This bungalow was built at Nepperhan Heights, Yonkers, N. Y., for Albert Wetherell.

The dining room is provided with ample china closets, which open directly into the kitchen

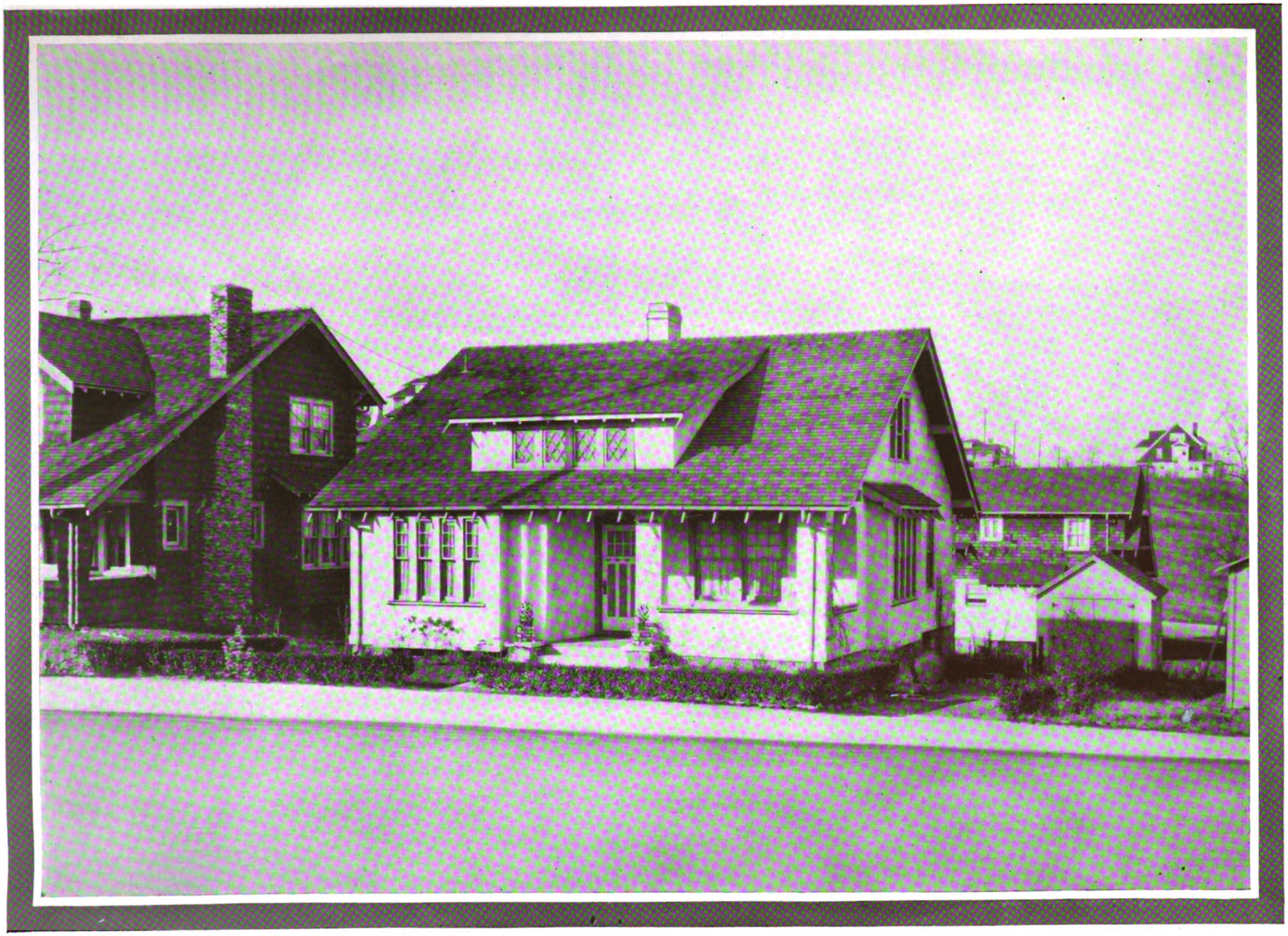
The living room fireplace is an odd design, most of the brick being laid as headers instead of stretchers, as is the more usual custom

## What I Have Learned About Financing Building Operations

(*Concluded from page* 255)

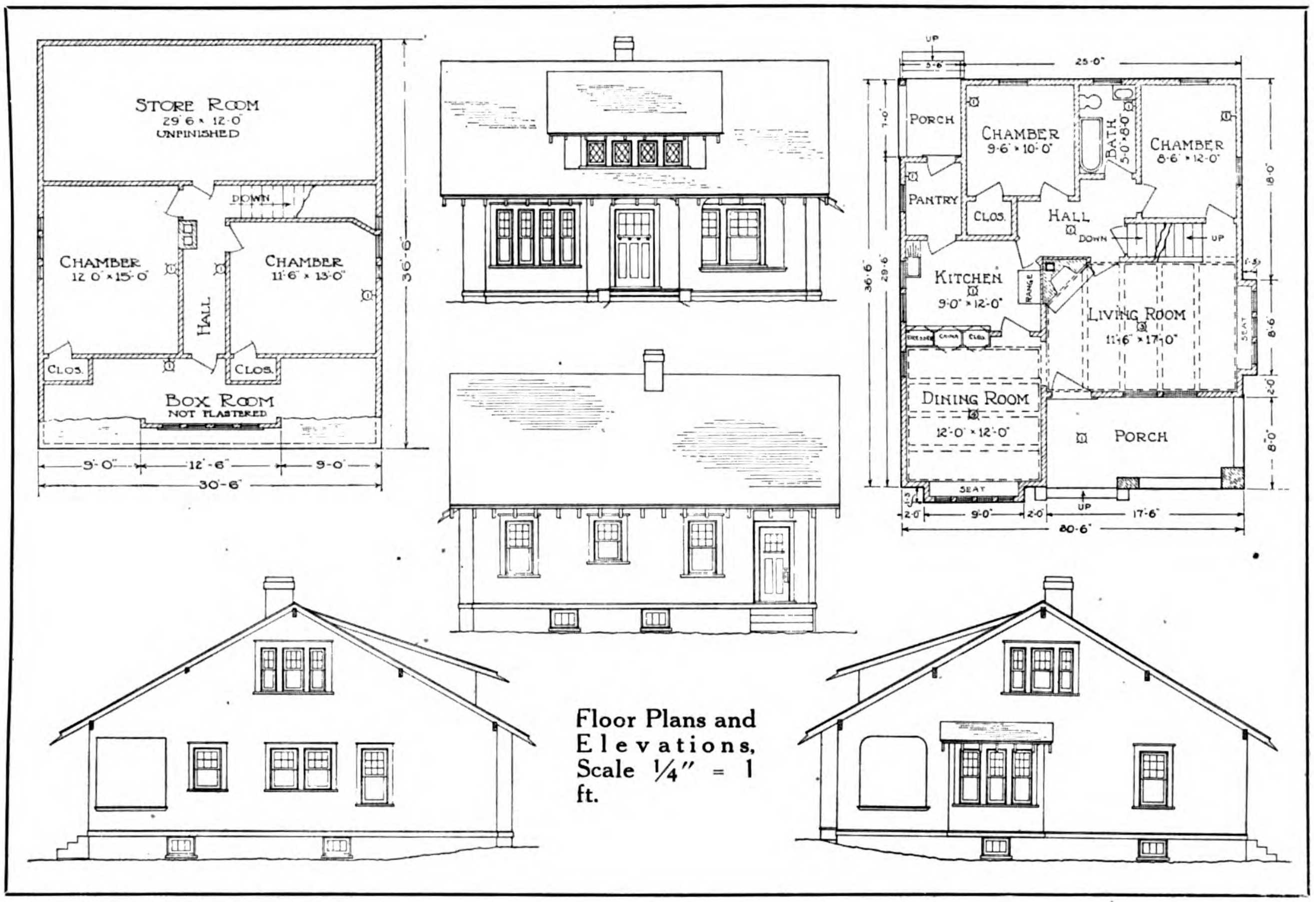
theatre totally equipped including staging, seating and equipment and other necessary fittings, to cost $55,000. They secured from an executor of an estate an agreement to loan them when their building was completed the sum of $25,000. The builder, whose contract to erect the building was $28,500, decided to take a second mortgage of $3,500. In order that the builder might have funds with which to pay his workmen as the building proceeded, on producing this agreement to a trust company the company after examination decided upon delivery of this agreement to loan the owners of the property sufficient means each month as the building progressed until same was finally completed. Then when the building was accepted, the estate paid the money and took the mortgage, the trust company being reimbursed for its outlay. This resulted in both these men, who conceived the proposition, becoming well to do and up-to-date men in the theatrical business.

This also brings to our attention the fact that before a builder proceeds to erect a building, or improve a parcel of land in and around a certain section, he should examine carefully and see if the conditions warrant the particular improvement of the building which he decides to erect. Oftentimes, builders make grave mistakes in rushing ahead and putting up buildings without looking into the conditions and ascertaining if the locality and people living therein warrant the improvements that are contemplated.

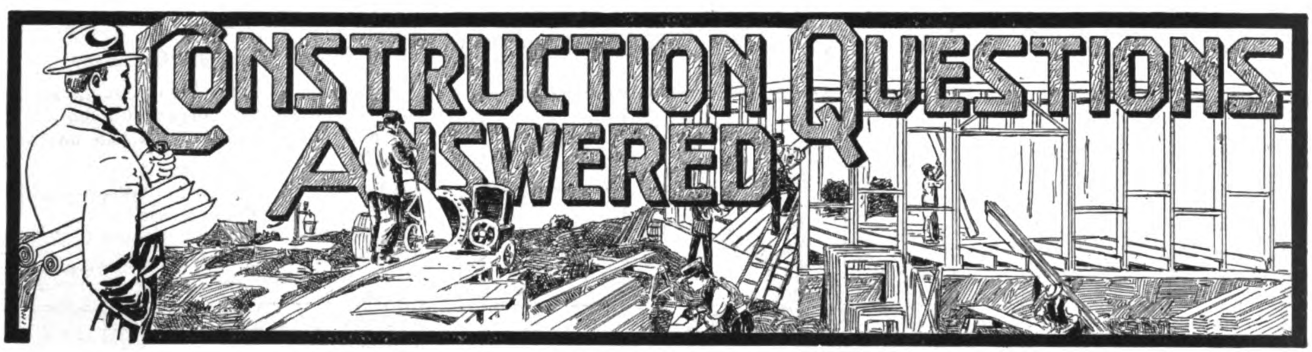




*Bungalow at Nepperhan Heights, New York*




Floor Plans and Elevations, Scale 1/4" = 1 ft.




## Failure of Rubble Masonry Arch

**From L. S. K., New York.**—Several years ago I was given the contract for the mason work on a pretty country residence. In looking over the plans I noticed that the corner marked "A" on the sketch was decidedly too light for the thrust of the two arches at B and C, and suggested that the corner "A" be buttressed, but was overruled by the owner.

For the past two or three years cracks have been developing as shown on the drawings. Each year these cracks get worse and this spring the arches cracked so far that the stone indicated in black dropped out. This stone is 14 in. long by 9 in. deep and 4 in. thick, with the 4 in. edge to the weather.

The owner claims that the arch is not properly bonded and failed for that reason. I on my part hold that the corner pier is not heavy enough to stand the thrust. This pier is considerably out of plumb now and has moved enough to show one-half inch clearance between itself and the porch flooring.

The owner wishes me to cut out the center of the arch and lay it up new again. This of course will only make matters worse.

Would it be asking too much of the BUILDING AGE if I ask them to publish the number of pounds required to overturn the pier "A," and also the number of pounds exerted against the pier by the combined thrust of the arches B and C. I would also be pleased to know the size of buttress required to secure the pier properly.

My idea would be to cut out the center of the arches, jack the pier back in place and then secure the corner with either one or two corner buttresses, and finally replace the keys.

**Answer**—The stability of a voussoir arch does not admit of exact mathematical solution. At best the theory is only an approximation. The current practice is to take some approved empirical formulas or practical rules based upon successful examples in practice, and proportion the details of the arch from them.

To determine the thickness of the crown or depth of keystone, Trautwine's formula can be used. Depth of key in

$$\text{feet} = \frac{\sqrt{\text{radius} + \text{half span}}}{4} + 0.2 \text{ feet}$$

For brickwork or rubble this depth should be increased about one-third. (Note that this formula does not take into consideration the amount of the load.)

According to this formula the depth of the keystone for the arches would be as follows:

$$\text{Arch B} = \left(\frac{\sqrt{8+4}}{4} + 0.2\right) \times 4/3 = 1.42 \text{ feet}$$

$$\text{Arch C} = \left(\frac{\sqrt{9+4.5}}{4} + 0.2\right) \times 4/3 = 1.49 \text{ feet}$$

The pier "A" is in reality an abutment pier and according to Trautwine's formula, the thickness of an abutment pier at the springing line should be equal to

$$\frac{\text{Rad. in feet}}{5} + \frac{\text{rise in feet}}{10} + 2 \text{ feet}$$

and for the arches in question the thickness should be

$$\text{Arch B} = \frac{8}{5} + \frac{.83}{10} + 2 = 3.68 \text{ feet}$$

$$\text{Arch C} = \frac{9}{5} + \frac{1}{10} + 2 = 3.90 \text{ feet}$$

The back or outside of pier "A" should batter at the rate of one twenty-fourth of the span to the rise, or in a height of 13 feet the batter should be

$$\text{Arch B} = \frac{1}{24} \times \frac{8}{.83} \times 13 = 5.22 \text{ feet}$$

$$\text{Arch C} = \frac{1}{24} \times \frac{9}{1} \times 13 = 4.87 \text{ feet}$$

According to these rules, using two side buttresses, the pier in the direction of the arch B should be 3'-8" wide at the springing line of the arch and 8'-10" wide at the base (top of concrete), and in the direction of the arch C the pier should be 3'-10" wide at the springing line and 8'-9" wide at the base.

The following attempt at a mathematical analysis can only be an approximation as the writer cannot tell from the drawing the loads coming upon the pier or upon the arches, with any degree of exactness.

The pier has 128 cubic feet of rubble masonry in it and there are 52 cubic feet of concrete in the footing so that the weight is equal to 27,000 pounds. To this should be added the vertical load coming upon the pier from the roof which the writer estimates at 4000 pounds. As the center of gravity of the pier is 1.70 feet from the outer edge of the footing the moment of the vertical forces which would resist any tendency of the pier to overturn would be equal to $(27{,}000 + 4000) \times 1.70 = 52{,}700$ foot lbs.

Assuming the horizontal thrust of the arch to be applied at a distance of two feet from the top of the pier or 18 feet above the bottom of the footing, the magnitude of this thrust required to overturn the pier would be equal to $52{,}700 \div 18 = 2930$ pounds This is the thrust from either arch which if exceeded would tend to overturn the pier.

The horizontal thrust of the arches can be obtained from the following formula:

$$\text{Horizontal thrust} = \frac{\text{load on arch} \times \text{span}}{8 \times \text{rise of arch in feet}}$$

Estimating the weight of the arches and the load on the arches we have for the case in hand

$$\text{Arch B} = \frac{6500 \times 8}{8 \times .83} = 7830 \text{ pounds}$$

$$\text{Arch C} = \frac{7300 \times 9}{8 \times 1} = 8210 \text{ pounds}$$

If we only took into account the weight of the arches and disregarded the load upon same we would have the horizontal thrusts as follows:

$$\text{Arch B} = \frac{4500 \times 8}{8 \times .83} = 5420 \text{ pounds}$$

$$\text{Arch C} = \frac{5060 \times 9}{8 \times 1} = 5690 \text{ pounds}$$

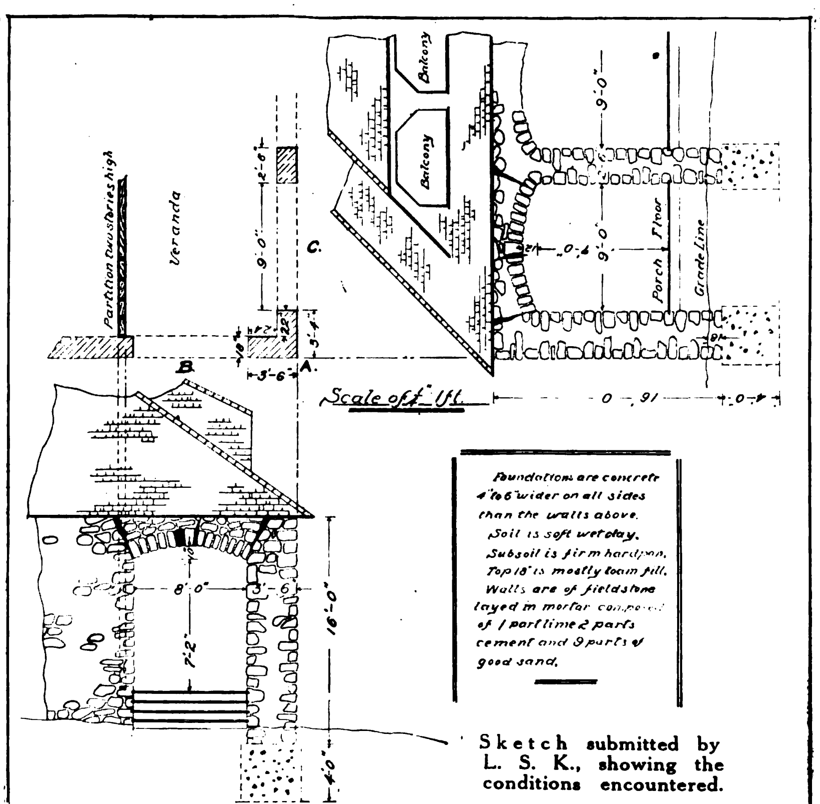
Which would indicate that the pier is insufficient.

The writer would suggest that a one-inch bar or preferable two three-quarter inch bars, with plates on the ends, be embedded in each of the arches to take the horizontal thrusts of the arches.

A corner buttress or two side buttresses may be used to prevent the overturning tendency of the pier from the thrust of the arch, but they would prove more expensive and may detract from, if not entirely spoil, the appearance of the building.

If the concrete footing under the corner pier is on hardpan there was little likelihood of settlement of the pier.

L. Goodman, C. E.

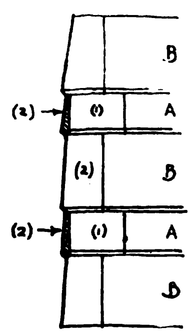



Sketch submitted by L. S. K., showing the conditions encountered.

## How to Shingle Corners

**From F. L., Tenn.**—Please let me know how to shingle the corner of a building which is covered with wide and narrow shingles.

**Answer.**—The proper way of shingling the corner of a building is shown in the accompanying sketch. To obtain a water-tight and weather-proof job, the shingles should never be mitred. There are two serious objections to this practice. In the first the changing weather conditions will eventually open up a mitred joint. In the second place, it is difficult and most impractical to miter a board that is ½ inch thick at the butt and tapers to a feather edge. The best way of finishing external angles is to allow the shingles to lap over each other alternately, as shown in Fig. 1. Thus in course A, shingle (1) is laid first and shingle (2) is butted up against it and nailed thereto. But care must be taken to shave off the edge of shingle (1) to correspond to the back of shingle (2). And similarly with the edge of shingle (2); the latter must be shaved off to conform to and be flush with the outer face of shingle (1).—A. B. G.



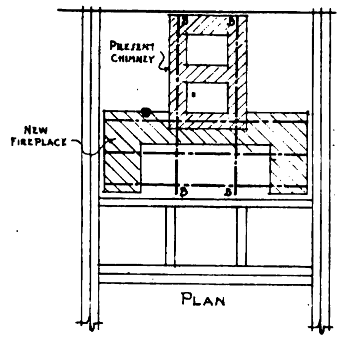



Fig. 1. Plan of fireplace built without trimmer arch.

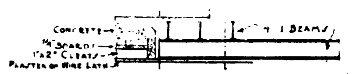


Fig. 2. Side elevation, showing how I-beams are used in place of a trimmer arch.

## Building Fireplace on Second Floor Without Trimmer Arch

**From W. D. G., Canada.**—I have been a constant reader of BUILDING AGE for some time and have studied some of the hard problems, but am up against one at present that I am not sure of the best way to solve.

I am building a fireplace upstairs on the narrow side of a chimney 16¾ x 25 in. and am using 2 x 7 floor joists and don't want the arch for hearth on fireplace to go below the ceiling.

**Answer.**—Cut out sufficient brickwork from the present chimney to allow for the insertion of two 4 in. I-beams, as shown at BB Fig. 1. These I-beams should be thoroughly and completely imbedded in cement and should be made long enough to extend from the exterior end of the old chimney to the outer face of the new fireplace. When thus built the brickwork of the chimney acts as an anchor to the cantilevered portion of the beams.

On top of beams BB place three 4-in. I-beams. See side elevation, Fig. 2. Fill in the spaces between the latter beams with brick and start the brickwork of the fireplace upon them. The fireplace should be carried up four feet above the finished floor and should be furred out for plaster above this point. Or, if there is a partition in back of the new fireplace, it may be finished as indicated in Fig. 2. In the latter case the projecting portion would become a shelf and could be treated accordingly.

The wood floor joists being 7 in. deep, the top of the upper row of steel beams would come 1 in. below the finished floor, provided there is a double floor. This 1-in. space could be filled in with cement which, when divided into 4-in. squares, would result in an attractive looking back hearth. However, if there is only a single floor, we would have to resort to another expedient, for the top of the I-beams would then be flush with the finished wood floor and there would be no room to lay our finishing material, unless the concrete hearth were built 1 in. above the finished floor, a not uncommon practice. However, if that is not desirable, the objection may be overcome by using two 6-in. channels, laid flatwise, instead of the three 4-in. I-beams. Concrete could then be poured into the receptacle formed by the web and flanges of the channels and the top could be finished with tile or cement, divided off into squares, as in the first instance.

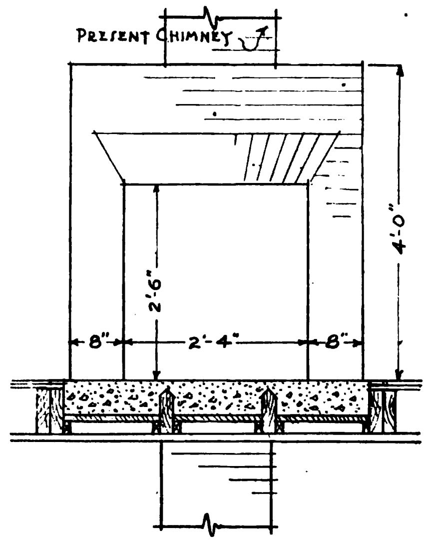



Fig. 3. Elevation of fireplace.

Now for the crux of your problem, namely, how to frame the area directly in front of the fireplace, the space ordinarily occupied by the trimmer arch. We suggest a construction similar to the one illustrated in Fig. 3 as a solution to your problem.

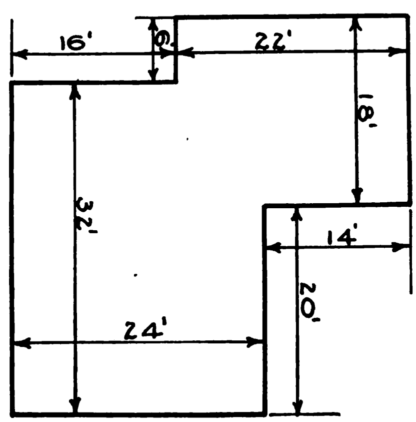
Frame the opening for the front hearth with 4 x 7 in. headers and trimmers, the same depth as the floor beams. In this space set two 2 x 7 in. beams, bevelled at the top and running at right angles to the headers. Nail 1 x 2 in. strips at the bottom of each of these beams, on both sides, to receive a flooring of ⅞-in. boards. Upon this flooring lay 5 in. of concrete and finish off with 1 in. cement, tile or brick.—A. B. G.

## An Awkward Problem in Roof Framing

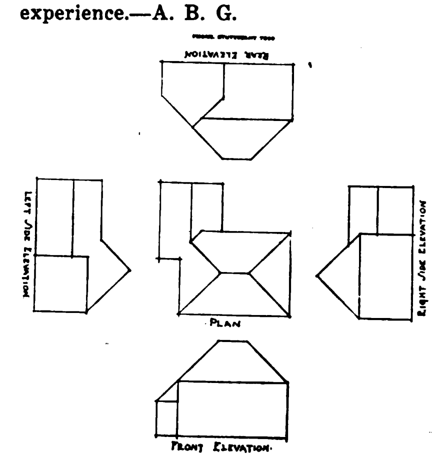
**From R. B. L., Canada.**—There was a fellow who suggested to me the plan of a house he thought of building. I will give you a rough sketch of the drawing. This is a two-story house. He wishes the right hand end (24 ft.) to have a cottage roof and either the 16-ft. span or the rear 18 ft. span to have a square gable with a window to light the attic. The cut of this roof is 9 in. rise to the 1 ft. run. Kindly send me a drawing on the roofing of it.

**Answer.**—Together with the plan of the roof, drawn to the dimensions indicated in your query, we have shown the elevations of all the four sides of the house. These drawings are self-explanatory and therefore need no further comment.

Of course, ours is not the only solution to your problem. And we dare say that some of our readers might suggest others equally good, if not better. We would certainly like to hear from some of them and receive the benefit of their experience.—A. B. G.




Outside wall plan of house, as submitted by R. B. L.




Suggested roof arrangement, which makes a good looking house.

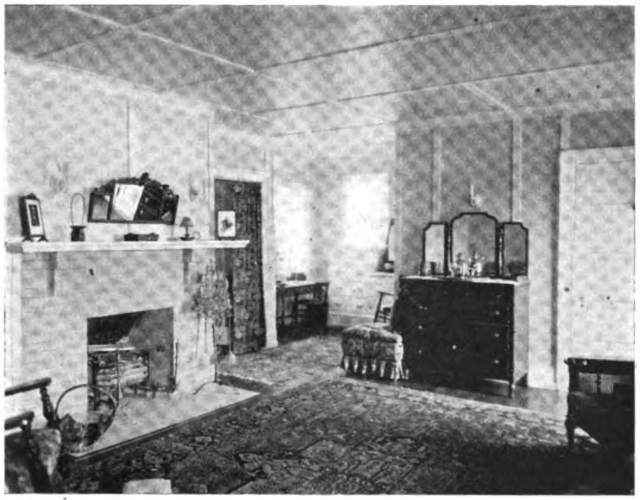
## How to Mix White Lead Paint

**From R. W., Canada**—Please tell me the ingredients of a good white lead paint, one that I can mix myself.

**Answer.**—The best kind of paint is made by mixing pure white lead, pure linseed oil and turpentine in proper proportions of ingredients necessary to make one gallon of paint being as follows:

Pure white lead, 14½ lb.; pure raw linseed oil, 4½ pints; pure turpentine, ⅛ pint; pure turpentine drier, ⅛ pint.

To mix the ingredients, "break up" or soften the white lead with just enough oil to bring it to a workable paste. A wooden paddle is used to stir it. If the paint is to be tinted, the next step is to add the colors, mixing them thoroughly.—W. G.



Harmony rather than contrast should be the aim in designing wallboarded rooms

# Effective Design

## *Faults to Guard Against—Beauty to*

By L. H.

WALLBOARD is a common material to most architects and builders nowadays. But, while its application advantages generally are well understood, its decorative possibilities often fail to be really appreciated.

Because a wallboard room must necessarily be a paneled design, a rather fixed impression has developed that it must be a study in sharp contrasts. This viewpoint on wallboard design and decoration probably also is due to the fact that wallboard became popular about the same time that the "mission" or craftsman type of interior decoration was in style.

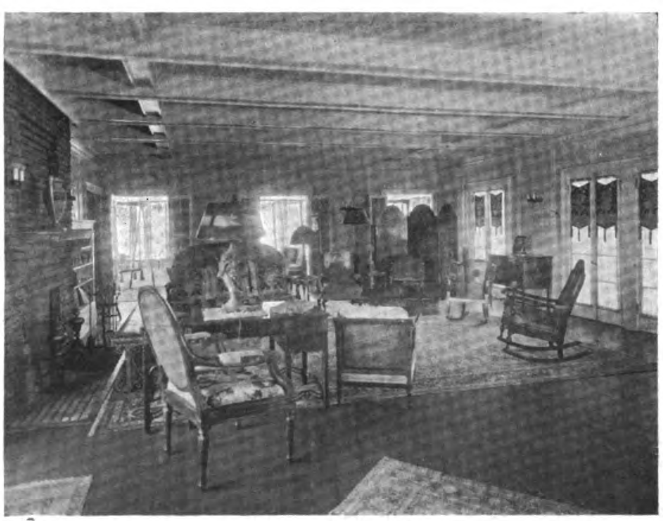
Almost all of the early wallboard work was designed in keeping with the craftsman idea. The trim was heavy, darkly stained and made a deep, bold contrast with the painted panels. This treatment was used so much that owners and builders alike misjudged wallboard as being suited to only such effects.

That this was a mistake is made plain by the wallboard interiors illustrated with this article. None of these rooms could be called examples of mission treatment. Paneling can suggest delicacy and harmony just as well as severity and ruggedness.

Present day decorative ideals lean toward quiet effects. There may be a more or less pronounced contrast between wall and ceiling. But sharp contrasts on either the side walls or on the ceiling are not considered desirable nor up-to-date.

There always have been two fundamental principles of color treatment, whether in room decoration, house painting, or high art. One is based on complimentary colors and the other upon harmonious values. The craftsman period was an example of the complimentary treatment. Red and green is one of the strongest examples of complimentary combinations while a light and dark tone of green make a harmonious treatment.

The result of placing complimentary colors together is to emphasize the strength of each color. When harmonious colors are combined, however, the strength of each tone is diminished. The result is that with the complimentary colors the eye is arrested by a series of sharp contrasts. On the other hand, in the case of harmonious treatments, the eye receives a general impression in which the color values are blended.



Large as well as small rooms are adapted to wallboard when skillfully handled

The complimentary treatment is likely to be favored where a strong attention getting effect is desired, as on a billboard or car sign. But when a combination is to be used over a long period, like a room, a suite of furniture, or an oil painting, the harmonious combinations are more likely to prevail. We can all remember the popularity of the "mission" days and recall how quickly this treatment became tiresome. The softer, harmonious styles of to-day are much more likely to retain popular favor and they will never become so pronouncedly out of date as was the mission period, once its popularity was ended.

Wallboard designing can be kept in keeping with these present-day standards just as readily as it fell in with the contrasty effects that were prevalent five to ten years ago. It merely means a little careful planning in arranging the panels and deciding upon the color treatment.

The first error commonly made in wallboard designing is to feel that the decorative trim must necessarily be stained or painted in a different color from that used on the panels. Paneling does not always appeal to the prospective user of wallboard; giving the trim a separate color of course makes the paneling all the more prominent. Yet paneling can be made hardly noticeable, and certainly not objectionable, by the simple plan of painting the trim and the board in the same color.

Effective paneling of a dining room

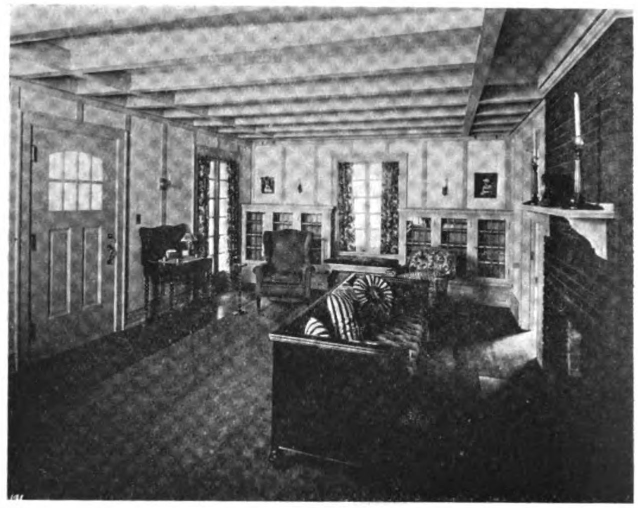
One always pleasing effect, which makes the paneling as inconspicuous as could be desired, is to paint both the panels and trim of the ceiling and frieze in some light tone, such as a soft ivory. Then the side panels and trim are given an all-over coat of a harmonizing brown. The room thereby has only a two-tone effect which is soft and restful to the eye and makes an acceptable background for the finest room furnishings. A tasteful effect is gained that in no way suggests the glaring combinations of the past. This result can be had with no more effort or expense than if one of the contrasty treatments were used. In fact it is often easier and less expensive to work out such harmonious designs.

To secure paneling that is attractive without being obtrusive, it is by no means absolutely necessary to give both the board and trim the same color coat.

# with Wallboard

## Panel Effects That Add the Home

HARVEY



Wallboard can be effectively used with a beam ceiling

A ceiling, for example, can have panels of light cream and trim of old ivory without becoming unduly prominent. The side walls can be given the lighter tone of a color while the trim is stained in a darker shade of the same color. The really important part is to work for a harmonious treatment and to avoid contrasty effects.

There is another reason why it is to the interest of the carpenter to be familiar with the possibilities for harmonious design in wallboard work. Wallboard is suited for every room in

An example of how "not to do it." Strong contrasts should generally be avoided

the house. Yet many people have felt that while it was a good material for the dining room, for instance, where paneling and beaming always are appropriate, it did not appeal to them for use in the bedroom or other rooms where a more subdued effect would appear to be in better taste.

This is an objection that can readily be removed if one is prepared to demonstrate the tasteful result that can be had by treating the panels and trim either in a monotone or two tones, light and dark, of the same color which will give a good effect. Simplicity is always desirable in good design.

It will be noticed that these harmonious results can be obtained without resorting to any expensive additional decoration such as mottling, tiffany toning, or stenciling. Where an especially ornate effect is sought, mottling and blending can always be employed to advantage. Delicate mottling and a modest stencil can be used with any of the harmonious treatments. But one of the chief points which this article is intended to bring out is that such additional treatments are not needed to carry through a color scheme that will be in perfect keeping with modern standards for interior decoration.

# Using Proportion as a Short Cut in Estimating

By D. W. DALEY

WHILE working as an estimator for one of the large contracting companies I developed a system of using simple proportion to find exact quantities of material in a proposed building. I am the only one I know of using this method and I have never seen it in print. When two quantities are known the third is easy to find. As an illustration, take the brick work of two buildings, one located in New York City and the other located in Pittsburgh, Pa.

The number of brick in a piece of work is usually controlled by the length and thickness of the brick and those dimensions vary with the different manufacturers and the amount of shrinkage in the clay from which the bricks are made.

The standard size of common brick in the New York Market is about 2¼ x 7¾ in., which is equal to 17.4375 square inches face measure. Some of the brick made in Pittsburgh are as large as 2½ x 9 in.=22.5 square inches face measure.

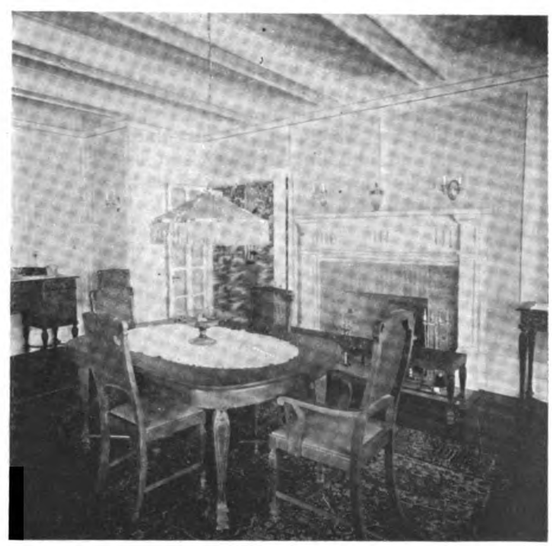
To illustrate, we will say the contractor is familiar with figuring on work in New York City and is called upon for figures on a Pittsburgh building. To arrive at the quantities all he has to do is to take the plans of the building and figure the actual number of brick required to build the building in New York City where the standard common brick will measure about 2¼ x 7¾=17.4375 square inches on face, and use this as one of the mean quantities in the proportion. The actual number of brick required to build the building in New York City is the other mean quantity and the face measure of the Pittsburgh brick to be used is the first quantity in the extremes of the proportion. The problem is simply this: Say it would require 800,000 New York brick, how many Pittsburgh brick will it require?

Proceed as follows: 22.5 sq. in. : o 17,4375 sq. in = 800,000 brick : the amount of brick required. In this case we find it to be 620,000.

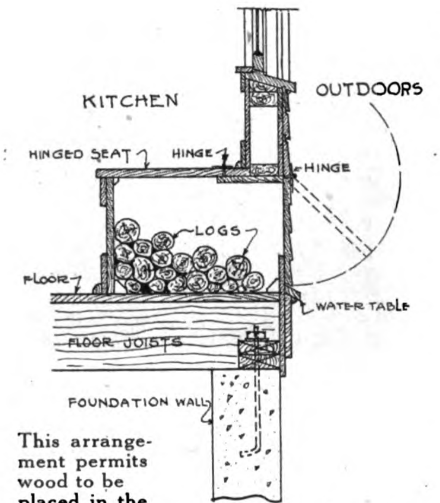
Multiply Number 1 and 4 of the proportion together; multiply 2 and 3 together. Since 22.5 × amount of brick required = 17.4375 × 800,000, we divide the latter multiplication by 22.5, which gives the number of brick required in Philadelphia.

To find the quantities of materials in the mortar, use the lengths of the two ends and the lengths of the two beds thus: New York brick 7¾ + 7¾ + 2¼ + 2¼ = 20 lineal inches; Pittsburgh brick 9 + 9 + 2½ + 2½ = 23 lineal inches. The problem is 23 : 20 :: number of barrels of lime in New York building : the number of barrels of lime required for the Pittsburgh building. The cement and sand is worked the same way.

I use simple proportion to find the quantities of cement, sand and gravel in concrete. The only data that is re-



Unobtrusive paneling like this is often most desirable quired is to know the actual quantities of cement, sand and gravel that were used as a unit of measure of the required mix in a piece of work that has been built. I also use a simple proportion to




**This arrangement permits wood to be placed in the box directly from outdoors, thus saving useless steps.**

determine the quantity of lath, nails, lime, sand and plaster of Paris in a piece of plastering. I find that where slate or tile is used for roofing purposes, simple proportion gives almost exact quantities as it takes care of the breakage and also takes care of the give and take which all roofers use in laying out their work to come to certain lines by either making the lap a little more or less than the standard, which is 3 in.

## Using a Kitchen Window Seat As a Wood Box

By A. J. SIMBERG

This form of construction illustrated above can be used to advantage rendering it unnecessary to come into the house with the wood, mussing up the kitchen floor with muddy feet and having to open the house door on cold, stormy days.

This construction can also be used in a room with a fireplace and a window seat, or a seat at an outside wall can be utilized as a wood box for fireplace logs. The outside hinged cover can be made to look like the siding or outside finish so as not to mar the exterior.

## Concrete Homes as Built in the Philippines

By L. M. EDHOLM

CONCRETE homes of unusual construction are being built by the Filipinos to replace their huts of nipa, which were very unsanitary. The Philippine Health Service has been trying to solve the problem of sanitary living conditions for the natives. It was necessary to have something cheap and simple as well as something that the people were acquainted with and could construct themselves. Their own primitive huts with a thatch of nipa were not durable, for almost as soon as completed they began to deteriorate and would have to be rebuilt within a very short time. Often a whole village would be completely demolished by fire, for these houses burned like a piece of paper. The thatch of the roof afforded a good shelter and breeding place for vermin.

It was to do away with all these unsatisfactory conditions and yet give the Islander a home that would please him, that the Health Board under the direction of Mr. J. D. Long began experiments with concrete. The result has been very satisfactory. A combination of timbers and thin slabs of concrete form the structure, while shingles of concrete replace the thatch. The design of the dwelling is not unlike the native hut, although it is neater and more practical. One good feature of the building is that it is permanent, while the nipa huts have to be repaired after every wind storm. The window panes are made from a shell which is almost transparent.

The concrete is composed of one part rice husks, while the other parts are sand and cement. The reinforcement of the concrete slabs is a loosely woven net of bamboo strands and is employed in the same manner as the wire mesh with which we are familiar. The model house constructed by the Health Board was exhibited at fairs and other public gatherings and the native at once took an interest in it. Books, giving minute details of the course of construction, the preparation of the bricks, etc., were distributed. The cement shingles and slabs are easily made by the Filipino. And also, a few of these slabs can be built at a time, after the day's work, as it is better to have the slabs stand over and become thoroughly cured. In this way the poor man can gather his home building material little by little when he has a few dollars to spare. The plumbing is modern and of an inexpensive system.

# How to Build and Fireproof with Hollow Tile---XVI

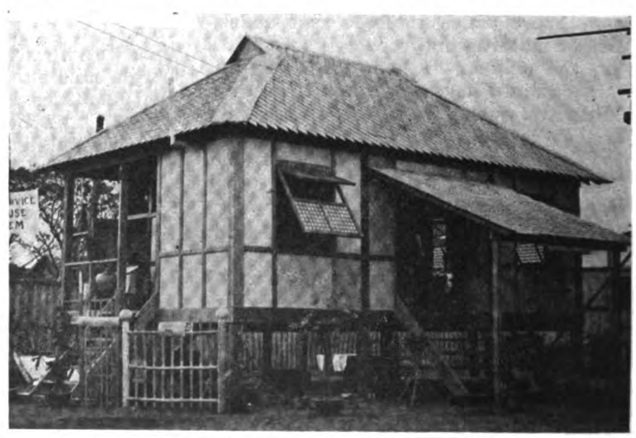
## *Beam Filling and Floor Finish That Is Fireproof*

By J. J. COSGROVE

BEAM filling, or the filling of the space on top of flat or segmental arches to the level of the top flange of the I beams, can be considered both from a fireproofing and from a structural standpoint, for it serves in both capacities. If, for instance, the space between beams was not filled, it would leave a fire passage through which flames could pass from one part of the floor to another. That is considering the matter from a fireproofing standpoint.

A noted authority on fireproofing said recently: "In a fireproof building under no circumstances should the space between the top of flat arches and the floor above, or the haunches of segmental arches, be left open to the free circulation of fire. This space should be filled with cement concrete. For short-span arches, cinder concrete will be found perfectly satisfactory, as it is fireproof, light, and rust-proof when properly mixed and poured. For long-span arches, on the other hand, it is better to use a good stone aggregate in the concrete as this will add to the strength of the arch."

It being accepted as good practice to beam fill all hollow-tile floors, the next question that arises is, what shall the space be filled with? Shall it be a heavy inert mass like brick dust and bats which add weight but not strength? Shall it be mineral wool which likewise adds weight but not strength? Shall it be stone concrete which adds strength as well as weight? Shall it be cinder concrete which adds some strength and some weight? Shall it be raised block



**Type of concrete house developed in the Philippines.**

hollow tile, or shall it be something else, and why?

This installment will try to throw some light on these several questions, and show why and under what conditions different methods should be used. It might be well to premise by stating that a better grade of concrete fill is used with a long-span arch than with a short-span arch, thereby adding to the strength of the arch as well as preventing the spread of fire.

Concrete is the material commonly used for beam-filling purposes. Blast furnace slag makes a very good aggregate for concrete for fireproofing as it possesses considerable strength and high fire resisting qualities. It may well be used where slag is plentiful and a little strength is wanted added to the arches.

Cinder concrete is the material most commonly used for beam filling. On account of its porous nature and the high resistance of the cinders to destruction from heat, it is perhaps the best of all concretes for strictly fireproofing purposes, where structural strength need not be considered. Cinder concrete possesses comparatively little strength and cannot be depended upon to give structural strength as well as fire protection.

When carefully selected, furnace cinders which are free from particles of unburnt coal and crushed to a suitable size are used in proper proportion with the sand and cement, they form the best of fireproofing concrete for beam filling above the hollow-tile arches, brick arches, or arches of any other kind which possess in themselves the necessary strength. The cinder concrete filling is light and fireproof, but adds but very little to the weight carrying capacity of the floor, and must be properly mixed and placed or it becomes an element of danger rather than of strength, sometimes corroding the beams and tie rods to a dangerous extent. For this reason the builder must exercise great care when using cinder concrete for a beam filler, and the architect or inspector must see to it when cinder concrete is used in any place for fireproofing, such as around columns, beams or girders, where the concrete will be in contact with the structural metal, that a mixture rich enough in cement is used to completely coat the cinders; that the concrete is sufficiently wet, and that when placed it is well tamped so that it will be dense and the cement completely coat the structural parts that are to be protected.

Opinions differ as to the cause of corrosion of iron and steel from cinder concrete. Some chemists believe it is the sulphur in different forms or combinations found in the cinders. Other chemists claim that the alkaline condition of Portland cement would completely neutralize the sulphur in cinders, especially as the cinders commonly used, which are soft coal cinders from steam boilers, contain only a small amount of sulphur. They claim it is an oxide of iron in the steam cinders which when not coated with cement causes the rusting of any iron or steel with which it is brought in contact.

But the practical builder is not so much interested in the academic opinions of chemists as he is in a good practical way to prevent the damage. This fortunately is a very simple matter, for all authorities are agreed that corrosion is brought about either by voids in the concrete when placed, or insufficient cement used to coat all the particles of cinder and fill the voids, or an aggregate so dry it cannot mix well.

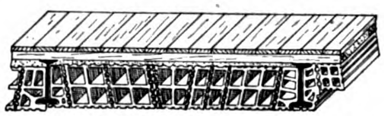


Fig. 132. Type of flat arch. The construction at the right is often used for roofs or where a paneled ceiling is desired

The remedy for this is easily figured out. All that is necessary is to make a mixture rich in cement, either 1-1-3 or one in which the proportion of cement is even larger; use enough water to make it a wet mixture instead of a dry one, then tamp to make sure all the voids are filled. If these measures are faithfully carried out, cinder concrete in practice will be found fully as safe as stone or gravel concrete so far as corrosion is concerned.

A cubic foot of hollow tile weighs 40 pounds while the same amount of the lightest cinder concrete suitable for arches weighs about 100 pounds. This fact has led to the development of an arch tile for segmental arches, particularly long-span arches, which combines the functions of structural material and beam filler. Such an arch is shown in Fig. 131. It will be observed that the tile blocks are graduated in size from very deep blocks next to the skewbacks down to six-inch blocks at the crown. The skewbacks are made only high enough to cover the area of pressure, and the space above is filled with concrete. It is plain to be seen that this form of construction not only reduces the cost, as the only concrete required is enough to level up the arch to the top of the floor beams, but it also reduces considerably the weight of the arches.

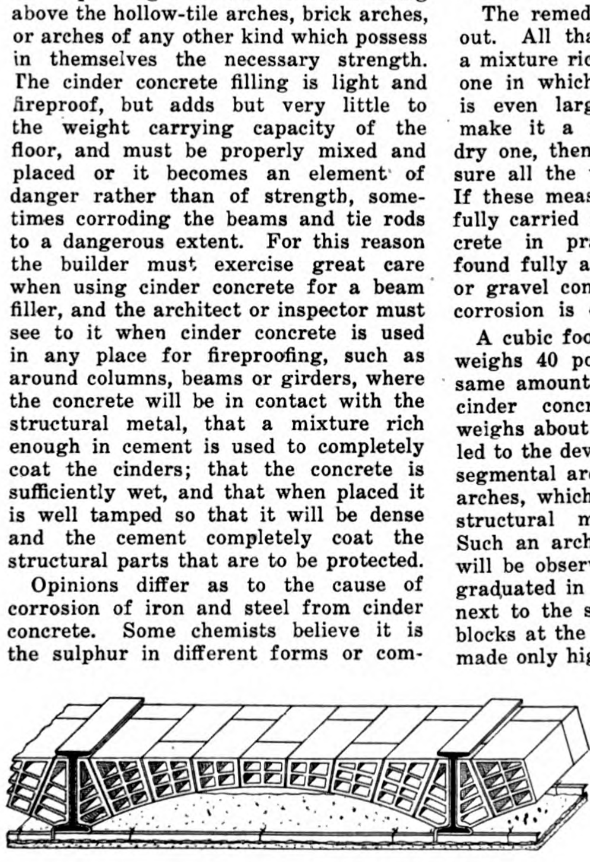


Fig. 131. Type of segmental arch. This tile acts in the twofold capacity of beam filler and structural material

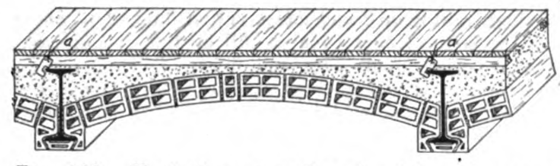


Fig. 133. Typical segmental arch with cinder concrete fill and wood sleepers for nailing floor to

The raised skewback shown in section in Fig. 132 is used likewise to cut down the amount of concrete required. When flat arches are sprung between deep beams, from eighteen inches upward in depth, it is necessary to use raised skewbacks or else have a large space above the arch, particularly at the haunches of segmental arches, which must be filled with concrete or other expensive fireproofing material. The only objection to raised arches is that they do not present a plain under surface. Where a paneled ceiling effect can be permitted, however, the raised skewback will be found cheaper than concrete filling. There is no great objection to a paneled ceiling in many kinds of buildings other than that it is not so effective as a flat ceiling in the distribution of light.

The practical builder will do well to note that the raised skewbacks are used extensively for roof construction because it is not necessary to make roof arches as deep as the beams, and by using raised skewbacks the tops of the arches can be kept level with the tops of the beams, so as to form a plain roof surface.

A typical section of a standard segmental arch with cinder concrete fill and wood floor on wooden sleepers in place is shown in Fig. 143. It will be noticed that the fill is much deeper near the beams than at the center, due to the crown of the arch, so that more beam filling material will have to be figured on for segmental arches than if flat arches were used. The 2 x 2 in. beveled or dovetailed sleepers to which the floor is nailed, are embedded in the concret and are run at right angles to the beams. This manner of running them of course helps distribute the load the floor carries to the beams, instead of having it come on the arches as it would if the sleepers were run in the opposite direction.

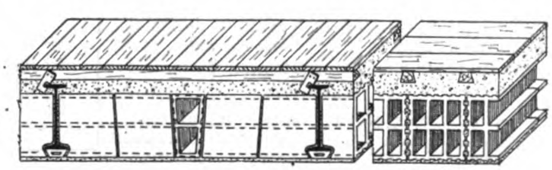


Fig. 134. Typical end construction flat arch

The manner in which the sleepers are attached to the beams is also shown. Sheet metal clips *a a* are notched to fit over the top flange of the beam and are nailed to the sides of the sleepers. The sleepers are then wedged up at the beams, a straightedge being used to get the floor level and true.

In Fig. 134 is shown a typical section

through a standard end construction flat arch with the cinder concrete fill on top, and the wooden sleepers and floor. To the right is shown a cross section illustrating how the wooden floor sleepers are beveled to dovetail into the concrete.

Instead of the wood floor shown in the preceding illustrations over floor arches of hollow tile, it is sometimes advisble to use concrete for the finish, and top off with a layer of cement and sand. Two inches of concrete is what is generally put above the level of the I beams in that case; doing so adds greatly to the carrying capacity of the arches. If still greater strength is desired, the concrete can be reinforcd; and so it goes on without limit. There are so many ways hollow tile can be used advantageously in combination with concrete that it would be easier to tell how they cannot be used rather than how they can and may.

*(To be continued)*

# Simple Cost Forms That Help Your Business Pay

## *Banks Favor the Man Who Knows His Costs—An Easy System That Can Be Used By Even the Smallest Contractor*

By G. E. HOLLOWAY

**The most important thing in the contracting business is cost keeping. Unless a business is run with a thorough knowledge of actual costs, it is very likely to be a failure. In fact, most of the business failures of to-day are directly traceable to a lack of accurate knowledge of costs.**

**Knowledge of costs will enable a builder to check his estimates and so make ever fewer mistakes. It will enable him to operate on an ever lower cost basis, as waste will tend to be eliminated. A good cost keeping system will strengthen a builder's financial standing and so make him a man favored by his bank.**

WHAT sort of mental picture comes to your mind when the subject of cost systems is approached? To many comes a vision of a receiving clerk, stockkeeper and other factory men protesting against the red tape; a large office with long rows of desks and men and women working calculating machines of all description. In other words, what they see is a cost department of a large manufacturing concern.

It is the critical description of this department by those who are more familiar with some of the primary details than their resulting value that has given some the belief that cost systems are too expensive and of insufficient value to justify their being maintained by small or moderate size businesses.

As a matter of fact some sort of cost system is employed by every individual as well as by every business enterprise; it may be cost finding, cost keeping, or cost accounting. When a man has only two or three debts owing to him he can generally feel safe in relying on his memory for the amounts and the due dates, but when the number increases to 20 or 30, all different in amount, it is necessary to make a record of them so that none will be overlooked or confused. Likewise a man may tell you accurately what his living costs are for each month although he keeps his cost data mentally. This is possible because only a few items enter into the final result. He may also employ this method of cost keeping in his business if he has only a very few simple transactions or operations. However, if his operations and transactions become at all frequent he will find it necessary to keep a regular and systematic record of all elements of expense entering into the cost of his operations, if he wishes to know the true costs, avoiding oversight and miscalculation. The cost system is nothing more or nothing less.

To no other person is a knowledge of costs of more vital importance than to the contractor. It is upon this knowledge that all estimates and quotations are made and submitted and the success of the contractor is largely dependent upon the degree of exactness attained. The mere fact that a contractor can show a net profit for each year is not always evidence that he has an accurate and dependable knowledge of his costs. Many instances have been found wherein a contractor has made a splendid margin on certains jobs but has had the profit, already earned, reduced by other jobs handled at a loss. With a permanent, complete and accurate record of the material, labor and overhead costs of each job completed or under construction, there would have been little need for this sacrifice of profits.

A no less important advantage of the cost system is the convenience of knowing the exact status of the entire business as well as of each individual job at any time. For example, a contractor who has his entire assets invested in several uncompleted contracts may find himself in need of a loan to finance a newly acquired contract or complete those in progress. In such cases a comprehensive statement will do much to instill the confidence of the bank in its customer who knows his exact position at all times, as his liability of failure is relatively small, when compared with one who does not know his exact condition.

A statement similar to the following accompanying the regular financial statement cannot fail to make a favorable impression on the loan officer in the bank.

The information contained in the foregoing statement will be almost immediately available at any moment by the use of a few simple forms and using the same subdivisions, or units of cost, in both the estimate and cost records.

The forms for contractors shown herewith are general in character and not intended as exact models for a particular class of work, but are used more for the purpose of charting a procedure in cost determination.

Form No. 1. This form is first used as an estimate sheet. When the contract is secured, another sheet is placed in the "Work-in-progress" ledger to which the actual costs are posted as they occur. The form is ruled on both sides, the descriptive data being omitted on the reverse side; the summary, which is here shown on the face of the form, is usually placed on the reverse side, leaving this column free for miscellaneous direct charges. When the job is large and takes in several classes of work, a closer analysis can be had by placing each class of work on separate sheets, *i.e.*, the excavating, the masonry, the carpentry, the plumbing, the painting, etc. A summary of the several sheets can then be made on a final sheet. This will not only permit the discovery of an error in the estimate of a certain branch of the work, but will show whether the inaccuracy was in the material, labor, miscellaneous, or overhead.

STATEMENT OF WORK UNDER CONSTRUCTION

*Estimated Cost and Profit for Work in Progress to Present Point of Completion*

| | Job. No.1 | | Job No. 2 | | Total |
|---|---|---|---|---|---|
| Material | | $4,562.50 | | $3,618.21 | |
| Labor | | 3,008.10 | | 2,064.14 | |
| Overhead | | 690.80 | | 501.06 | |
| Profit | | 1,652.28 | | 1,236.68 | |
| | | $9,913.68 | | $7,420.09 | $17,333.77 |
| Portion of quoted price applicable to work completed: | | | | | |
| ACTUAL COST | | | | | |
| Material | $4,412.23 | | $3,700.76 | | |
| Labor | 3,119.52 | | 1,984.19 | | |
| Overhead | 695.04 | 8,226.79 | 490.08 | 6,175.03 | 14,401.82 |
| Net profit earned to date | | $1,686.89 | | $1,245.06 | $2,931.95 |

Any material left over can be deducted and charged back to the materials account, the same as material purchased.

The total of the work-in-progress ledger, or work-in-progress account, is a current asset and as each job is completed, it is charged to the customer's account for the contract price; the work-in-progress account is credited for the actual cost and the difference, if a gain, is credited to "Net Profit on Contracts" account, and if a loss, is charged to "Loss on Contracts" account.

The entries for form No. 1 are secured from forms No. 2 and forms No. 3 as indicated and miscellaneous charges and overhead from the cashbook and journal. The total overhead, or expense not wholly chargeable to a single job, should be distributed among all the jobs, or at least those benefiting, on some equitable basis, such as proportionate labor hours, or cost, obtainable from the payroll.

Form No. 2 is made out for all material received on a job; it is posted directly to forms No. 1 and to form No. 4 and when from stock to form No. 6.

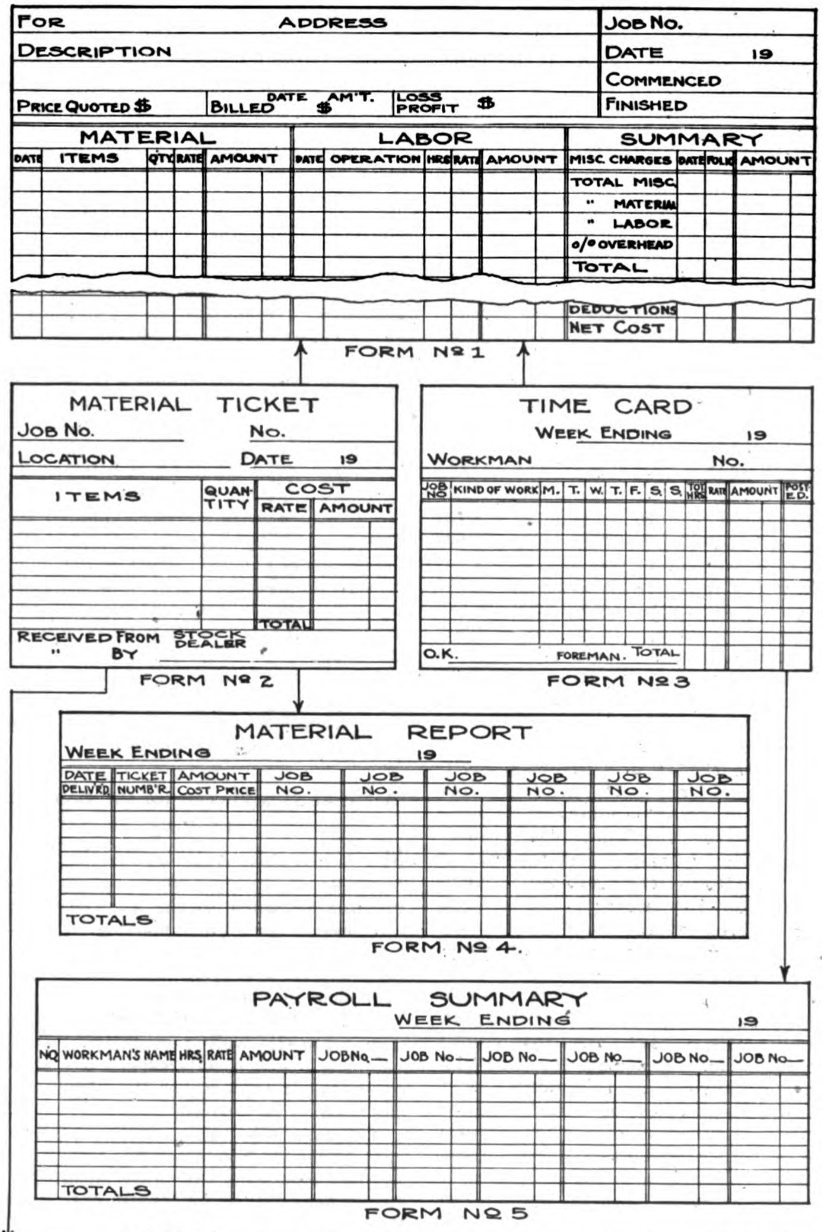
Form No. 3 is made out for each workmen employed and is posted to forms No. 1 and No. 5. On this form a separate line should be used for each class of work done on each job. All non-productive hours should be shown, indicating the job and subdivision to which they are chargeable. When a job is large enough to warrant subdivisions they can be carried on this form without confusion.

Form No. 4 is a condensed record of all material used. The total amount is posted to the credit of "materials" account. The debit is composed of the separate items already posted from forms No. 2 to forms No. 1. The various amounts should be extended into the "Job No." column to which they apply; the total of these columns will prove each of the material columns contained in forms No. 1.

Form No. 5 is the weekly payroll, showing the hours, rate and amount for each man; the portions of each man's pay applying to the different jobs are extended to the proper "Job No." column. All the information required for this form is summarized on forms No. 3. When payment is made the total amount of form No. 5 is credited to cash in the regular way and a check mark placed in the posting column as the debit consists of the separate items already posted from forms No. 3 to forms No. 1. The totals of the "Job No." columns will verify the footings of each "Labor" column contained in forms No. 1.

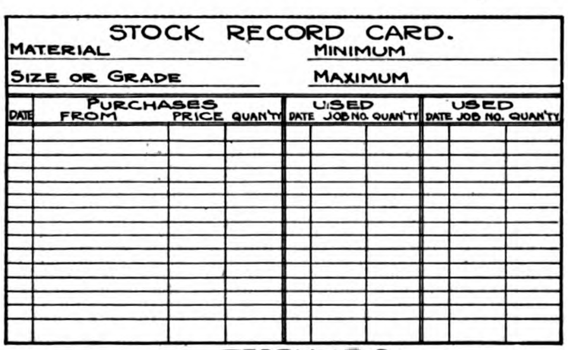
Form No. 6. On this form is kept a record of each class of material purchased for stock and all withdrawals made from it; the difference between the quantity purchased and the quantity used should represent the amount on hand for each class. A total of all these is represented by the "Materials" account. An inventory from time to time of any one material will reveal any mishandling of the supplies and a discrepancy can be adjusted in the materials account. The material used is taken from form No. 2

When a contractor's jobs consist principally of one class of work, in which only a few distinct operations are performed and only a few kinds of material used, such as sidewalk laying or painting, the postings from forms No. 2 and forms No. 3 to forms No. 1 can be dispensed with and the totals of the "Job No." columns in forms No. 4 and No. 5 posted to forms No. 1 instead.




Forms similar to those explained are carried in stock by some of the larger manufacturers of loose-leaf forms. When stock forms are adaptable to a business they are cheaper than the made-to-order forms. However, when a better analysis can be had or a short cut effected by the use of a special form, it should be secured by all means. The first requisite in designing the system is to determine just what information is desired to be obtained from it and then proceed to arrange the forms to gather and accommodate this information with as little labor as possible.

The average cost system is usually handled with less effort than the preparing of estimates would require without it.



# THE EDITOR'S PAGE

## With Peace, What Is the Price Tendency?

With the signing of the peace treaty, the world again is to open to trade. And what of us?

The United States to-day is a favored nation. The prosperity of the coming years will not be small, even when measured by the turbulent activity of the war period.

We are a creditor nation. Our loans to Europe have been vast. American securities in foreign lands have in a large measure been redeemed. Instead of our seeking capital abroad, Europe must rather continue to seek it here.

It is not we, but our allies who have suffered the devastation of war, who must wearily take up the burden of rebuilding towns anew, and of repopulating cities with a blood that has been robbed of much of its best. We here in the United States have suffered much, but only in small degree as compared with our European brethren. Our wants, long held back, are raising an urgent clamour for more goods. And across the seas the same cry is being raised, a cry that we will help to still by our increasing exports. That means an ever increasing demand, a demand that will help to keep prices at least at their present level.

Labor in many cities is scarce and high. Authorities freely predict a shortage. The price level is 107 per cent above that of 1914, being the highest in modern business history. Those who predicted a lowering of wages and the cost of living have found their prognostications at fault, for the tendency has been to a higher level rather than to a lower.

With the great annual wheat movement, a bumper crop, that soon can be expected to tighten the freight situation, railroad congestion may even surpass that of last year. And that is only another tendency towards the stabilization of high prices, for this year at least. It is widely accepted as a fact that we are on a new price level and that the price of both commodities and labor can recede but little.

Activity is bound to be on the increase and prosperity will certainly follow, a prosperity that will to no small extent smile upon the builder who needs must house this growing prosperity now facing us more certainly than ever before.

## Things That Trickle

Many a man handles opportunities as a child does sand at the seashore, for he lets them trickle through his fingers, one by one, as does the child with the grains of sand.

It is a truism to say that some men await opportunity, while others make it. And just as much of a truism is it to say that some men wait for business while others create it.

Some men will say that big opportunities are not to be found in small towns. That, to a certain extent, is true. The builder in a small town will seldom have the opportunity to put up a half-million dollar structure. But he can create enough smaller opportunities to more than make up for this lack of the big one.

In every town there is a certain amount of business, an amount of business that is divided up among the builders in town. This construction is essential, often the minimum that the town can get along with. But the point is that this amount of business can be made to increase, even double or triple, by the right kind of publicity and business-getting methods.

It is indeed true that things come to him who has. And business is no exception to this rule. The more business a man has, the more tends to come to him. So the builder who goes determinedly out in search of work that can be created will find that for every job he develops many others will tend to come to him. Let him inclose one porch and other house owners in the street will come to him to do likewise. Let him suggest a valuable use for a vacant piece of property and other property owners will seek his ideas.

There are opportunities—plenty of them—on every hand for the man who can recognize them. Don't let them trickle through your fingers.

## A Home Is a Haven for the Business of Living

Man's greatest business in life is the business of living. And nothing contributes so much to the success of this business as does good housing. Civilization is built up on this idea. The most progressive and civilized nations have ever been the best housed.

To-day the industrial value of home ownership is well recognized. It develops a pride, a self-respect, a stability of character that makes the home owner the man to be desired.

The man who can save and achieve a real haven to house his business of living has something that differentiates him from those not so fortunate. His credit is better, he is more highly regarded by the community, and he is *the* desirable citizen.

Most homes must be built on loans. As handled in the past, the mortgage has been pictured a home wrecker, a dreaded something to harass a man's old age.

To-day the tendency is toward amortization, which is a gradual paying off of the principal so that in time the home will be free and clear. Amortization removes the only drawback to the ownership of a home. Whereas it is hard to save $4,000 to pay off in a lump sum, it is easy to pay $33 a month for ten years, plus $20 interest charges, which latter decrease every month. How many of us have bought things on the partial payment plan, meeting the payments easily, and meanwhile enjoying the luxury of possession?

Just so it is with a home. And provided it is located right, one or two rooms can be rented that will cut the monthly payments in half. That feature alone has proved the deciding factor with many who desire to be a real success in the business of living.

But this home should be built to last, to be in as good condition when the payments are finished as when they are started. That means spending money where it doesn't show—for a year or so. It means good plumbing, good heating, good, sound timber framed by a builder worthy of trust, by a man whose bid may not be the lowest, but whose bid is based on the kind of construction that will cause the home to stand up bravely against the elements, a real haven for the business of living.

## English Architect's Idea to Recognize Good Builders

An interesting method of certifying good work done by builders has been advanced by an English architect. In brief, the suggestion is that a "good work certificate" be given by the Royal Institute of Boston Architects upon recommendation of three members of the institute. Thus a builder who did first class work would receive a recommendation that would do much to enhance his reputation. Naturally such a certificate of reliability and capability would be much sought after, with a consequent tendency to raise the standard of work.

Although the suggestion implies that members of the Institute will only certify as to the quality of work done for them, yet such a limitation would be undesirable. Many first class builders in England seldom do work for a member of the Institute, and barring them would result in no good.

Most of the better class of builders in this country agree that some recognition is due the capable, reliable contractor. Licensing of builders has been proposed and will probably soon be in effect in some states, although actively opposed by many.

Recognition of merit by certificate, granted either by the National Association of Builders' Exchanges or by the American Institute of Architects might well be advisable. Such certificates might be granted by the state association upon the recommendation of three or more reputable architects or rated builders.

It is to the best interest of the trade in general that the best work be done. No fair-minded builder would hesitate to select the right kind of competition as worthy of official recognition, for that would tend to eliminate the incompetent, unreliable man who runs his own business on such a basis that he not only ruins himself but seriously injures the better class of builders.

# Bringing Efficiency to the Kitchen---II

## *How to Select and Place Fixtures—Built-In Features*

By ARTHUR WEINDORF, Architect

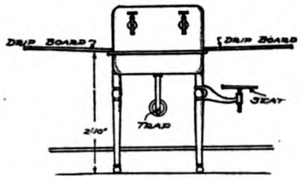



Fig. 4. A seat such as this, swinging under the sink, is a real comfort to the housewife

IN the selection of the range consideration should be given to the one free from all ornamentation and scroll work, as all this extra embellishment does not add to the efficiency but causes extra work in keeping it clean, and also causes more heat to radiate so that it is lost for cooking purposes.

The range should be free from ordinary stove legs, and should be placed on a smooth finish base inclosing the space under the stove. This space around the stove legs is useless and difficult to keep clean, there should be no place in the kitchen that will be hard to clean rapidly. The range should be set about 34 in. from the floor and should be arranged with a ventilating smoke hood over it, to take off the odor of cooking and excessive steam and prevent the odors from penetrating throughout the house, causing the collection of dust to walls and breeding of vermin.

When building it will cost very little more to place a ventilating flue in chimney for the purpose of taking care of smoke hood and it will be a great benefit to the health in keeping the home free from odors of cooking and steam.

In choosing the gas range it should have a high oven—it will be slightly more expensive but it will repay one many times by the relief that it affords by not bending or getting on one's knees to open the oven door.

By placing the hot water boiler in the basement and heating same by gas heater, the kitchen will be kept cool and comfortable in the summer and there will be two articles less to keep clean in this room, without reducing its efficiency.

The kitchen sink should be of a sanitary type. Iron enameled, of a good size with a high back and a white enameled drain board attached. The drain board should be 22 in. in width and elevated 33 or 34 in. from the floor, and of a length to take care of the family needs. The sink should be supplied with hot and cold water and be open underneath, allowing the plumbing to be exposed. The trap should be arranged high enough from the floor so that it can be properly cleaned. The sink can be supported on iron legs and to one leg can be attached a seat that swings under sink when not in use, as shown in Fig. 4. This seat will be found convenient for the housewife at times when considerable work is to be done at the sink and why should not this drudgery be done in comfort?

The refrigerator should be constructed or placed in the kitchen as the saving of the home keeper's time and strength will more than repay the extra cost of ice. Fig. 5 shows a built-in refrigerator that will be found convenient and also an ice saver if properly constructed.

There is also the disappearing refrigerator on the market, this one is arranged so that it can be operated through the kitchen floor from cellar. This is also a very convenient arrangement and saves floor space, also keeps refrigerator always in a cool place and within easy reach.

The ice box should be lined with zinc, tile or glass, the latter preferred, and should have glass shelves or the zinc rod shelves so ice box can be kept immaculate. It should be properly trapped and connected to house drainage system. This alone will save much time and anxiety over emptying the ice box pan.

No kitchen is complete without some place to keep brooms, brushes, etc., therefore, a broom closet will cost but little and be of great convenience and a place where one can always find these household articles in order and ready for use.

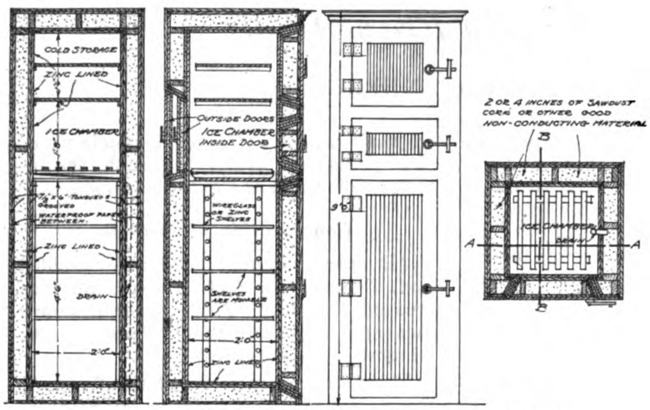



Fig. 5. A built-in refrigerator that can be placed in the kitchen, thus saving unnecessary steps

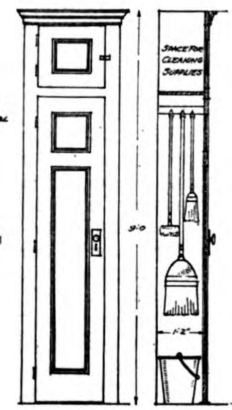


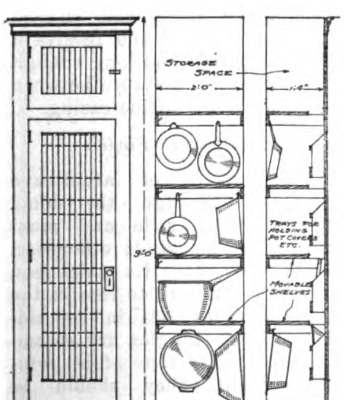

Fig. 6. A broom closet should by all means be provided

The broom closet, as shown in Fig. 6, should be systematically arranged, for these things are used every day. It is also good to have this closet metal lined so that it can always be easily kept free from dirt. A closet 14 in. x 1 ft. 6 in. will be found a good size for average family.

The pot closet will also be found very convenient for the storing away of pots, pans, etc. It should be constructed about 2 ft. wide and 16 in. in depth, inside dimensions, and should be arranged so that every pot and pan will have its place. The doors can be arranged to hold covers and pans without handles (see Fig. 7).

The dining nook will be found to be a very convenient feature, a place where the morning meals can be readily served and many steps saved between the kitchen and dining room. The nook can also be used by the housewife in the preparation of the meals and in taking care of her sewing.

Fig. 8 shows such a dining nook.




Fog. 7. A pot closet keeps cooking utensils readily accessible

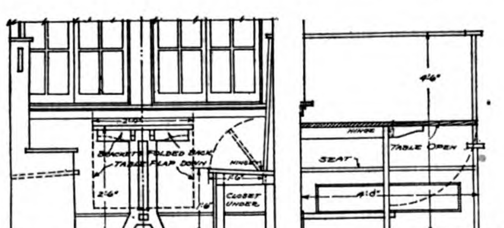



Fig. 8. A breakfast or dining nook that is just the thing for a small family

a space 5 or 6 ft. wide by about 4 ft. deep will prove sufficient. The table will be about 3 ft. 6 in. long and from 2 ft. 4 in. to 2 ft. 10 in. in width as the case may require. The table is also arranged so that it can be readily moved in order that nook may be kept clean. The seats are stationary but are arranged with a flap top so underside of seat can be used as a closet where the housewife may keep her sewing, etc.

The cost of installing some of the features here suggested will be found to be very little as compared with the convenience and efficiency that they afford the housewife in making the home work pleasant and a great deal lighter. It will enable her to gain extra time that can be utilized in a patriotic service.

The kitchen is deserving of attention and thought as well as any other workshop. Of course it is possible for but few people to have efficiently planned kitchens, but it is possible for everyone to arrange this room and make it as near efficient as possible.

The average man building can afford to have many of the above suggestions installed and to those that would care to expend more, can still add to the efficiency of their kitchen by adding many of the patented time-savers that are on the market, such as the vacuum cleaner, garbage incinerator, electric dish washer, etc.

*(The End)*

# Country House Details

## *Construction of Double Hung Windows in Frame Walls*

By A. BENTON GREENBERG, Architect

FENESTRATION, or the study of openings in walls, is a broad and important division of building construction. It is not our intention to enter into any theoretical discussion of this subject, but there are several principles of design and construction which are so fundamental that a consideration of them will prove of value.

1. Wherever possible place voids over voids, and solids over solids.

2. The size and character of the window should indicate the function of the interior. Small windows, placed near the ceiling, convey the idea of privacy. Large windows signify rooms of a more public character, such as living rooms, music rooms, etc.

3. In general, a window should be twice as high as it is wide; at any rate, it should be at least rectangular in shape.

4. The area of glass in all the windows of a room should be at least one-tenth the area of the floor surface.

5. In dwelling houses, the bottom of windows should be approximately 2 ft. 6 in. from the floor for principal rooms, 3 ft. for bedrooms and from 4 ft. to 5 ft. for kitchen and bath rooms.

6. The tops of all doors and windows should be as near the ceiling as possible for maximum light and ventilation. They should also be on one line to produce the proper architectural effect.

Of the many types of windows in use, that which has two sashes (counterbalanced by means of cords and weights) and known as the double-hung window, is the most popular in this country.

The plate illustrates a typical window frame, with sliding sash, for a frame wall. In order to present the construction of this window in logical sequence, we shall consider it as being made up of four parts: the frame, the sash, the interior finish and the exterior finish.

### *Construction of Frames*

All openings must be double studded and, if over four feet in span, must be trussed besides. These precautionary measures must be taken to prevent the window from sagging.

The principal member of the frame is the pulley stile (m). It is made from ⅞ in. to 1⅜ in. thick, depending upon the size of the windows and the quality of grade of the work. Note that the outer edge of the pulley stile is tongued into the blind stop (d). The outer edge of the yoke may be similarly secured. These tongues form excellent wind and rain stops, and insure a rigid frame with accurately fitting sashes. A space of about one-quarter of an inch is left between the back of the yoke and the studs to allow for contraction and expansion.

The space between the back of the pulley stile and the studs is reserved for the weights. The depth of this weight box is from 2 in. to 2½ in., according to the thickness of the sash. The weights themselves are of lead or iron, about 1⅜ in. in diameter, and so located that the centers of the weights are in line with the centers of the sashes. The pendulum (R) is a ⅜-in. strip of wood and is used only in better grades of work to prevent the weights from clashing. It is suspended from the top so that it may be swung to one side to get at both weights through one pocket. The pocket is a kind of trap-door in the pulley stile, through which the weights are inserted and adjusted. It extends from the inside edge of the pulley stile to the parting bead. It is usually located about 6 in. up from the sill and is about 18 in. long. The ends of the pocket piece are bevelled and held in place by screws. The parting strip (F) is commonly made ½ in. thick, extends ⅜ in. into the pulley stile and projects ½ in. beyond its face. The ends of the blind stop, parting strip and stop bead should always be in line.

### *Size of Sash*

For 4-in. wall studs, 1⅜-in. sash, or better, still 1½-in. sash, may be used. By moving the inside casing slightly forward until its edge is flush with the outside face of the pulley stile, the blind stop may be shifted so as to cover the joint between the two members, thus giving room for a thicker sash. However, it is best to use 5 in. or 6 in. studs wherever sash of 1¾ in. or greater in thickness is required. Details of such windows will be given in a subsequent place. The upper rail of the sash is generally made from 2 in. to 2¼ in. in depth; the lower rail from 2¾ in. to 4 in.; and the meeting rail from 1⅛ in. to 1⅜ in. The meeting rail should be bevelled, as shown, to insure a tight joint when the sashes are brought together.

### *Interior Finish*

The inside casing or architrave is generally made of ⅞-in. material. Its function is to cover the joint between the plaster and the window frame. It should be made wide enough not only to cover the plaster joint but to get a nailing into the stud. In fastening the casing or any other trim, care should be exercised to drive the nails through grounds (G), and not through plaster. The reason for this is quite obvious, for not only does plaster afford an insecure hold, but it will eventually crack and disfigure the wall surface.

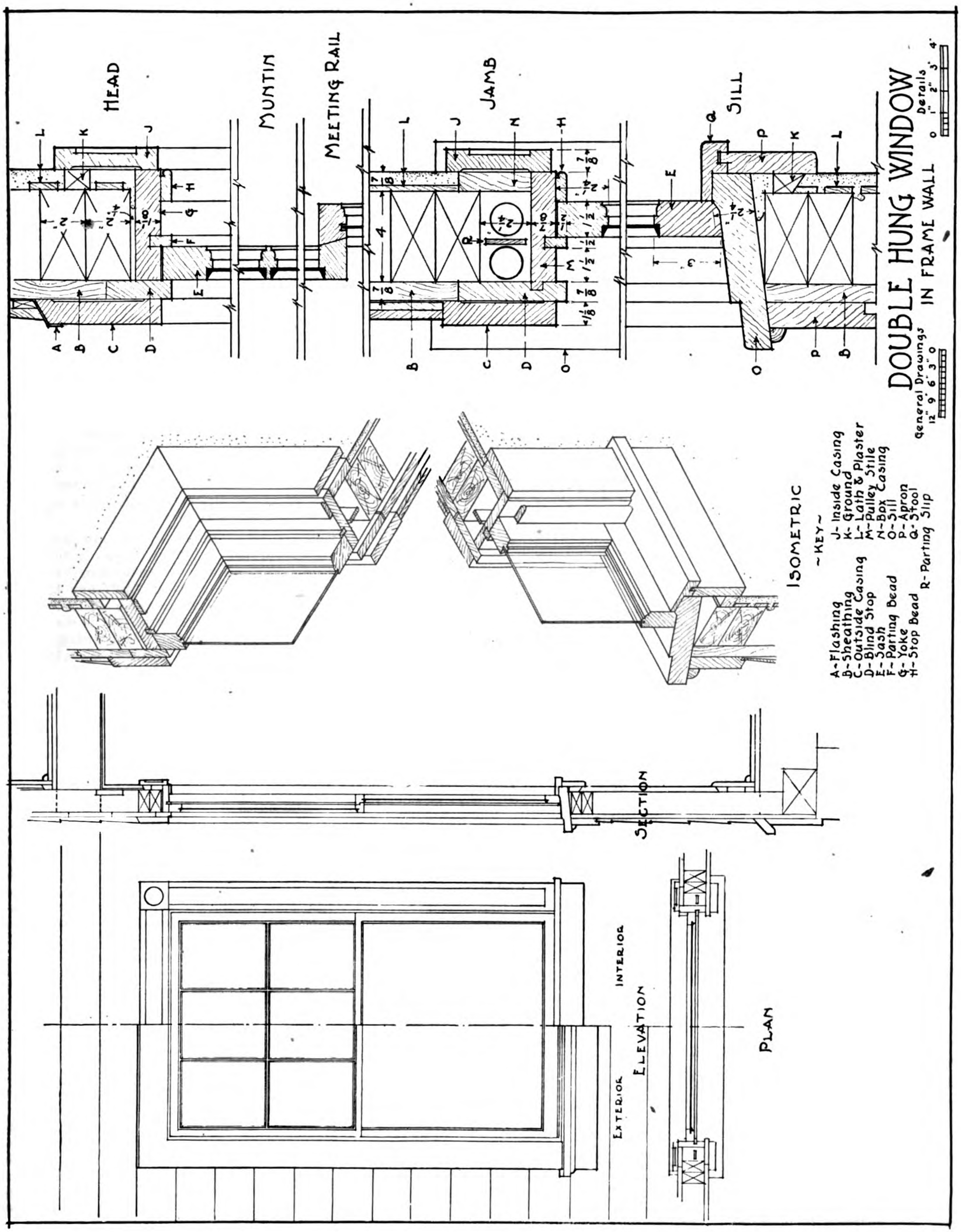
The stop bead should not be less than 1½ in. wide, to properly accommodate a window shade. In good work the stop is fastened with round-headed screws in slotted metal stop adjusters. These permit the sash to be adjusted after shrinkage has taken place and insure a tight window.

The sill is finished on the inside with a stool (Q), which may be made ⅞ in. thick for cheap or moderate grade work and 1⅛ in. for higher grade work. Underneath the stool is placed the apron (P). This member is ⅞ in. in thickness and should be made wide enough to cover the plaster joint and receive a nailing into the ground and long enough to equal the horizontal distance between the extreme ends of the inside casing.

### *Fastening Outside Finish*

The outside casing or architrave must be nailed through the blind stop into the pulley stile and must get a nailing into the stud; otherwise, the width is optional. Its thickness, however, must be sufficient to receive the clapboards or shingles; 1⅛ in. for siding and 1⅜ in. for shingles are recommended. To make the tops of all windows weather-tight, they should be flashed with tin for inexpensive work and with copper or sheet lead for expensive work. The flashing is turned over and securely fastened to the edge of the casing and is carried up under the clapboards.

The sill should be at least 1¾ in. thick and should be inclined, say about ¼ in. to every inch in width. The apron (P) which forms part of the exterior finish of the sill is cut at the bottom with a groove about ¾ in. in depth to receive the clapboards. This makes an effective water-tight and wind-proof joint.



# Investigation of Building Costs

## *Figures Compiled by Eleven Noted Contractors Showing Increase Over 1919 Costs*

AN investigation just completed by BUILDING AGE on the increase in building costs from 1914 to June, 1919, in various sections of the United States reveals some interesting facts. Costs have not advanced with any degree of uniformity in various sections of the country, but vary widely. Part of this is due to varying wage increases, part to other local conditions that affect costs.

The cities and names of contractors who have generously given us their increase in costs are as follows:

*Sharon, Pa. — Wallis & Carley Co., Contractors and Builders, Builders' Supplies*

According to our data on building costs, the present level of building costs in this vicinity is very close to 100 per cent higher than that of 1914. Our costs are not divided so as to make comparison in the various types of construction, but the above figure applies to general construction such as we do. Needless to say, high wages and inefficient labor, in our opinion, are responsible for practically all of the increase we have experienced.

*Winston-Salem, N. C. —Name Withheld by request*

Our records show that the percentages of increase to the present are about as follows: Brick and concrete buildings, from 60 to 75 per cent; frame dwellings about 100 per cent. Labor has increased from 100 to 150 per cent, lumber about the same, lime and cement 50 to 75 per cent, sand 75 to 100 per cent.

*Charlottesville, Va.— King Lumber Co., Contractors and Builders*

According to our records the present costs of building construction over those of 1914 are approximately 80 per cent more for buildings of the type of steel construction; 100 per cent more for concrete construction, and 125 per cent more for wood construction.

*Scranton, Pa.—Spruks Brothers, Wholesale and Retail Lumber Manufacturers and Dealers*

As near as we can figure the lumber on house and factory building, it runs about 80 per cent higher than it did in 1914, labor about 90 per cent, plumbing 100 per cent, plastering and stone work about 75 per cent, and we do not see any change in the near future, as the building material is very much higher now than it was a month ago, except plumbing supplies, which seem to be a little cheaper.

*Boston, Mass.—Leighton-Mitchell Co., Builders*

We believe the increased cost of buildings is about as follows: Steel frame buildings 70 per cent; dwellings 40 per cent; miscellaneous types of buildings vary between these two. We are of the opinion that buildings will cost more a year from to-day than they do now. The labor will be higher and we are not expecting any material decrease in material prices; in fact, we note a number of increases recently.

*Philadelphia, Pa. — Armstrong & Latta Co., Engineers and Contractors*

In our class of work the cost now ranges between 80 per cent and 100 per cent more than the 1914 cost. This refers to dock building, pile and concrete foundation work and harbor improvement work in general, except dredging, of which we know nothing.

*Scranton, Pa.—Hewer & Siender, Contractors and Builders, General Lumber Dealers*

We find the cost of building to-day over 1914 is practically from 50 to 65 per cent greater. We must freely admit, however, that at the present time we are very busy, receiving during the week of June 9 from $40,000 to $60,000 worth of business, even at these high prices. Our construction consists principally of dwellings of all classes and silk mill construction. Our building business is principally wood-line.

*Ithaca, N. Y.—Driscoll Brothers & Co., Heavy Masonry, Reinforced Concrete, Archi ectural and Engineering Service*

All our estimates so far this year show an advance of from 50 to 60 per cent over 1914, depending somewhat on the nature of the work. It is also our firm conviction that 1920 will bring still further advances in labor and material. Our experience is based on frame residences, brick and steel boiler houses, brick and steel offices or bank buildings, farm buildings and reinforced concrete factory construction. We might add that labor in our vicinity has not advanced to the extent that it has in other localities.

*Chicago, Ill.—Building Age Western Representative*

I have interviewed quite a number of contractors who specialize in residence and flat work in the suburbs. These parties do work out as far as Waukegan, which is 35 miles north—and others operate west of the city. The added costs over pre-war period seem to range from 30 to 40 per cent and I believe a fair average would be 35 per cent. The wages do not seem to affect this cost, as wages were always higher in this section than in eastern districts.

The opinion seems to be that the cost of buildings will increase owing to the demand for material, which is really scarce at this time. By looking through the lumber yards one is struck with the very light stocks in hand. The bad weather in the spring had slowed up the production in the mills and there is a real shortage of stocks. There will be no appreciable reduction within five years and then it will be gradual and will never return to pre-war conditions.

There is a great deal of house construction and a very great deal of remodeling and addition work. In fact, every suburb is dotted with new construction and mechanics are well employed. The construction of factory buildings is increasing steadily. These people simply have to increase their plants to care for the increased business. The increased profits now available in their business takes care of the increased cost of building construction.

A large contractor has kept a very expensive foreman on the payroll with no work to do for three months. He knew that he would have some work later and figured that the money he paid out to the foreman would be paid out in income tax, so he kept the man and his organization at the same time. It seems like good business to me.

*Hanover, Pa. — J. F. Rohrbaugh*

Average cost at present 65 per cent higher than pre-war prices. I base this figure on brick and frame house, also on wood and brick factories; this is changing a little at present.

*Minneapolis, Minn.— C. F. Haglin & Sons Co., Fire Proof Building Construction*

We are unable to give you a very comprehensive comparison of our costs on different types of buildings. However, we enclose a copy of comparative costs, which we got up for one of our clients last spring. These figures are based upon costs in 1915 and upon the high cost in 1918-19. As it is rather difficult to compare any two buildings, due to the different interior finish, equipment, etc., we have found that in making comparative costs it is better to take the bare frame of the building. By this we mean a concrete or steel frame, cement floors and outside curtain walls, no finish whatsoever. In other words, a building of strictly warehouse type. From such a type the comparisons are more or less comprehensive. The attached figures are based upon a building of the above-mentioned type 100 feet wide by 300 feet long, six stories and basement of reinforced concrete, flat slabs. We hope that the figures following will be of use to you.

| | Quantity | Unit 1915 | Unit 1918 | Cost 1915 | Cost 1918 | Increase Per Cent | Per Cent Total Cost 1915 | Per Cent Total Cost 1918 |
|---|---|---|---|---|---|---|---|---|
| Excavation | 12,000 yds. | $ .40 | $ .60 | $4,800 | $7,200 | 50 | 3.5 | 2.9 |
| Lumber | 225 M ft. | 23.00 | 40.00 | 5,175 | 9,000 | 74 | 3.8 | 3.6 |
| Cement | 21,500 bbls. | 1.22 | 2.50 | 25,230 | 53,750 | 105 | 19.0 | 21.2 |
| Stone | 8,900 yds. | 1.25 | 1.85 | 11,125 | 16,465 | 48 | 8.2 | 6.5 |
| Sand | 8,400 yds. | .65 | .75 | 5,460 | 6,300 | 15 | 4.0 | 2.5 |
| Brick | 590 M | 6.60 | 8.65 | 3,795 | 4,203 | 18 | 2.8 | 1.8 |
| Steel | 740 tons | 29.00 | 80.00 | 21,460 | 59,200 | 175 | 16.1 | 23.6 |
| Roofing | 300 sq | 3.00 | 4.50 | 900 | 1,350 | 50 | .7 | .6 |
| Flashing | 1,200 lin. ft. | .15 | .30 | 180 | 360 | 100 | .1 | .1 |
| Tile part | 16,000 sq. ft. | .05½ | .09½ | 880 | 1,520 | 72 | .6 | .6 |
| St. col. fms | 308 | 6.00 | 10.00 | 1,848 | 3,080 | 63 | 1.4 | 1.3 |
| Steel sash | 6,000 sq. ft. | .62 | 1.00 | 3,720 | 7,200 | 94 | 2.7 | 2.8 |
| Wood sash | | | | 1,100 | 1,615 | 47 | .8 | .7 |
| Lime | 660 bbls. | .62 | 1.30 | 409 | 858 | 110 | .3 | .4 |
| Labor | | | | 49,000 | 78,600 | 60 | 36.0 | 31.4 |
| | | | | $136,082 | $251,000 | | 100.0 | 100.0 |

*Building Age New York Office* . We estimate the cost in frame construction as between 30 and 40 per cent over pre-war costs. We know of a large firm in New York City operating all over the country which confidentially states their costs as about 40 per cent over 1914, reinforced concrete construction. Frame buildings, well constructed, are being erected in this locality at from 30 to 35 cents per cubic foot, or less in the case of speculative building. Stocks are in fair shape, although some dealers find it impossible to supply some materials at present.

*Paterson, N. J. — Name withheld by request* We figure our present costs are approximately 100 per cent greater than in 1914. The approximate increase in cost of 100 per cent over 1914 costs applies both to fireproof and slow-burning construction.

# Lumber Interests Try to Stabilize Prices

THE past month has disclosed the greatest rises in prices and the greatest shortages in stock that the lumber industry has ever experienced. Aided by a great boom in building in the Middle West, the demand began some two months ago and has continued ever since. When the peak was reached, Eastern lumber dealers rushed "to cover," creating a new demand. This demand is gradually slowing down, as summer wears on, but prices are still on the upward trend. Up to last week no end to higher prices could be seen.

Stabilization, rather than lowerization, of prices and assurances that supply would seek and maintain normal channels of distribution are essentials that the lumber dealer has urged for some months and things that must be had before readjustment is really accomplished. Stabilization of prices will have the effect of restoring distribution to normal channels, of quieting generally chaotic conditions. And the beginning of the era of price stabilization is promised in a letter which the Long-Bell Lumber Co. sent out to the trade last week. That letter, among other things, says:

"While we know the tendency is to higher prices, yet it is our very strong conviction that it would be better for the trade in general if prices were more stable, and we are disposed to use our influence to that end. Therefore this is to announce that our prices on our yellow pine lumber until August 15 will be no higher than now. We are unable to predict what market and manufacturing conditions on yellow pine lumber will be after that date, but it shall be our policy to endeavor to protect our trade by stable prices on yellow pine lumber for successive periods of thirty days, if humanly possible. It being the policy of our company to render prompt service, it shall not be our thought to take orders that we cannot reasonably expect to ship within thirty days after acceptance."

Parallel to this, lumber dealers with stocks to offer, in some parts of the country, have been issuing announcements during the past two months guaranteeing their prices for periods of a month.

In connection with this, Portland cement manufacturers some months ago sent out a notice to the trade that the price of $3.25 a barrel for their product will remain until Aug. 15.

This is a start—and a real start—toward stabilization, toward encouragement of building operations to go forward. During the period of chaotic price fluctuations, the dealer was "scared" to quote on contracts submitted by contractors, believing that, as they didn't have the lumber in their yards, the price of it might be $10 higher than they now quoted, when he was ready to buy.

Other manufacturers of yellow pine lumber and other manufacturers of other kinds of lumber will not be slow to follow the example set by the Long-Bell Co., and perhaps it won't be long until the thirty-day period of stabilized prices will be followed by a sixty-day period, a ninety-day period, and so on until both the lumber dealer and the lumber consumer will know just about "where they are at"—something that neither has known during the past several weeks of demoralized conditions. Nor is the promise of temporarily stabilized prices the only hope held out to the lumber dealer through the action of the Long-Bell Co., for its further promise not to accept orders that cannot be filled within thirty days, if generally adopted by yellow pine and other manufacturers, will soon definitely establish the relation between supply and demand.

The scarcity of lumber offered at the high prices prevailing in the lumber trade has alarmed the trade until many dealers are looking to substitutes of wood to satisfy their demands.

If a dealer, for instance, has an order for lumber which must be filled within thirty days, and if he hasn't the lumber with which to fill it or can't get the lumber from the manufacturers to fill it, then it is a plain business proposition for him to tell his customer the facts in the case and suggest the use of some other building material that he has or can get within the allotted time. Indeed, lumber dealers all over the country are doing that very thing right now, particularly in the matter of substituting asphalt shingles and other kinds of roofing for the red cedar variety, which has become elusive both as to the matter of quantity and price. It's a practice that is going to—and by rights should—become general unless the period of real readjustment, the period of stabilization, comes to the lumber industry pretty soon; unless the policy of the one company quoted above becomes the general policy of the manufacturing end of the industry.

Mills are swamped with orders. Handicapped by 10-in. rainfalls and a great shortage of labor, manufacturers find it very difficult to speed up product. This last is a solution to the entire problem. Let the supply "catch up" to the demand and "everybody will be happy."

The demand in the East is good, especially in the rural sections. There is an actual famine in flooring of all kinds and red cedar shingles are scarce. The higher grades of hardwoods, oak, poplar, ash, birch, chestnut, are not on the market. Booms in the export and furniture trades is the answer. Production of lumber and other building materials is being closely watched by builders.

Cement, still showing the lowest percentage of increase in price since the signing of the armistice, or 7½ per cent, is meeting forward buying movements representing heavy road building, some export business and some effort on the part of distributors to be covered for possible eventualities in the building material and labor markets late this fall or early next spring. A. C. S.

# Building Activity in the United States

IT has been a surprise to many to have the building situation overcome its obstacles with such ease. High prices of labor and materials have proved but a little deterrent. Whereas five months ago commissioners of city building departments were largely blaming high prices for the unfavorable situation and often forecasting a practical cessation of building until prices dropped, now reports are making little mention of these factors, in spite of the fact that advances are constantly occurring, notably in the recent increases in lumber In other words, the building situation is hitting its stride, high prices or no high prices. Such projects as that of the Chicago Housing Association, organized to provide at cost homes for wage earners, and the "Own Your Own Home" movement are responsible for much of this favorable showing.

Figures received direct from 179 city building departments show that the value of permits granted for June 1919 reaches the impressive total of $135,-130,606 as compared with $51,880,412 for June, 1918; this is a gain of 162 per cent. Still more impressive is the fact that 165 cities show gains as against only 14 showing a loss. Of course, the unfavorable situation of last year must be taken into account, yet this does not minimize the fact that construction will soon be above normal.

Eastern cities report a gain of 240 per cent, 50 out of 60 showing increases; middle cities, 49 out of 51 showing increases with 101 per cent gain; southern cities, 41 out of 42 showing increases with 230 per cent gain and of western cities, 25 out of 26 show increases with 82 per cent gain.

CITIES IN EASTERN STATES

| | June, 1919 | | | | June, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Albany, N. Y. | 37 | $281,100 | 189 | $61,360 | 15 | $35,475 | 188 | $69,770 |
| Allentown, Pa. | 35 | 91,050 | 12 | 23,400 | 12 | 88,950 | 9 | 30,975 |
| *Altoona, Pa. | 35 | 128,665 | 65 | 55,028 | 8 | 7,475 | 46 | 15,496 |
| *Atlantic City, N. J. | 17 | 116,715 | 75 | 30,229 | 10 | 14,775 | 61 | 20,101 |
| Auburn, N. Y. | 17 | 13,508 | ... | ......... | 13 | 37,350 | ... | ......... |
| Bayonne, N. J. | 47 | 164,600 | ... | ......... | 22 | 184,600 | ... | ......... |
| *Binghamton, N. Y. | 80 | 295,291 | 172 | 29,156 | 53 | 15,443 | 98 | 15,307 |
| *Boston, Mass. | 124 | 2,153,225 | 436 | 593,039 | 52 | 741,640 | 337 | 424,658 |
| *Bridgeport, Conn. | 178 | 698,692 | ... | ......... | 89 | 241,655 | ... | ......... |
| *Brockton, Mass. | 40 | 229,705 | 22 | 19,515 | 10 | 7,385 | 10 | 15,150 |
| *Buffalo, N. Y. | 701 | 1,576,000 | ... | ......... | 398 | 687,000 | ... | ......... |
| Cambridge, Mass. | 70 | 118,236 | ... | ......... | 63 | 124,697 | ... | ......... |
| *Camden, N. J. | 118 | 274,204 | ... | ......... | 33 | 169,995 | ... | ......... |
| *Chelsea, Mass. | 28 | 73,080 | ... | ......... | 14 | 43,375 | ... | ......... |
| *Easton, Pa. | 14 | 157,705 | 20 | 25,085 | 4 | 8,100 | 70 | 11,375 |
| *East Orange, N. J. | 78 | 566,084 | ... | ......... | 44 | 97,104 | ... | ......... |
| *Elizabeth, N. J. | 91 | 503,313 | ... | ......... | 31 | 98,435 | ... | ......... |
| Erie, Pa. | 85 | 153,735 | 80 | 69,846 | 79 | 265,130 | 40 | 20,795 |
| Fall River, Mass. | 34 | 98,460 | 25 | 13,630 | 16 | 587,250 | 15 | 101,050 |
| *Fitchburg, Mass. | 22 | 10,370 | 14 | 86,890 | 9 | 7,175 | 11 | 13,100 |
| *Harrisburg, Pa. | 41 | 480,850 | ... | ......... | 21 | 28,800 | ... | ......... |
| *Hartford, Conn. | 80 | 665,257 | 53 | 66,507 | 53 | 347,805 | 16 | 38,335 |
| Hoboken, N. J. | 26 | 27,702 | ... | ......... | 24 | 227,234 | ... | ......... |
| Holyoke, Mass. | 23 | 33,525 | 19 | 11,700 | 10 | 27,550 | 4 | 20,175 |
| *Lancaster, Pa. | 28 | 72,575 | 21 | 29,533 | 5 | 10,450 | 11 | 3,580 |
| Lawrence, Mass. | 41 | 107,685 | 12 | 37,775 | 19 | 417,218 | 8 | 11,650 |
| *Lowell, Mass. | 60 | 517,660 | 51 | 76,885 | 29 | 80,010 | 33 | 94,860 |
| *Manchester, N. H. | 40 | 24,630 | 56 | 32,815 | 27 | 7,340 | 33 | 20,380 |
| *Mt. Vernon, N. Y. | 29 | 158,390 | 17 | 15,065 | 16 | 29,515 | 9 | 15,715 |
| *Medford, Mass. | 52 | 142,283 | ... | ......... | 11 | 14,985 | ... | ......... |
| *Newark, N. J. | 327 | 1,430,885 | ... | ......... | 163 | 580,921 | ... | ......... |
| *New Bedford, Mass. | 63 | 434,300 | ... | ......... | 40 | 68,150 | ... | ......... |
| *New Britain, Conn. | 64 | 281,200 | 33 | 11,305 | 61 | 150,250 | 40 | 27,035 |
| *New Haven, Conn. | 185 | 784,528 | ... | ......... | 101 | 179,012 | ... | ......... |
| New York: | | | | | | | | |
| *Manhattan | 441 | 13,448,881 | ... | ......... | 280 | 2,253,689 | ... | ......... |
| *Bronx | 408 | 3,015,675 | ... | ......... | 203 | 333,518 | ... | ......... |
| *Brooklyn | 679 | 7,379,545 | 653 | 804,630 | 192 | 1,522,827 | 790 | 476,757 |
| *Queens | 1167 | 4,665,406 | ... | ......... | 641 | 479,850 | ... | ......... |
| *Richmond | 234 | 391,432 | 67 | 42,742 | 94 | 114,461 | 41 | 21,318 |
| *Niagara Falls, N.Y. | 66 | 476,910 | 26 | 29,915 | 40 | 122,140 | ... | ......... |
| *Passaic, N. J. | 20 | 188,150 | 12 | 11,450 | 14 | 137,850 | 5 | 2,500 |
| *Paterson, N. J. | 165 | 359,492 | ... | ......... | 98 | 133,309 | ... | ......... |
| *Philadelphia, Pa. | 1951 | 7,354,625 | ... | ......... | 694 | 1,671,900 | ... | ......... |
| *Pittsburgh, Pa. | 392 | 1,160,796 | 148 | 335,533 | 381 | 976,259 | 137 | 237,830 |
| *Portland, Me. | 34 | 37,685 | 36 | 59,250 | 16 | 10,720 | 14 | 8,120 |
| *Reading, Pa. | 74 | 200,100 | ... | ......... | 17 | 60,800 | ... | ......... |
| *Rochester, N. Y. | 209 | 453,945 | 153 | 143,121 | 88 | 271,295 | 74 | 22,120 |
| *Schenectady, N. Y. | 82 | 135,280 | 29 | 8,575 | 51 | 76,600 | 23 | 7,640 |
| *Salem, Mass. | 33 | 193,857 | ... | ......... | 31 | 34,984 | ... | ......... |
| *Scranton, Pa. | 46 | 165,310 | ... | ......... | 20 | 43,085 | ... | ......... |
| *Somerville, Mass. | 60 | 65,770 | ... | ......... | 23 | 36,525 | ... | ......... |
| *Springfield, Mass. | 163 | 927,864 | ... | ......... | 79 | 132,900 | ... | ......... |
| *Syracuse, N. Y. | 240 | 840,695 | ... | ......... | 141 | 170,223 | ... | ......... |
| *Troy, N. Y. | 2 | 52,000 | 34 | 14,623 | 17 | 37,200 | ... | ......... |
| *Utica, N. Y. | 40 | 295,085 | 13 | 38,000 | 23 | 156,875 | 8 | 22,500 |
| *West Hoboken, N. J. | 18 | 55,105 | ... | ......... | 11 | 49,560 | ... | ......... |
| Wilkes-Barre, Pa. | 59 | 42,832 | ... | ......... | 69 | 56,725 | ... | ......... |
| *Worcester, Mass. | 148 | 384,803 | 103 | 107,170 | 84 | 217,825 | 65 | 90,089 |
| *Yonkers, N. Y. | 44 | 229,800 | ... | ......... | 32 | 207,900 | ... | ......... |
| *York, Pa. | 25 | 34,775 | 32 | 7,947 | 6 | 4,355 | 31 | 2,175 |
| | 9710 | $55,421,026 | 2678 | $2,891,719 | 4900 | $14,995,624 | 2227 | $1,860,556 |

CITIES IN EXTREME WESTERN STATES

| | June, 1919 | | | | June, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Berkeley, Cal. | 36 | $127,838 | 74 | $22,438 | 8 | $24,000 | ... | $27,000 |
| *Boise, Idaho | 6 | 24,300 | 46 | 17,043 | 2 | 16,800 | 20 | 9,091 |
| *Butte, Mont. | 21 | 129,700 | 68 | 28,400 | ... | ......... | ... | ......... |
| *Cheyenne, Wyo. | 14 | 120,000 | ... | ......... | 2 | 15,000 | ... | ......... |
| *Col. Spgs., Col. | 14 | 6,800 | 22 | 17,654 | 8 | 2,515 | 11 | 2,870 |
| *Denver, Col. | 150 | 456,650 | 128 | 65,000 | 188 | 225,600 | 108 | 65,950 |
| *Eureka, Cal. | 2 | 7,000 | 8 | 8,620 | 4 | 2,050 | 2 | 450 |
| *Fresno, Cal. | 63 | 268,740 | 45 | 16,932 | 38 | 91,515 | 22 | 6,680 |
| *Long Beach, Cal. | 254 | 413,926 | ... | ......... | 223 | 333,679 | ... | ......... |
| *Los Angeles, Cal. | 604 | 1,661,378 | 347 | 253,092 | 287 | 582,042 | 222 | 196,638 |
| *Missoula, Mont. | 7 | 15,450 | ... | ......... | ... | ......... | ... | ......... |
| *Oakland, Cal. | 262 | 656,205 | 89 | 48,579 | 127 | 511,077 | 76 | 78,346 |
| *Pasadena, Cal. | 112 | 193,184 | ... | ......... | 74 | 87,251 | ... | ......... |
| *Portland, Ore. | 386 | 938,635 | 314 | 114,683 | 261 | 356,000 | 230 | 94,495 |
| *Pueblo, Col. | 53 | 43,200 | ... | ......... | 56 | 41,692 | ... | ......... |
| *Sacramento, Cal. | 105 | 126,020 | ... | ......... | 54 | 45,476 | ... | ......... |
| *Salt Lake City, Utah | 111 | 273,405 | ... | ......... | 68 | 165,815 | ... | ......... |
| *San Diego, Cal. | 43 | 107,410 | 64 | 32,405 | 39 | 84,045 | 42 | 17,298 |
| *San Francisco, Cal. | 148 | 1,285,515 | 384 | 221,263 | 72 | 880,541 | 291 | 234,798 |
| *San Jose, Cal. | 23 | 94,462 | ... | ......... | 29 | 69,087 | ... | ......... |
| *Seattle, Wash. | 1266 | 1,755,795 | ... | ......... | 976 | 1,023,525 | ... | ......... |
| *Spokane, Wash. | 62 | 291,615 | 56 | 39,005 | 44 | 9,820 | 24 | 3,330 |
| Stockton, Cal. | 71 | 154,985 | ... | ......... | 72 | 219,184 | ... | ......... |
| *Tacoma, Wash. | 176 | 299,757 | 187 | 64,600 | 60 | 193,899 | 172 | 46,304 |
| *Tucson, Ariz. | 30 | 152,287 | 20 | 4,617 | 10 | 35,000 | 16 | 3,000 |
| *Wheeling, W. Va. | 44 | 28,140 | 20 | 2,800 | 24 | 10,740 | 41 | 6,309 |
| | 4063 | $9,632,397 | 1872 | $967,131 | 2726 | $5,026,353 | 1287 | $792,559 |

*Indicates increase

CITIES IN MIDDLE STATES

| | June, 1919 | | | | June, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Akron, Ohio | 612 | $2,266,772 | 144 | $81,510 | 203 | $780,605 | 62 | $31,945 |
| *Bloomington, Ill. | 10 | 40,500 | 10 | 6,000 | 1 | 1,000 | ... | 2,300 |
| *Canton, Ohio | 202 | 471,870 | ... | ......... | 106 | 205,075 | ... | ......... |
| *Cedar Rapids, Iowa. | 29 | 154,000 | 23 | 36,000 | 15 | 142,000 | 10 | 11,000 |
| *Chicago, Ill. | 900 | 11,415,600 | ... | ......... | 277 | 4,062,500 | ... | ......... |
| *Cincinnati, Ohio | 1066 | 902,100 | ... | ......... | 925 | 474,895 | ... | ......... |
| *Cleveland, Ohio | 1399 | 4,655,625 | ... | ......... | 905 | 1,568,800 | ... | ......... |
| *Columbus, Ohio | 243 | 531,655 | 95 | 117,005 | 104 | 249,995 | 94 | 79,875 |
| *Danbury, Conn. | 10 | 84,575 | 11 | 10,650 | 3 | 9,400 | 14 | 12,300 |
| *Davenport, Iowa | 110 | 245,750 | ... | ......... | 67 | 69,887 | ... | ......... |
| *Dayton, Ohio | 252 | 811,903 | 100 | 52,960 | 86 | 319,797 | 40 | 75,315 |
| *Decatur, Ill. | 66 | 213,025 | 18 | 17,900 | 17 | 36,660 | 16 | 18,300 |
| *Des Moines, Iowa | 143 | 532,140 | ... | ......... | 66 | 143,099 | ... | ......... |
| *Detroit, Mich. | 2411 | 6,649,045 | ... | ......... | 899 | 3,012,975 | ... | ......... |
| *Dubuque, Iowa | 46 | 285,695 | ... | ......... | 4 | 2,680 | ... | ......... |
| *Duluth, Minn. | 237 | 277,863 | ... | ......... | 148 | 210,112 | ... | ......... |
| E. St. Louis, Ill. | 33 | 54,050 | ... | ......... | 25 | 167,825 | ... | ......... |
| *Ft. Wayne, Ind. | 77 | 198,705 | 20 | 46,238 | 33 | 118,555 | 9 | 15,600 |
| *Fargo, N. D. | 30 | 173,000 | 14 | 20,000 | 12 | 30,000 | 15 | 17,000 |
| *Grand Rapids, Mich. | 225 | 637,010 | ... | ......... | 108 | 91,580 | ... | ......... |
| *Hamilton, Ohio | 33 | 101,345 | 21 | 22,953 | 16 | 18,500 | 14 | 5,796 |
| *Indianapolis, Ind. | 390 | 907,088 | 414 | 137,172 | 212 | 488,813 | 208 | 52,838 |
| *Jackson, Mich. | 97 | 149,315 | ... | ......... | 59 | 58,916 | ... | ......... |
| *Joplin, Mo. | 12 | 13,900 | 4 | 1,950 | 16 | 19,393 | 2 | 968 |
| *Kalamazoo, Mich. | 23 | 82,625 | 13 | 12,700 | 7 | 17,155 | 5 | 3,500 |
| *Kansas City, Kan. | 23 | 150,400 | 24 | 19,876 | 30 | 97,475 | ... | ......... |
| *Kansas City, Mo. | 414 | 937,550 | ... | ......... | 160 | 698,820 | ... | ......... |
| *Lansing, Mich. | 127 | 216,685 | 28 | 17,575 | 16 | 18,690 | 4 | 1,800 |
| *Lincoln, Neb. | 56 | 136,070 | 19 | 25,310 | 26 | 79,440 | 15 | 66,211 |
| *Milwaukee, Wis. | 310 | 1,079,726 | 185 | 327,914 | 157 | 476,921 | 154 | 158,977 |
| *Minneapolis, Minn. | 702 | 1,351,985 | ... | ......... | 354 | 490,235 | ... | ......... |
| *Omaha, Neb. | 224 | 634,320 | ... | ......... | 83 | 467,650 | ... | ......... |
| Peoria, Ill. | 53 | 1,068,965 | 36 | 58,800 | 26 | 5,103,430 | 29 | 37,405 |
| *Quincy, Ill. | 6 | 165,800 | ... | ......... | 2 | 9,800 | ... | ......... |
| *Richmond, Ind. | 19 | 49,675 | 11 | 13,450 | 7 | 8,360 | 10 | 4,640 |
| *Saginaw, Mich. | 233 | 246,235 | ... | ......... | 22 | 22,309 | ... | ......... |
| *St. Joseph, Mo. | 67 | 187,855 | ... | ......... | 38 | 22,565 | ... | ......... |
| *St. Louis, Mo. | 346 | 1,489,011 | 379 | 527,700 | 217 | 683,913 | 354 | 207,950 |
| *St. Paul, Minn. | 276 | 1,056,433 | ... | ......... | 111 | 276,696 | ... | ......... |
| *Sioux City, Iowa | 118 | 820,475 | ... | ......... | 35 | 139,150 | ... | ......... |
| *South Bend, Ind. | 168 | 961,878 | ... | ......... | 91 | 63,148 | ... | ......... |
| *Springfield, Ohio | 80 | 169,795 | ... | ......... | 22 | 27,640 | ... | ......... |
| *Springfield, Ill. | 29 | 112,870 | 59 | 60,520 | 19 | 39,660 | 30 | 23,625 |
| *Springfield, Mo. | 21 | 145,550 | 26 | 14,638 | 10 | 9,925 | 17 | 6,600 |
| *Superior, Wis. | 148 | 119,265 | ... | ......... | 101 | 57,285 | ... | ......... |
| *Terre Haute, Ind. | 31 | 62,290 | 42 | 18,255 | 36 | 53,675 | 39 | 24,070 |
| *Toledo, Ohio | 396 | 654,832 | ... | ......... | 147 | 507,534 | ... | ......... |
| *Topeka, Kan. | 26 | 114,455 | 16 | 38,335 | 13 | 24,895 | 10 | 2,750 |
| *Wichita, Kan. | 116 | 801,340 | ... | ......... | 78 | 419,350 | ... | ......... |
| *Youngstown, Ohio | 228 | 742,520 | 43 | 27,300 | 198 | 408,012 | 30 | 34,525 |
| *Zanesville, Ohio | 10 | 14,475 | 8 | 8,511 | 4 | 3,760 | 8 | 9,011 |
| | 12,883 | $45,345,611 | 1762 | $1,721,212 | 6317 | $22,510,588 | 1189 | $904,301 |

CITIES IN SOUTHERN STATES

| | June, 1919 | | | | June, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Atlanta, Ga. | 102 | $1,030,847 | 132 | $150,190 | 65 | $360,059 | 129 | $89,144 |
| *Augusta, Ga. | 9 | 44,468 | 142 | 49,229 | 5 | 24,150 | 48 | 21,170 |
| *Baltimore, Md. | 1178 | 4,902,360 | 901 | 301,850 | 134 | 171,885 | 577 | 145,500 |
| *Beaumont, Tex. | 88 | 173,845 | 21 | 3,534 | 80 | 189,175 | ... | ......... |
| *Birmingham, Ala. | 110 | 221,502 | 225 | 64,675 | 29 | 26,315 | 170 | 40,733 |
| *Charleston, S. C. | 22 | 51,605 | 13 | 9,215 | 14 | 31,675 | 3 | 2,300 |
| *Charlotte, N. C. | 48 | 276,610 | 12 | 8,985 | 24 | 116,825 | ... | ......... |
| *Chattanooga, Tenn. | 199 | 298,506 | ... | ......... | 131 | 18,925 | ... | ......... |
| *Colorado Spgs., Col. | 36 | 24,454 | ... | ......... | 19 | 5,385 | ... | ......... |
| *Corpus Christi, Tex. | 14 | 8,275 | ... | ......... | 5 | 600 | ... | ......... |
| *Covington, Ky. | 18 | 68,675 | 13 | 7,350 | 2 | 2,200 | 8 | 2,300 |
| *Dallas, Tex. | 142 | 935,480 | ... | ......... | 45 | 174,231 | ... | ......... |
| *El Paso, Tex. | 97 | 221,297 | ... | ......... | 87 | 58,727 | ... | ......... |
| *Fort Worth, Tex. | 134 | 645,020 | 68 | 110,943 | 40 | 170,665 | 31 | 72,320 |
| *Jacksonville, Fla. | 24 | 122,550 | 22 | 163,050 | 16 | 22,050 | 23 | 16,315 |
| *Galveston, Tex. | 453 | 91,914 | ... | ......... | 83 | 9,225 | ... | ......... |
| *Houston, Tex. | 122 | 533,195 | 225 | 65,357 | 58 | 89,751 | 116 | 35,875 |
| *Huntington, W. Va. | 96 | 214,935 | ... | ......... | 33 | 60,930 | ... | ......... |
| *Knoxville, Tenn. | 14 | 78,375 | 102 | 59,740 | 10 | 36,892 | 66 | 18,010 |
| *Louisville, Ky. | 77 | 391,050 | 162 | 82,453 | 27 | 104,850 | 110 | 73,662 |
| *Lexington, Ky. | 75 | 88,130 | ... | ......... | 47 | 57,335 | ... | ......... |
| *Little Rock, Ark. | 102 | 358,927 | ... | ......... | 53 | 59,240 | ... | ......... |
| *Memphis, Tenn. | 237 | 524,340 | ... | ......... | 48 | 150,607 | ... | ......... |
| *Miami, Fla. | 84 | 450,200 | ... | ......... | 61 | 198,700 | ... | ......... |
| *Macon, Ga. | 30 | 145,015 | 32 | 23,925 | ... | ......... | ... | ......... |
| Muskogee, Okla. | 15 | 53,350 | ... | ......... | 11 | 70,400 | ... | ......... |
| *Nashville, Tenn. | 42 | 459,400 | 196 | 39,000 | 5 | 26,400 | 92 | 21,300 |
| *New Orleans, La. | 40 | 248,150 | 35 | 174,715 | 32 | 139,650 | 23 | 22,131 |
| *Norfolk, Va. | 192 | 1,092,064 | 31 | 10,000 | 79 | 811,785 | 28 | 6,450 |
| *Oklahoma City, Okla. | 161 | 868,805 | ... | ......... | 66 | 254,272 | ... | ......... |
| *Pensacola, Fla. | 9 | 66,350 | 108 | 43,444 | 6 | 26,987 | 82 | 33,164 |
| *Pine Bluff, Ark. | 30 | 109,590 | ... | ......... | 3 | 6,330 | ... | ......... |
| *Richmond, Va. | 94 | 545,920 | 89 | 88,705 | 22 | 94,585 | 66 | 103,963 |
| *Roanoke, Va. | 102 | 159,330 | ... | ......... | 24 | 9,835 | ... | ......... |
| *San Antonio, Tex. | 238 | 291,990 | ... | ......... | 240 | 189,178 | ... | ......... |
| *Savannah, Ga. | 46 | 91,250 | 12 | 11,575 | 8 | 5,850 | 8 | 6,650 |
| *Shreveport, La. | 48 | 142,890 | 76 | 29,283 | 18 | 26,226 | 19 | 5,196 |
| *Sioux Falls, S. D. | 33 | 302,510 | 3 | 4,850 | 14 | 83,950 | ... | ......... |
| *Tampa, Fla. | 33 | 54,065 | 66 | 21,585 | 13 | 19,120 | 46 | 12,310 |
| *Tulsa, Okla. | 214 | 2,193,793 | 44 | 25,950 | 69 | 419,196 | 25 | 15,196 |
| *Washington, D. C. | 350 | 2,513,627 | 495 | 267,359 | 141 | 580,785 | 293 | 189,312 |
| *Wilmington, Del. | 156 | 649,889 | ... | ......... | 89 | 452,484 | ... | ......... |
| | 5314 | $17,334,548 | 3225 | $1,816,962 | 1956 | $4,857,430 | 1963 | $933,001 |

BUILDING AGE

NEW YORK, SEPTEMBER, 1919

# An English Cottage with Garage Underneath

## *Good Pantry Arrangement—Scale and Proportioning of Windows a Feature*

THE dominant feature of interest in the English cottage illustrated is the central gable. The casement windows on the first story with their central panel of stucco mark an interesting departure from the usual. It will be noticed that the shutters on the central gable on the second story lend added width to the window space, although they are not used elsewhere as they are not needed; this triple window contrasts well with the practically unbroken space above.

The roof line is well broken up, the effect being gained rather by the placing of large masses of roof rather than by breaking them up with gables, etc. The front entrance and the porch at the right have circular heads, as is often done with the English type of house. The lack of heavy overhangs is not only typical of the English style of house, but also is a factor in keeping the cost down.

One enters a vestibule provided with a coat closet. The vestibule opens into a small hall containing the main stairway and continuing through back into the pantry. The placing of the pantry in this particular position is rather interesting, as kitchen odors are shut off not only from the dining room, but from the main part of the house as well, which is not always possible when the hall opens directly into the kitchen, as is often done.

An attractive vista is presented as one enters the house, for a wide cased opening makes the living room seem practically one with the hall. A fireplace placed opposite the cased opening forms the central feature of interest, and is flanked on either side by French windows opening on to the porch.

French doors separate the living room from the dining room, which latter is provided with ample window space.

In examining the plan of a house such as this one should notice the manner in which the windows are grouped, and the comparatively small size of them. Grouping windows in this fashion makes it possible to secure more wall space for furniture without having any less windows. Likewise when casement windows are used, they can be made smaller than the ordinary double hung window and still provide as much ventilation in the summer time. Small windows such as these are best placed up near the ceiling level where the most ventilation can be secured, and due to the high placing of them, furniture may be placed underneath to good advantage. In the ordinary type of house high windows are usually only placed over space provided especially for tables, buffets, etc., but in the English type of house the windows are often placed high in order that they may scale in better with the proportions of the dwelling.

The pantry is provided with ample closet space. The kitchen has a drain 36 in. high placed directly under a triple window, and on either side of the sink is a drain board. The kitchen is provided with a large closet and the ice box is placed in an entry. The position of the gas range should be noted, as the housekeeper can work at it without being in her own light. Due to the placing of the windows, light is thrown on the range from opposite whichever of the two exposed sides she may choose to work.

The second floor contains three bed rooms and a bath room. The front bed room, or master's bed room, contains two large closets and a sewing room or dressing room. A separate lavatory is provided for this room.

Each of the other bed rooms is provided with a good-sized closet. At the rear of one of the bed rooms is a balcony, which is large enough for sleeping purposes.

All the second floor closets have a shoe shelf built up a small distance from the floor so that it is unnecessary to stoop so far in picking up shoes from the closet floor.

The third floor is merely an open attic, although it could be finished into desirable quarters, if required. The cellar is well laid out, a garage being provided underneath.

This house was built for Dr. H. M. Herring at Mount Vernon, N. Y., in accordance with plans and specifications prepared by Lewis Bowman, architect, of Gramatan Homes, architects and builders, 154 East First Street, Mount Vernon, N. Y.

The manner in which the drawings for this house were prepared is described on the pages following this.

Note the placing and proportioning of windows

# How We Prepare Drawings That Get Better Buildings

## *As Described by a Member of an Exceptionally Successful Firm of Architects and Builders Specializing in Country House Work*

By Lewis Bowman, M. Arch.

AS a prelude to the observations and opinions given in these articles, I wish to mention a few of the problems, only too well known and too little considered by architects and builders alike, concerning the small country and suburban house. These are taken both from the side of the architect and from the point of view of the builders of this particular class of house.

**The drawings on this and subsequent pages to 285 illustrate the house on the previous page, as well as this article. The article tells why and how these drawings meet builders' needs, and gives hints on the preparation of specifications.**

At the present time the extreme lack of housing facilities makes the closer co-operation of architect and builder of the greatest importance, as it is already seen that under the stress of pressure one or both are made to suffer; the architect through misinterpretation of his drawings and specifications, and the builder from the dreaded and perpetual thought of an unpractical plan and loose specification.

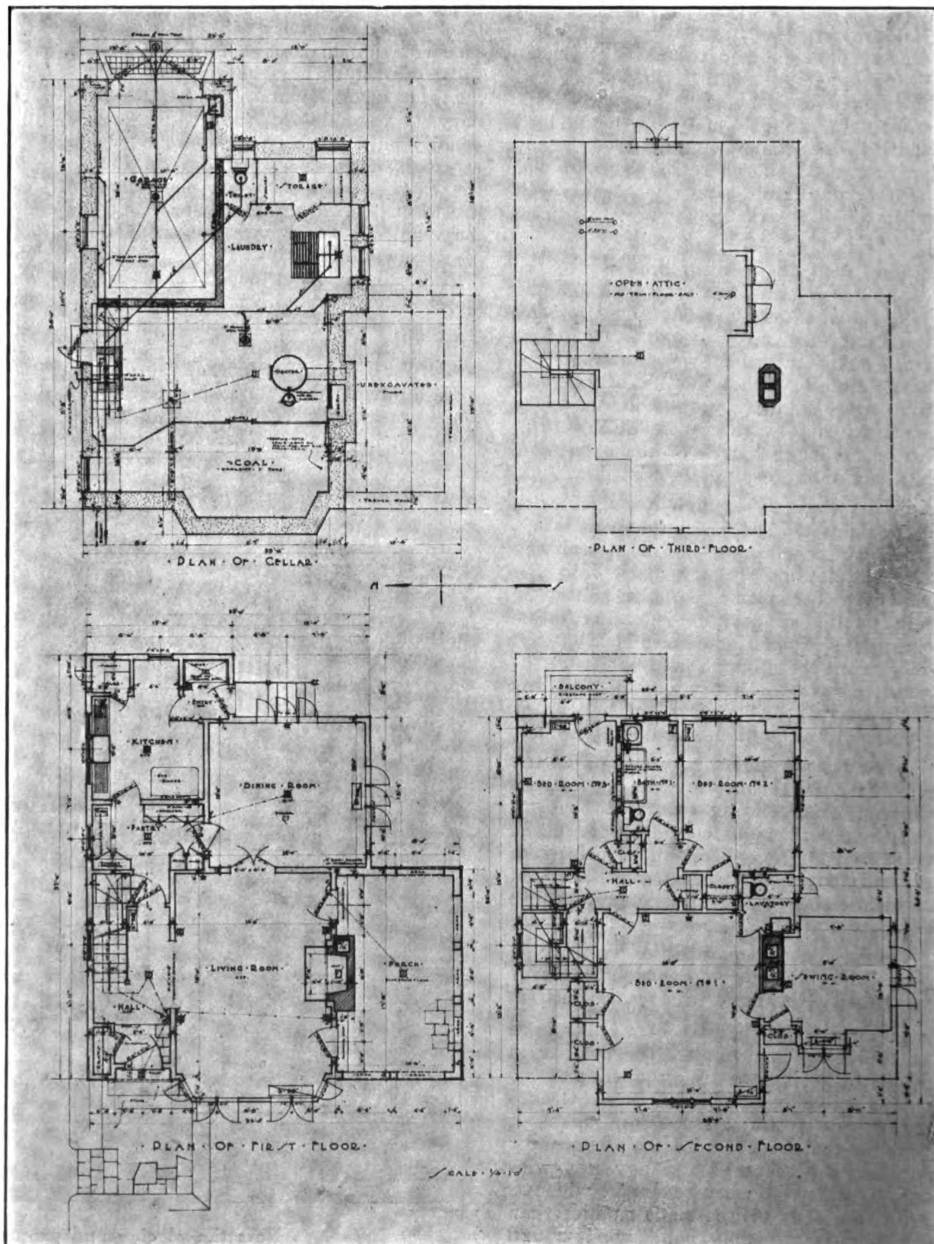
### *Drawings*

To both builders and architects it is perhaps needless to say that the building project starts with the plans. To give an architect advice on how to draw plans is perhaps superfluous on the surface, but the actual fact of the matter is, that the great majority of the architects prefer to consider themselves "designers." It seems to be their pet obsession.

In that respect we can all recall dozens of men, adequately educated, carefully trained, and capable of exquisite and attractive sketches, who rather deprecate the actual working drawings and the making of framing plans and larger details which are all that the actual creator of the building, namely, the builder, sees. It is more than likely the builder never ·s the sketch and no one seems ink that it is necessary that he should. No doubt the fact that the builder and his workmen and foremen have an interest in the looks of the building and a reasonable pride in the completion of an attractive structure would come as a great revelation to the so-called designer, who is very liable to take the whole output very personally.

As the present decade seems to have an intense admiration for the work of the middle ages and the results produced by the master builders in Europe and in the early stage of our country, whose spirit we are fostering to-day, it would seem that this class of architect becomes one of the greatest stumbling blocks placed in the path of the builder.

If the architects of the present could all have lived at the time of the formation of our "Colonial Precedence" they would have had to be of necessity "Master Builders" as architecture was practically an unknown profession. The "master builder," according to old records, was the man who made the design and personally instructed the workmen in the construction of the building. He had the requisite knowledge to enable



**This article is one that will prove of great value to architects, as well as builders. The author is a graduate of Cornell University, from which he received the degree of Master of Architecture. Upon graduating he connected with a firm of architects nationally famous. Seven years ago he secured an interest in the Milligan Company, now known as Gramatan Homes, Inc., a firm specializing in the erection of country houses.**

**As Gramatan Homes is a firm of architects and builders, every effort was made to prepare drawings that would cut costs on the job. The mechanics were watched and questioned as to the methods of preparing drawings which most facilitated their work, and drawings that undoubtedly cut costs have resulted.**

**The firm does all its own mason work, carpenter work, and painting; in addition, it runs a good-sized stock yard in order to enable its clients to get better prices on materials. Thus it can erect houses that are honestly built and exceptionally well designed at a cost that is often appreciably lower than would be done by the average firm. It cannot be emphasized too strongly that this low cost, like all low costs, is effected by eliminating waste and running the business on sound structural and business principles. Several of this firm's houses have been illustrated in "Building Age."**

**This article is only the first of several that Mr. Bowman is preparing for us. Subsequent articles, to appear from time to time, will describe how estimates are made and checked up as the work progresses, how the work is handled on the job, how the workmen are kept contented, and, in other words, how the entire business is handled. This series is one of the most valuable ever published by any building magazine and should be carefully followed by architects and builders who are in search of success.**

him to direct the means that produced the very result that was his ideal.

In the words of to-day the idealistic dreamer, the planner of the comfortable home, and the maker of the sketch must be able to place before the builder, not by words, but by plans, details, framing and construction sections drawn in the methods of the builder—just what is desired. That is, if the architect wishes to produce the ideal that is hatched in his own mind. The builder is no mind reader. No doubt he is more than willing to do it in the architect's way, only he must be given explicit directions. The architect must not wait until he has erected his cornice and then go around and criticize it—and through the power of his position have the builder change it.

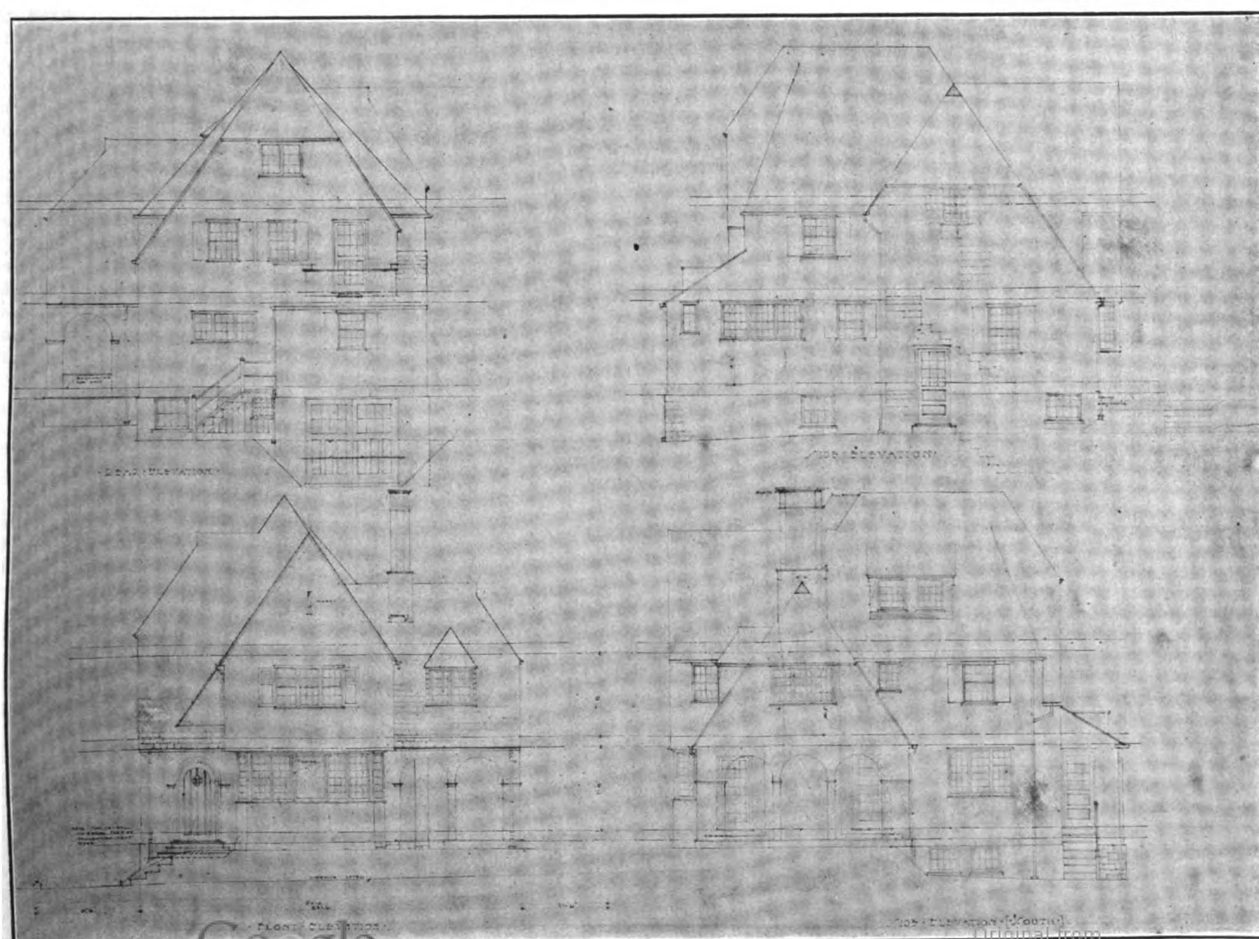
It is entirely possible in a well executed drawing to clearly indicate every line on a house and nearly every moulding used. The specification can do the rest. The words "to detail" in reference to a particular part will honestly give the builder a preliminary idea, but the sizes of the members used, also mentioned, will enable him to give you a fairer bid.

There seems to be a tradition among architects that a too detailed drawing and a too well defined specification will compel the contractor to give a larger bid. It may, but it is better business to have it given at the beginning than to have the builder secure it in "extras" as the work progresses, for if the builder is a good business man he will certainly secure such extras.

### *Framing Plans and Sections*

The real heart of a house, and where the actual design comes out, lies in the so-called framing plans and framing sections, shown on pages 282 and 283. It is perfectly obvious that an idea that cannot be built is of no value. Also it is naturally impossible to change the lines of the house anywhere but in the frame.

From the framing plans it is possi-



ble to list off each individual beam and timber shown in an accompanying cut and the material goes to the job in ordered lengths. This eliminates waste, over or under ordering, and gives the lumber yards a chance to help you in your organization. In fact, the frame comes like a knockdown affair.

These framing plans are not commonly known as part of the architect's equipment of details, but when these drawings are made it is impossible to forget bearing partitions and excessive spans which seem to be a chronic fault with so many plans. The saving of time to the builder would doubtless enable him to make such drawings of enough consideration in the cost for the owner to order such plans prepared.

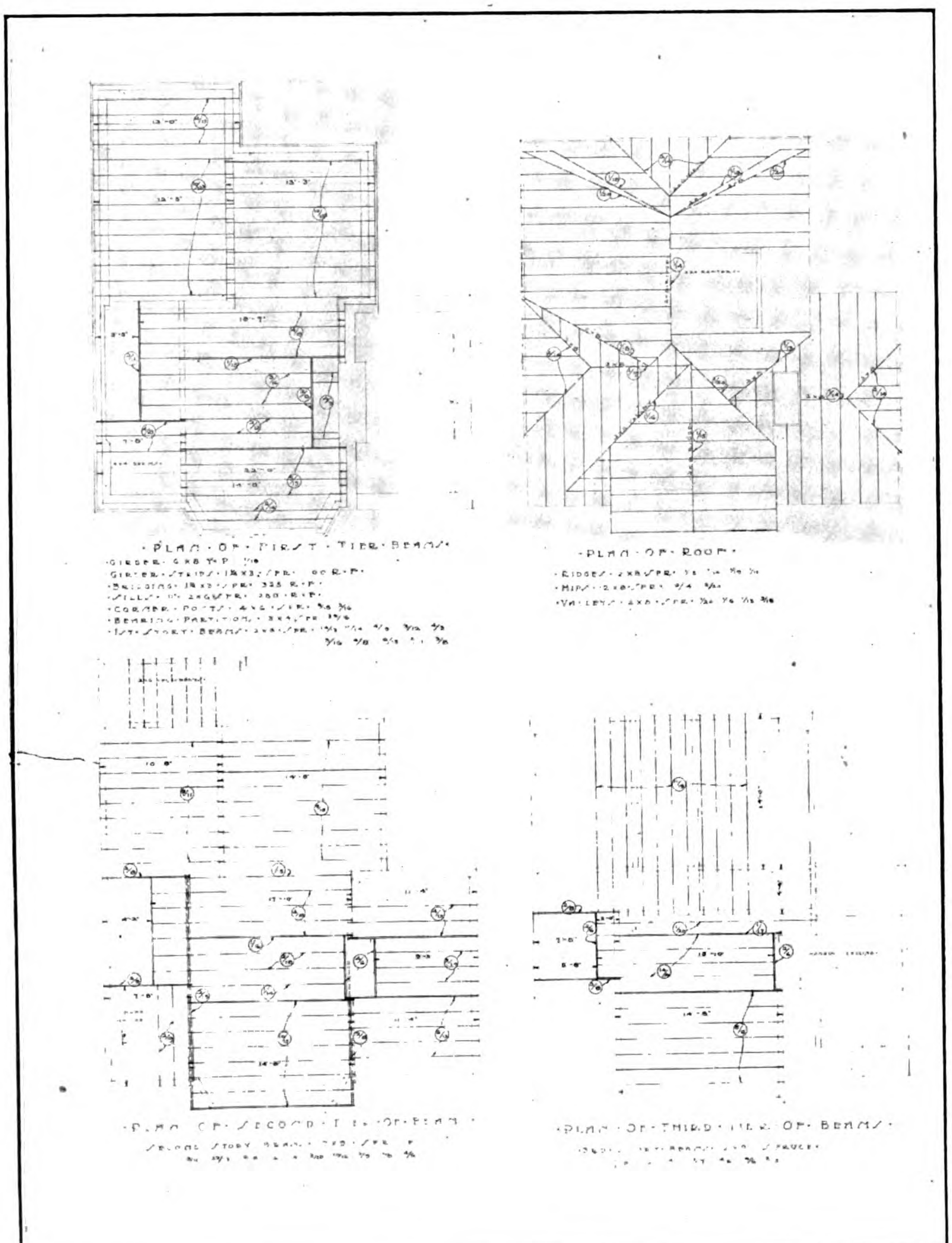
The framing plans are drawn over the actual quarter scale drawings and it is an easy matter to transfer the actual dimensions on the floor plan to the framing plan. On the section, girder construction, stair heights, rafter pitches, overhangs, in fact all the elevation data is given. The shape of the house in its skeleton form shows up, and any faulty line can be corrected.

The section is usually drawn to a scale of one-half inch to a foot. The average mechanic prefers to work everything out with a two-foot rule and either this scale or else one-inch to the foot is a very practical standard for outside framing drawings.

### *Figuring Plans*

There are various ways of figuring a plan; so many in fact that there seems to be no standard. Some figure to the center of the stud partition. Some include finish walls, showing six inches for a finished plaster wall.

We have found that the best method of figuring is always to the rough frame and outside stud dimensions. As a partition is always set some weeks before it is plastered the carpenter is hardly interested in its finished size, particularly as plaster is seldom a full inch thick when used with common lath, and of course we are now speaking of the majority of cases. Also this method of including the plaster always leaves odd inches to juggle around and to subtract and add, and is confusing to the framer. Figuring to the center of the studs makes it harder to lay out the partitions and the string of figures across a plan is harder to check on the building. It is also reminiscent of the speculative builder's trick of making rooms figure larger than they actually are by including one-half of the wall sizes in each room.




It is fair to assume that the way to figure a plan is to do it in the way a carpenter will lay it out, as the drawings are made for his benefit and figuring to the rough seems to be the accepted mode, in this locality at least.

Window and door sizes give us another chance for a large difference. Any mill man will tell you what he wants and all that he wants is the sash size always given as "width by height." The elevation shows the disposition and number of lights and from the specification he secures the thickness, size of rails and muntins—a frame detail gives him the frame. During the framing the carpenter has not the slightest interest in the sash. He wants to know just where to place the frame and how high to set the sill. This is so he can frame his openings, which are made before the frame comes to the job. In order to have him allow sufficient pocket room for weights and fitting, a frame detail of windows and doors should always accompany the framing plans and sections.

We have found it an excellent practice to figure our frames to the center of the sill, as it is easier to line up the frames in drawing and to center them on ridges and over one another. Also the carpenter takes the frames as they come from the mill, scribes a mark in the center of the sill, and sets them according to the centers given on the plan; this produces a consistent checking and centering basis and an error on plan or in framing is instantly caught.

As a standard basis for figuring, we carry through three lines of figures: One, an over-all dimension, one giving all breaks in the surface, and one giving window centers. This makes it extremely easy to check plans either in the office or on the job.

One thing about drawings that should always be remembered: They are not made for an office record or to show the client how his house will look, but for the mechanics on the job who build the structure, and any odd bit of construction, anything out of the ordinary, should be brought clearly to their notice by note on the plans or in the specification.

The electrician, the heating man and the plumber also appreciate this fact. The familiar and customary indications seem to differ in localities, but certain well defined rules of plumbing and heating are the same all over.

The working out of soil lines always has been a particular joker in plans and it invariably insists on coming through doors and windows. But if worked out beforehand they give the plumber an exact basis to figure on and give the carpenter an idea of how he must cut for his beams and partitions.

If the lines under the cellar floor are worked out you can escape having to set lally column footings and footings for chimneys and piers over them, which to say the least is bad for both the plumbing and the stability of the footing.

To many of the readers these suggestions may appear to be superfluous, but the disgusted comment that the average builder makes upon the average set of plans doubtless proves that a great many of the methods of plan drawing must be at fault. As I said before, the plans are not for the architect's benefit. He knows what he wants very clearly, but for the builder to use to construct the architect's idea. Therefore they should be drawn in the builder's language. And I can truthfully say that the kind of plan they prefer has proven itself as good a piece of architectural mechanical drawing as any discriminating architect could wish.

We have found it possible to indicate on one quarter scale drawing practically every condition that may arise and we believe that a great many dollars in time have been saved on a job by clear indications.

It may not be out of place here to bring up the case of the sparsely drawn and sketchy indicated plan and elevation. Some architects call such an object a "snappy" drawing and fill it full of centering lines that do not center, etc., to enhance this effect. We hold to the opinion that a line that cannot be "built" is unnecessary unless it tells a story of its own or indicates a direction or helps in determining the clearness of the plan.

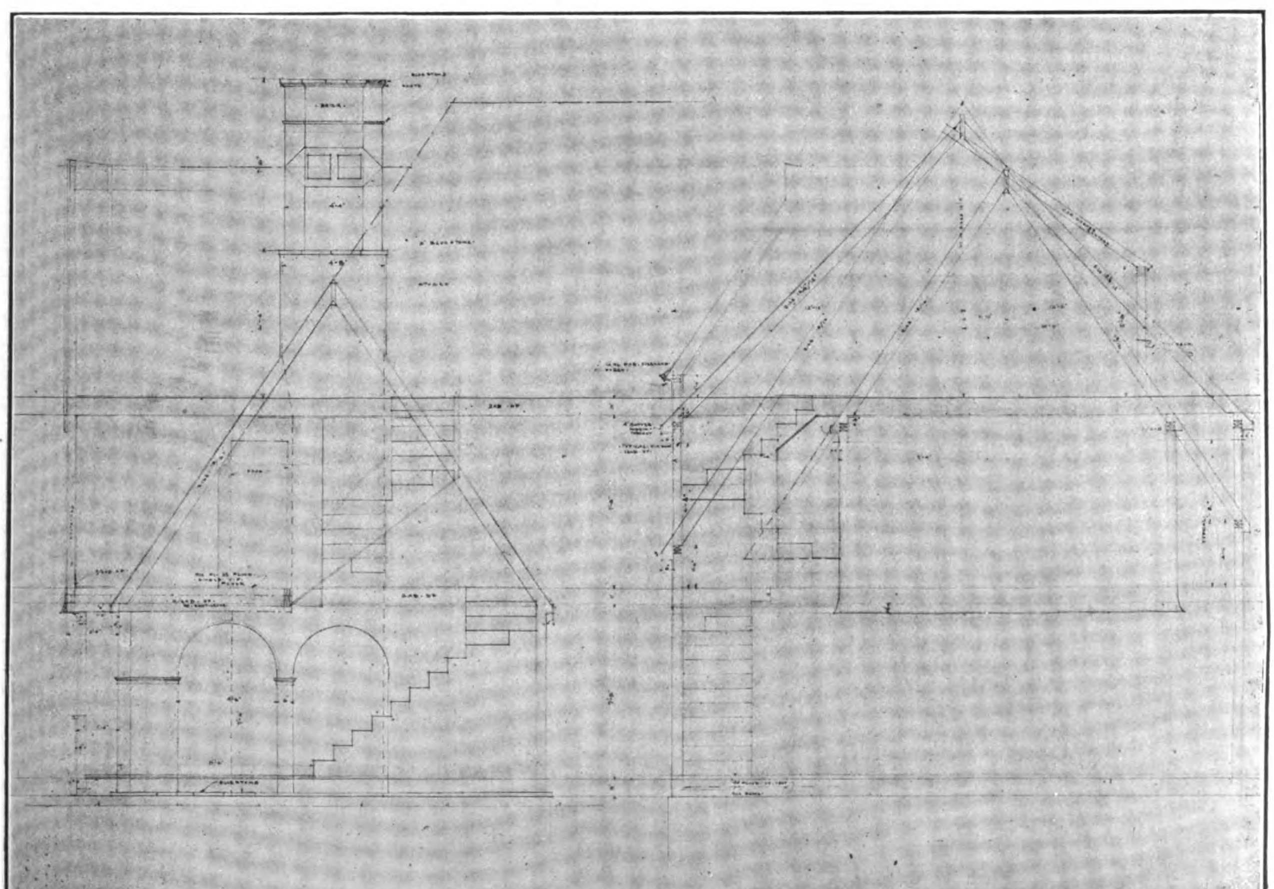
It is not fair to expect mechanics to do neater work than an architect cares to show, yet many a man would be thrown off a job for doing work in a manner such as some plans and elevations indicate.

As far as neatness is concerned, no architect is a better judge of the execution of a good piece of work than a thorough master mechanic who works in that particular branch. There are hundreds of little things that builders take exception to, but if an architect will take pains on the points discussed it is safe to assume that unconsciously the smaller points will follow.

All the points given above are the familiar faults that are encountered by the average builder in the average set of plans and we give them hoping that the suggestions will help to span the needless and existing gulf between the architect's office and the actual job.

One of the most common causes of complaint of builders is on the subject of specifications. And again we have the same theory to apply. They should be written as the plans are drawn; to instruct the builder. In too many cases they confuse him instead. One of the builders' aversions is the continuous or rambling type that contains bits of carpenter work in the tinning and heating, and plumbing in the mason and vice versa. In this type of specification stairs have a strange habit of landing in the carpenter work, when it is a separate trade, or at least figured separately. Hardware for a door seems to like to come after describing the door in the mill specification and marble sills that usually are set by the tile setter under carpenter work.

The natural inclination of any sub-



contractor finding bits of his work scattered throughout the specification is to either refuse to figure the plans or to add an emergency item to cover himself.

Each trade is naturally only interested in its own branch and all work should come under that trade's specification. Reference from one trade to another can be frequently used to clear up any difficulties.

# Making a Success of Stucco Work

## *Framing and Methods of Application That Prevent Cracks, as Recommended in Extracts from Committee Report of the American Concrete Institute*

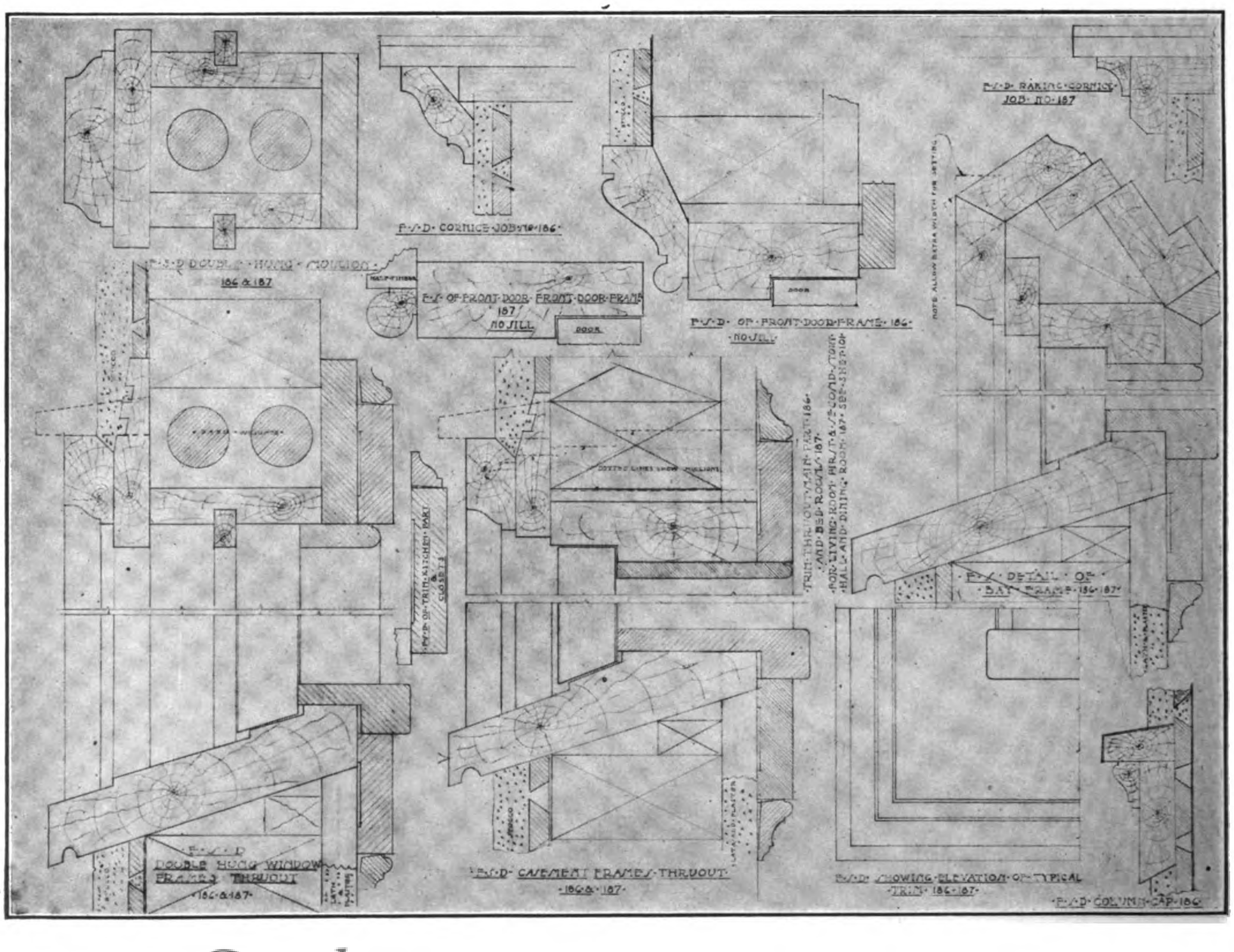
ONE of the fundamental considerations in successful stucco work is a suitable design of the structure for stucco. The architect does not always realize that an exterior plaster of any kind merits whatever protection can legitimately be given it, that for the sake of appearance it needs more protection against leakage and drip than brick, stone, or even wood exteriors. Thus it must be recognized that stuccoed copings, cornices and horizontal or nearly horizontal surfaces are more exposed to deterioration than vertical surfaces, that attention to details of chimneys, down spouts, gutters, window-sills, and overhead flashing will avoid much unnecessary staining and unsightly cracking. * * * The committee is of the opinion that walls of hollow tile, brick, concrete, concrete block, and similar materials, are superior to frame construction for the application of stucco.

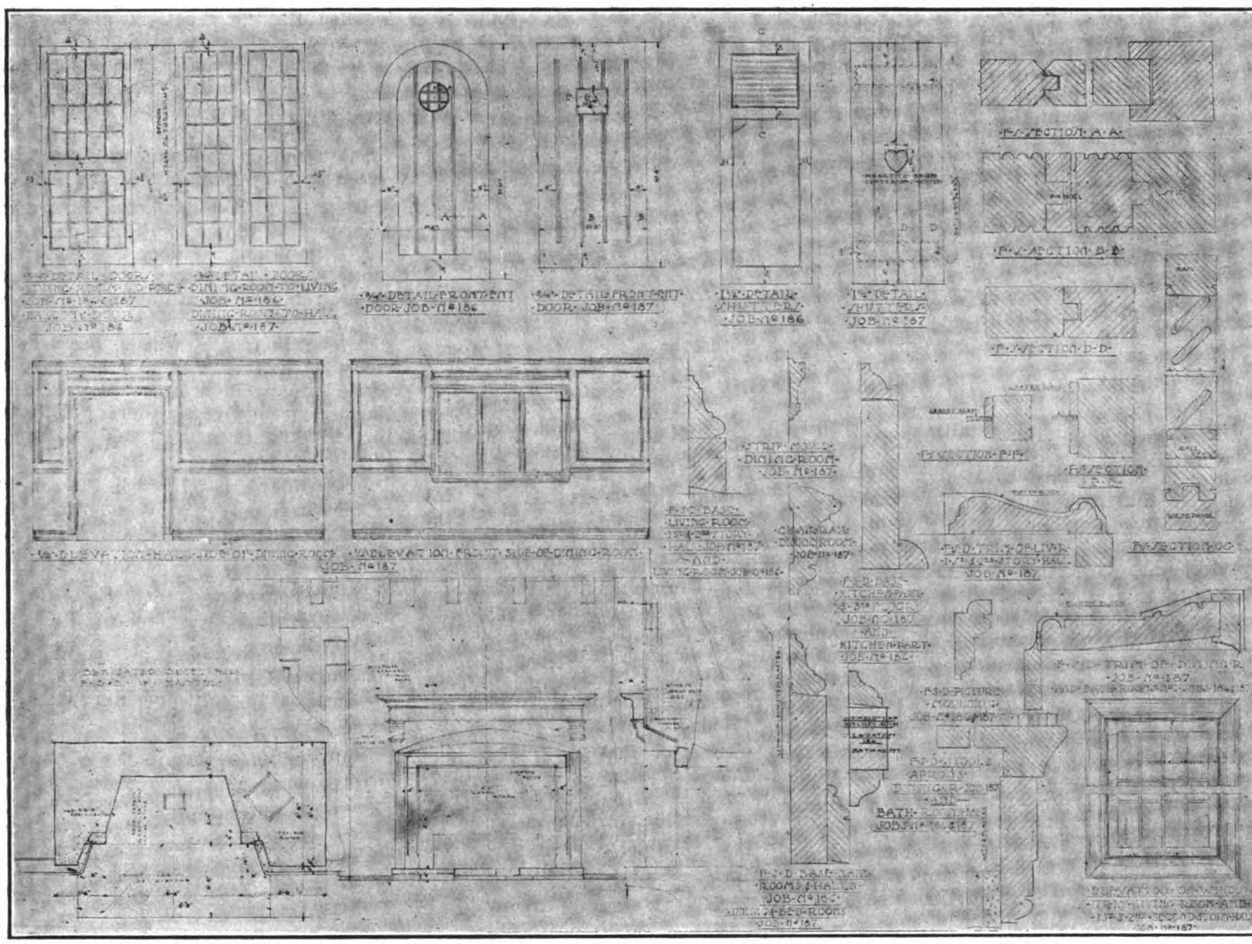
Good bracing of the frame is important to secure the necessary rigidity. Bridging between the studs at least once in each story height is recommended whether the frame is to be sheathed or not. In the former case the bridging serves as a fire stop, even if not necessary, as bracing, and should be of the same size as the studs (usually 2 x 4 in.). In the back-plastered type of construction where sheathing is not used, bridging is required for stiffening the frame, and should be 1 in. less than the studs in depth. It should be placed horizontally, and 1 in. back of the face of the studs, in order that the back-plaster coat may be carried past the bridging without break at this point. Diagonal bracing at the corners of each wall is recommended, especially when sheathing is omitted. Such bracing may be of 1 x 6-in. boards, 6 or 8 ft. long, let into the studs on their inner side in order not to interfere with the back plastering or the interior plastering. The length of the corner bracing will, of course, depend to some extent on the location of window or other openings.

When sheathing is used it should be laid horizontally and not diagonally across the studs. The stucco test panels erected at the Bureau of Standards in 1915 and 1916 have demonstrated conclusively that diagonal sheathing tends to crack the overlying stucco by setting up strains in the supporting frame. This result is undoubtedly due to the shrinkage of the sheathing, and whatever benefit might be anticipated from the more effective bracing provided by diagonal sheathing appears to be more than offset by the shrinkage effect. Diagonal sheathing is also less economical than horizontal sheathing, both in material and labor.

Waterproofing of the faces of the studs in back-plastered construction seems to be ineffective and unnecessary, and its elimination is recommended.

The proper type and depth of furring





is a question on which information is desired. If metal lath is applied over sheathing and the commonly recommended practice of filling with mortar the space between lath and sheathing is to be followed, there seems to be no good reason for using furring deeper than ¾ in. On the other hand 1 x 2-in. wood furring is widely used for both metal and wood lath, and there are good arguments both for and against this type of furring. The question of the proper length and gage of staples for metal lath is involved with that of furring. The committee recommends reducing the depth of furring to ⅜ in.

Metal lath should be specified by weight rather than by gage, and should be always galvanized or painted. Galvanized lath is a good investment in most cases, and is to be recommended in preference to painted lath, unless the method of applying the stucco is such as to insure complete embedment of the metal, as, for example, in the back-plastered type of construction.

The results of tests and field observations indicate that more attention should be given to the application of lath to exterior surfaces. Cracks frequently develop in stucco over laps or at junctions of metal and wire lath, indicating a weakness at these points. This may be due in part to reduced thickness of the stucco where the lath is lapped, or to insufficient tying and fastening at the joints. The ideal job of lathing would obviously be that in which the lath forms a uniform fabric over the structure, without seams or lines of weakness, and with equal reinforcing value in all directions. This ideal condition cannot be realized, but evidence is at hand to indicate that butted and laced, or well-tied horizontal joints are better than lapped joints, and in the case of ribbed lath, that carefully locked joints are better than lapped joints. Vertical joints must almost of necessity be lapped, but the joints may be made secure if they occur over supports and are well stapled at frequent intervals.

The use of wood lath as a base for cement stucco finds many advocates and many opponents, and more field and test data should be available before the evidence for and against wood lath can be carefully weighed. Further information is desired in regard to the type of wood lath best suited for cement stucco. In some of th most satisfactory work reported by the committee, the lath were of white pine 1 in. wide and ½ in. thick. Both material and size were here unusual, but the committee is of the opinion that this type of narrow lath is worthy of consideration. It may be stated, however, that nearly all of the test panels of wood lath erected at the Bureau of Standards developed large cracks, in such manner as to suggest that narrower lath (those used were 1⅜ in. wide) with wider keys and heavier nailing would have given better results. The tests also indicate that counter lathing in which the lath are applied lattice fashion produces no more satisfactory results than plain lathing, which is much more expensive.

The really important part of stucco work is the mortar coat. Practice varies widely in the mixture and application of stuccos. The use of hair, lime, and waterproofing materials, the variations in the mixtures for the different coats, the number and thickness of the coats, the intervals between the coats, the degree of wetting of the undercoats, and the precautions necessary in protecting the coats from too rapid drying, are details subject to question, and all will stand further investigation. However, the study of the experimental panels at the Bureau of Standards has yielded considerable information on some of these points.

One of the most important indications from these panels is that lean mixtures containing well graded aggregate give better results than those commonly specified. Mixtures as lean as one part of cement to six or seven parts of graded aggregate have given excellent results in these tests. The committee is of the opinion that the volume change of rich mortars is accountable for much of the unsightly cracking of

(*Continued on page* 301)

# Economical Design of Plumbing Systems

## *Proper Arrangement of Fixtures in Rooms May Save Considerable First Cost and Increase Efficiency of System—Three Bathroom Plans Compared for Efficiency and Economy*

By William Hutton

ECONOMY in plumbing installation is easily attained if the architect or builder will take pains to design his building so that groups of fixtures can be arranged to drain into a common soil stack. If this is done the amount of water supply pipe also is reduced in proportion.

Certainly this is recognized to some extent by competent architects, but more often than not the lay-out of the plumbing equipment is considered of secondary importance to that of the location of the rooms in which it is placed in relation to the bedrooms, or the kitchen, or perhaps of the windows which are to light the rooms.

In large buildings the floor plans, as a rule, are laid out so that the various soil and vent stacks of the plumbing system are made to perform approximately the full duty of which they are capable. In many comparatively small residences, if more than one bathroom is provided, a stack has to be erected for each and perhaps another to serve the kitchen and laundry fixtures.

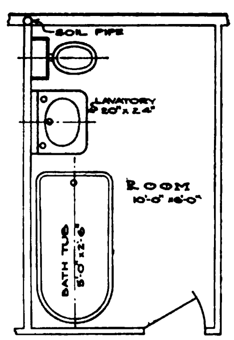
This entails a great increase in the cost of the plumbing, for the "roughing" is an expensive branch of the installation. On it is required about 70 per cent of the labor and, of course, all of the material excepting the fixtures.

If the kitchen and laundry can be planned so that they are under the bathroom, a 4-in. soil stack will serve all of the fixtures easily. If two bathrooms are to be provided and they can be arranged so that the rooms adjoin, which does not necessarily mean that the entrances adjoin, the 4-in. soil stack will serve the three groups of fixtures excellently well. And the venting of the fixtures is simplified, and not only simplified but improved, for the runs of vent piping are shorter and therefore more efficient.

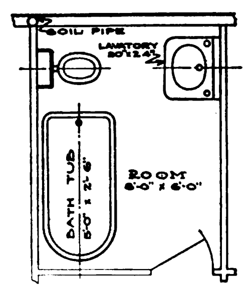
### *Good Arrangement in a Country Residence*

A country residence recently completed affords a good example of efficient planning in this respect. The laundry is in the basement, the kitchen sink is immediately above it and the maids' and owner's bathrooms adjoin, although the entrance to the first is in a hallway and the owner's bathroom is entered from his bedroom. This is made possible by locating the two rooms at the junction of an ell, which contains the kitchen and maids' rooms with the main part of the house. A 4-in. soil stack and a 2-in. galvanized iron vent stack running beside it receives the wastes and vent pipes from all of the plumbing fixtures in the house. And as the hot and cold water supply headers and the hot water boiler and heater are in the basement, the piping is simplified and the valves controlling each line are placed in a row near to the foot of the soil stack and are located so that the proper valve can be found with the minimum of trouble.

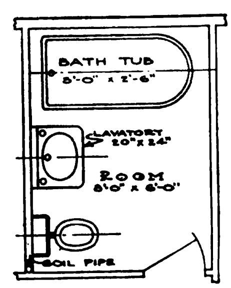
The location of the fixtures in the room is also deserving of careful study. If the room must of necessity be narrow it should be made long enough to admit of the closet, lavatory and bathtub being placed along one wall. If this is done the work of the plumber is greatly simplified and the amount of material required is reduced by a considerable amount. Comparison of the plans numbered 1 and 2 will show this very well.




Plan number one




Plan number two




Plan number three

In Plan No. 1 the soil pipe is located in a corner of the room next to the outside wall. In passing it may be stated that where a 4-in. cast-iron soil pipe is to be erected in a partition or in an outside wall of frame construction, a 6-in. stud should always be provided. A 4-in. cast-iron soil pipe measures 6 in. over the hub or bell, and if it is possible to provide this width the necessity of furring around the pipe or of providing a box is avoided.

The arrangement of the fixtures is such that the closet is placed close to the soil pipe. This should be done to secure as short a branch as possible and also to avoid the necessity of cutting joists or of providing headers, which weaken the construction. Then, if the lavatory is placed next and the bathtub is set with the waste or outlet end nearest to the soil stack, the runs of waste and vent pipe are made as short as they can be and the number of angles and turns required to connect them is reduced to the minimum.

If, on the other hand, the fixtures are arranged as shown in Fig. 2, the necessity of crossing the floor with the waste pipe from the lavatory is apparent and in addition, the length of vent pipe from the lavatory to the vent stack is much greater. In fact, it will be necessary to carry it high enough to cross over the top of the window or to take it up to the ceiling and cross there. The venting efficiency is reduced and the expense is much greater.

Proof of this is offered in the schedule of measurement of pipe and fittings required to "rough" the two sets of fixtures.

### *Material Required for Roughing of Bathroom—Plan No. 1*

1—4 in. x 2 in. soil pipe sanitary tee,
1—4 in. x 4 in. soil pipe sanitary "Y",
1—4 in. x 2 in. soil pipe tapped tee,
1—4 in. brass ferrule,
1—4 in. lead bend,
Lead and oakum,
2 ft. of 2 in. lead pipe,
1—2 in. solder nipple,
1—1½ in. lead trap,
1—1½ in. solder nipple,
3—½ lb. solder,
1—2 in. galv. nipple,
1—2 in. galv. reducing tee,
5 ft. of 2 in. galv. iron pipe,
1—1½ in. galv. tee,
3—1½ in. galv. ells,
2—1½ in. R. & L. nipples and couplings,
1—1½ in. galv. drainage ell,
1—1½ in. galv. drainage basin tee,
2—1½ in. galv. drainage Y branches,
2—1½ in. galv. drainage 45 deg ells,
1—1½ in. galv. nipple,
23 ft. of 1½ in. galv. iron pipe,
Labor of plumber and helper.
Total cost of labor and material, figured at current prices, plus fair profit .................. $48.00

### *Material Required for Roughing of Bathroom—Plan No. 2*

1—4 in. x 4 in. soil pipe sanitary tee,
1—4 in. x 2 in. soil pipe sanitary Y.
1—4 in. x 2 in. soil pipe tapped tee.
1—4 in. brass ferrule.
1—4 in. lead bend.

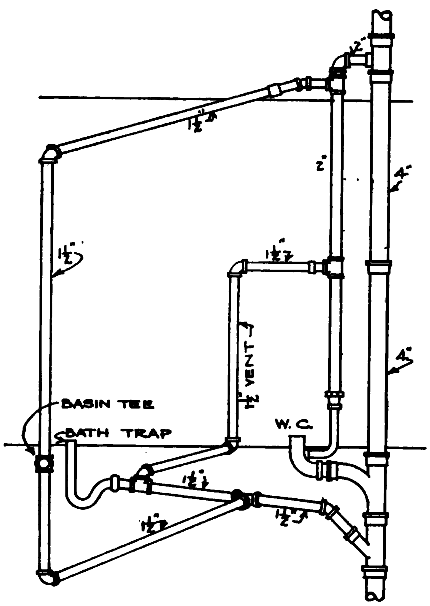
2 ft. 2 in. lead pipe.
1—2 in. solder nipple.
9 ft. 2 in. galv. iron pipe.
2—2 in. galv. reducing tees.
33 ft. 1½ in. galv. iron pipe.
5—1½ in. galv. ells.
2—1½ in. galv. drainage tee Ys.
3—1½ in. galv. drainage ells.
1—1½ in. galv. drainage basin tee.
1—1½ in. lead trap.
1—1½ in. solder nipple.
3—½ lb. solder.
Lead and oakum.
2—1½ in. R & L couplings and nipples.
Labor of plumber and helper.
Total cost of labor and material figured at current prices plus fair profit .................... $57.00

***Material Required for Roughing of Bathroom—Plan No. 3***

Fittings and labor same as No. 1.
Pipe required costs about $1.00 less.
Total cost of material and labor figured at current prices plus fair profit .................... $47.00

These quantities are taken from the plans as they would be measured by any plumber making a careful estimate and are priced at current rates with the addition of a moderate amount to cover overhead expense and profit. Both are priced at the same rate of course. The second plan requires about one half-day more labor than the first.

The first layout gives more floor space for the comfort and convenience of the user and costs $9.00 less. In plan No. 2 the room shown is shorter and a trifle wider. The layout is a common one, but is not one that gives good appearance or that makes for convenience in using the fixtures. A room of the same size is shown in Fig 3, with the fixtures arranged so that the maximum of free floor space is provided, the greatest economy in piping effected and the comfort of the user enhanced as much as possible. The plumbing of the fixtures is arranged so that the vent connections do not have to be carried higher than is necessary to keep them above the water line of the various fixtures.




**Arrangement of vent and waste pipes for bathroom number two**

***When Simplification of Plumbing Is Desirable***

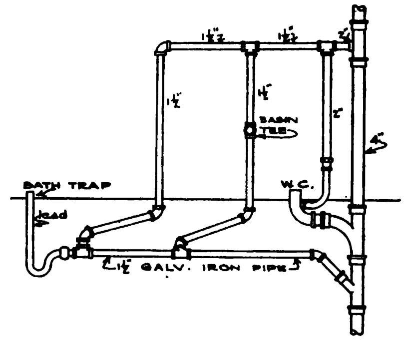
Simplification of the plumbing piping, when simplification means cutting out some essential of sanitary efficiency should not be permitted. In country districts where no plumbing laws are enforced the elimination of all vent pipes but the main one or continuation of the soil stack to the roof is common. If the branches to the fixtures are long, this practice undoubtedly shortens the life of the piping, even if no siphonage of the fixture traps results. Corrosion undoubtedly is promoted when decaying organic matter is allowed to collect on the walls of the pipes without a passage of fresh air through them. In fact, the collection of organic matter and ultimate stoppage is more apparent in an unvented than in a vented pipe. Much of the fatty matter which forms the stoppages commonly found in waste pipes from lavatories and sinks is dissolved by the action of air passing over it and passes out into the sewer in liquid form.

Anti-siphon traps may or may not prove effective as retainers of the water seal. The discharge of water from fixtures on upper floors will often cause breakage of the seal by pressure if it does not cause loss by siphonage. Then, each time a discharge from the upper floor fixtures is made, the air pressure blows the contents of a lower fixture trap up into the bowl and a quantity of foul air passes into the room. This is simplification that is not to be recommended, no matter how much is saved thereby.

***How to Arrange for Vents***

The method of venting shown in the three plans is as simple as can be devised. It meets the requirements of practically every city code and positively prevents siphonage or breakage of the seal by pressure unless some extraordinary condition is set up. It is not expensive, because it is easily installed, and the piping is of comparatively small diameter. Of course, if groups of fixtures on several floors enter the same stack, a separate vent stack must be provided into which the branch vents are connected. This enters the soil stack at the bottom and virtually forms a loop or by-pass from the lowest point at which waste water is entering the stack to a point well above the highest point at which a waste connection is made. Then air can follow a discharge freely to prevent the formation of vaccum and can pass equally freely in front of the discharge with ample opportunity to escape to the roof through the loop of the vent stack without affecting the water seal of the traps.

The lavatories are vented on what is known as the continuous plan, now recognized as the best for many reasons. It requires very little work, and the air supply is never choked with soap or grease deposited in the neck as was sometimes the case when vent connections were made to the crown of a trap. If the space between floor and ceiling permits, it is feasible to adopt the same method of connection to bath traps and floor or shower drains.




**Arrangement of vent and waste pipes for bathrooms numbers one and three**

***Kind of Drainage Fittings to Use***

Galvanized recessed drainage fittings are recommended for use with waste lines constructed of galvanized iron pipe. The flow through these fittings is unobstructed, the bore is the same as the pipe and the turns are easy. It is not safe to use pipes of smaller diameter than 1½ in. for bath tubs or lavatories, but it is good enough practice to use a lavatory trap of 1¼ in. diameter, connecting into a basin tee on a 1½ in. vertical galvanized iron waste and vent pipe if this size is preferred. The regular round or pipe trap is as good a trap as is made for use with a bath tub. It cleans itself well and if properly vented will maintain its seal under the most severe conditions of service. The old-fashioned pot trap, made of lead or brass, gives a larger seal and corresponding greater resistance to loss by evaporation when the fixture is out of use for a considerable time, but it requires periodical attention to maintain sanitary conditions, as it does not clean itself so well as the pipe trap.

The main points to look out for in design of a bathroom so as to secure the greatest efficiency at the lowest cost may be summarized as follows:

Get the closet bowl as close to the soil stack as possible.

Place the fixtures so that it will not be necessary to carry waste or vent pipes across the room to them.

If two bathrooms are on the same floor, try to plan the building so that one stack will serve both. This simplifies the water supply also.

Try to group the fixtures so as to secure the greatest amount of floor space in front of the closet or lavatory.

If possible, swing the door so as to conceal the closet on opening.

Do not simplify the plumbing at the expense of its efficiency, and do not depend upon traps alone to maintain sanitary conditions in the rooms in which fixtures are placed.

# Less Known Woods and How to Finish Them

## *What Woods to Use for Enameling—How to Treat Woods With or Without Prominent Grain*

By G. V. Leonard

AS the available woods from our forests have grown steadily scarcer, many kinds hitherto considered unsuitable for fine finishing have been experimented upon, treated successfully, and rapidly put to use. Some faults considered too serious for remedy have been overcome.

Gum is one of the most prized of woods to-day for its great beauty of grain and color, although it was not popularly used until quite recently owing to an unfortunate tendency to warp. It is now so treated as to eliminate this fault entirely and may be safely accepted for the finest work. It is usually quarter sawn like oak, to secure the most interesting markings, and when given a walnut stain, it closely resembles Circassian walnut. It may also be successfully finished in mahogany. Although there are three kinds of gum woods, red or sweet gum is the only kind used for interior finishing. It is close grained and does not require filling.

### *Why Cypress Is Popular*

Cypress is popular for its durability and its strongly marked decorative grain. For interior use it finishes well when stained in weathered, fumed, cathedral, or old English oak. It is much used for porch floors, railings and posts and for rough siding and shingles, as it is not affected by moisture. It is the only wood which may be left entirely unfinished for exterior use. When weathered it takes on a rich, soft coloring. Many fine specimens of beautiful and well preserved cypress are found in old English country houses a century or more old. It well deserves the name it has earned of "the wood eternal."

Sycamore is cross-grained and reddish-yellow in color. The California variety is most generally used for woodwork. It may be finished natural or stained brown. Magnolia wood is used in many southern localities. Cherry, the wild cherry, is one of the most popular of decorative woods. It is strong and hard and is capable of taking a very high polish. It has a beautiful reddish tone and may be finished natural or stained mahogany. Apple and pear wood are decorative and used for fine paneling. They are delicate in coloring and are beautiful finished natural. The heart wood is the most highly colored, but the outside portion next the bark may be stained slightly to match. Cedar for veneering is often as beautiful as the best "crotch" mahogany. The giant redwoods of California furnish wood which can be used in large construction. It is especially durable for shingles. Certain distortions of the grain which occur in this wood as well as in walnut, ash, birch and maple add a special beauty to the wood. This "curly" portion is valuable for fine woodwork and furniture.

### *Woods That Are Highly Colored*

Tropical woods are as a rule the most highly colored, but the native woods are not lacking in this respect. Stains of the better class are clear and pure in color and very permanent, so that this quality may be added to the pale, colorless varieties. Redwoods, cedar, cherry, walnut, yellow poplar, black locust, osage orange and holly are rich in natural coloring, and the mahogany of southern Florida is superior both in color and hardness to much of the Mexican mahogany. The natural color of the wood is somewhat darkened by the oil in the varnish, but this may be prevented by an application of white shellac before varnishing. The sooner, the less it will darken, as all woods oxidize or change color more or less when exposed to the air.

Cotton wood, poplar, white wood as well as white pine, spruce and light-colored cedar, are almost devoid of grain and color. These may all be used with especially good results for enameling. There is little or no sap to discolor the paint or enamel, and no strong grain. A coat of shellac over pine will seal the pitch in and prevent the danger of discoloration. White wood on account of its fine close grain may be used in fair imitation of mahognay so that the same wood may be used for all of the trim in the combination of enamel with mahogany doors. White wood is very workable and is excellent for carving.

Flush veneered doors make it possible to produce very beautiful effects. Variety is sometimes added by the use of inlaid borders of other kinds and colors of wood. Some of these simple doors have well designed glass panels. Very good examples of these are the quaint doors so much used in bungalows. The use of furniture and doors constructed of metal and finished in imitation of wood helps to conserve much fine wood for decorative purposes. Manufacturers of these substitutes sometimes claim for them that their superiority over wood in being fireproof will cause them to fast displace wood. They are indeed of incalculable value, especially for use in office buildings of the skyscraper type and in theaters, hotels and all public buildings. The use of wood and other inflammable substances in fireproof buildings for casings, doors and furniture, filling them full of fuel like a stove, is of course foolish and little short of criminal. While fair imitations of wood are made, there are certain qualities which cannot be simulated. Just as there are qualities in certain woods which cannot be imitated in other kinds of wood, there is a charm which cannot be secured in the wood substitutes. This quality is most noticeable in "crotch" mahogany. There is a sort of luminous or transparent quality as though one were looking beyond the surface of the wood. The appearance of the markings changes with a change of angle of vision. This same quality is found to a lesser extent in all kinds of wood with any noticeable grain and it is not to be imitated. For this reason wood will still continue to hold its own for decorative purposes.

# Eliminating Waste in Measuring Materials for Concrete

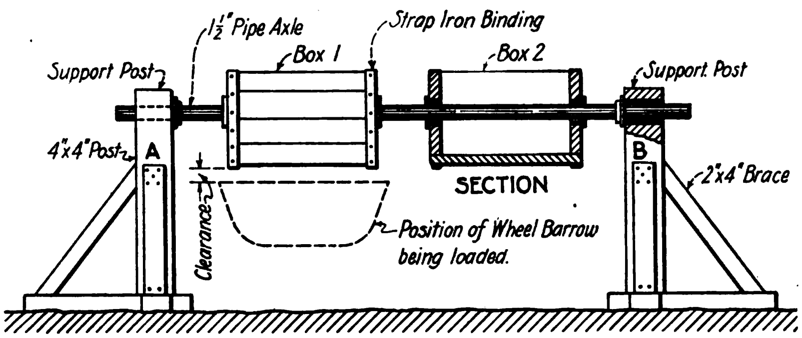
By B. A. Williamson

WHEN mixing concrete, the materials —cement, stone and sand—should be used in suitable proportions and should be measured accurately if the best results are to be obtained. Sometimes the wheelbarrow in which the materials are carried to the mixer is used for a measure. This method is liable to be inaccurate and furthermore the man who pushes the barrow loses time while it is being filled.

To insure accuracy in measuring, the materials and also a minimum of wasted time, the tip measuring boxes shown in Fig. 1 were designed by a mining engineer. Each box is made to have a known cubic contents and is hung, a trifle above its center, on a 1½-in. iron-pipe axle. When mounted on the axle the bottom of the box should be at such a distance from the ground that a wheelbarrow may be pushed under it without interference. Support posts, *A* and *B* in the illustration, sustain the pipe axle, which passes through a hole bored horizontally in these vertical members. Each end support comprises a cross-shaped base made of 2 x 4 sticks, upon which is mounted a vertical 4 x 4 braced with 2 x 4 pieces. The entire arrangement is that it may be dismantled at one location and reassembled in another in a minimum of time.

In use, the workers fill the boxes (which are hanging as shown in the illustration) even with their brims with the rock, sand, or cement, as the case may be. Then the barrow men wheel their barrows under the boxes, which, the barrows being in position, are promptly dumped. Now, while the barrows are making their journey to the mixing trough and back, the boxes are being filled again so that another charge will be ready when the barrows return.

Several boxes (hung in a row between pairs of supports on the pipe axles) arranged in front of the sand and rock piles are usually desirable if the greatest economy is to be obtained. For example, assume that a 1:2:4 concrete (1 part cement, 2 parts sand and 4 parts crushed stone) is to be mixed. Also assume that each mixture comprises 10½ cu. ft. of dry material. Then, there should be six tip boxes. One 1½-cu. ft. box would be for cement, two 1½-cu. ft. boxes for sand and three 2-cu. ft. boxes for stone. With all of these six measuring boxes filled with its designated material, a complete dry batch would be ready for mixing. For each batch, the routine procedure of filling the batter of boxes, dumping their contents and wheeling it to the mixing trough is so simple that ordinary laborers can follow it through readily and accurately without making mistakes in proportioning the materials.




**A tip box that helps to eliminate waste in measuring materials for concrete**

# How Builders Have Increased Their Business

## *Where Prospects Have Been Discovered and How They Have Been "Landed"*

By Robert F. Salade

IN practically all of the cities and the larger size towns of the United States is an unusual demand for houses, flats and apartments. During the last five years only a comparatively few individual homes and apartment houses have been built, due to conditions brought about by the great World War, and even in the present time not a sufficient number of homes and flat houses are being erected to meet the needs of the people. With the return of millions of American soldiers to this country, thousands of marriages are taking place which means, of course, a constantly increasing demand for new homes. But, in many cases, the homes are not to be had "for love or money."

The housing problem is one of the most serious problems which has ever confronted the people of these United States. The ways and means must be found to furnish every decent American family with a modern, comfortable home. The "tumble-down shack," and the dilapidated tenement house, are things of the past. The narrow courts and alleys of the great cities, with rows of old houses closely facing each other, are other evils which soon must be eliminated. In these days the American people want the right kinds of dwellings and they are going to have them, cost what it may.

The American builders are in a position to solve the housing problem and they are going to do it!

### *Remodeling Jobs More Plentiful Than Ever Before*

In addition to erecting thousands of entirely new homes, the builders will remodel hundreds of old houses, and they will also change-over many large-size homes into apartment houses. While it is true that a great deal of this class of reconstruction work has been done by the builders during the last few years, and while it is also a fact that much of this work is being done at the present time, a far greater amount of this same class of reconstruction work will have to be accomplished in the future.

The scarcity of homes in the towns and cities has been responsible for a great deal of remodeling work, and for many changes and improvements in old property which under normal conditions may not have been attended to. Before the recent war occurred it was common for one to see "To Let," or "For Sale" signs on old, badly-in-need-of-repairs houses which perhaps had been standing vacant for long periods of time. Not many of such buildings are to be seen now, but there are some still standing in every town and city, and the progressive builder should have no difficulty in persuading the owners to have the property remodeled or at least repaired.

### *How One Builder Got in Touch With Prospects*

One progressive builder is following a creative business plan which is proving very fruitful in the way of orders for remodeling homes, repairs, additions and improvement work in general. This plan is simple enough: The builder every day reads over the real estate transfer columns of the newspapers and takes note of the name and address of each party who has bought property. The property in question may be a new home, an old home, a business house, a factory or any other kind of building, and the builder figures that in most instances the building is in need of at least slight repairs. With this in mind, the builder first "looks over" the exterior of the property that has just changed owners, and his eye is quick in noting things which should be repaired. Frequently, after having made a "close-up" inspection of the property, the builder recognizes possibilities for remodeling or enlarging the building. The next step leads to a personal interview with the new owner, and the builder then offers his ideas in a clear and convincing way.

Recently, a Mr. Williams bought a brick dwelling located on a main street of a certain town for $7,000. The house was only about three years old and it had been kept in excellent condition. When our friend, the builder, glanced over the front of the structure he could find nothing that seemed to be in need of repairs. He would have suggested an enclosed porch to the new owner had it not been for the fact that the house already possessed one. What then could be suggested in the way of changes or improvements? The question was answered after the builder had seen the back part of the house. It was a "straight-up-and-down" back with no bay window or summer kitchen. Instantly our friend scented business. A few days later he had a talk with the owner; explained how the second-story back room could be enlarged by the addition of a bay window, and also boosted the project of a good-size summer kitchen with the two side walls of brick, and the front of glass-and-wood partitions.

Naturally the new owner was proud of his recent purchase and was interested in any suggestion which might mean a more useful home. The builder was soon awarded the contract for constructing the bay window and kitchen, and it is safe to say that he never would have received the order had he not gone after it. One of the strongest points in his selling argument was to the effect that with the addition of the summer kitchen the regular kitchen of the house could be used as a breakfast room.

Never before in the history of the United States has there been such a large number of home-buyers as during the last two years or so. The "Own Your Own Home" slogan has been accomplishing good results, but the principal reason why people are buying homes now is because it is simply a case of buying the home one lives in before some real estate "profiteer" buys the home over one's head. Be that as it may, the people in all parts of the country are buying their own homes—more so than ever before—and this means additional business for the builders. Why? Because whenever a man buys an old house the first thing he thinks about is putting the building in better shape. He may be capable of doing odd jobs of repair work, but seldom is he capable of attending to important repair-work and remodeling-work himself. Often the builder may procure this business merely by asking for it.

One builder keeps a force of men continually busy by doing all kinds of repair and remodeling work for well-to-do property owners. Several of his regular customers are owners of a dozen or more homes of the better class which are rented to refined people who may or may not be in a position to own their own homes. These properties are of the kind that sell from about $8,000 to $12,000, and of course it is necessary for the owners to have such buildings kept in first class condition. As a general rule the exterior of the dwellings is painted every year or so, and it is the builder's duty to see that all essential repairs are attended to before the painting is done.

### *Reducing Upkeep Brings New Business*

Naturally, the builder makes it a practice to keep frequently in touch with the owners of the houses referred to for the purpose of ascertaining what improvement work is to be done to the properties from time to time. Occasionally the builder asks one of the owners to have lunch with him at a leading hotel or restaurant, and while dining together and enjoying a pleasant conversation, the talk eventually leads to business matters. A recent after-dinner dialogue between the builder and one of his good customers sounded like this:

Builder—"How are you finding business these days, Mr. Wellington?"

Owner—"Fair, with the exception of those three-story porch-front houses on North Broad Street. All of them need painting again, and a lot of the woodwork—steps, floors, railings and several of the pillars—is again in need of repair. You know what it costs to keep those fronts in the right condition, and with the advancing costs of labor, paint and other material, I fear that those houses will be a losing proposition for me this year, unless I increase the rental figures, and I don't like to increase the rents at this time."

Builder—"I know of one way of eliminating the constant expense of painting and repairing, so far as the porches are concerned, and you know the porches are the principal source of the trouble."

Owner—"Man alive! Tell me what you mean."

Builder—"My plan is simple: Have the steps, floors, railings and pillars of the porches all constructed of concrete. The concrete never needs painting; it looks as well as cut stone work, and it will last for a lifetime without requiring repairs."

Owner—"Simple as your plan is, I had never thought of it. Concrete would be just the thing for those porches, as it certainly would eliminate the constant expense of painting and repairing. Well, go ahead with the job. Thanks for your suggestion. Whenever you have any other good suggestions in mind, don't hesitate in letting me know about them. I am always ready to consider any suggestion which may mean a saving in the upkeep expense of my property."

This dialogue should be of helpful interest to many readers of this magazine. How about it, friend builder, do you ever invite a "Class A" customer to have dinner with you at one of the best hotels or restaurants? If you have not been following this custom, you should at least give it a fair trial. Your most sedate customer will not be insulted if you politely write him or call him on the telephone, asking him if he will kindly join you at luncheon or dinner at a certain time and place. Understand, you are not going to ask the customer for any business on such an occasion. You won't have to *ask* for business. It will come along to you in a most natural way.

Recently a dentist who owns and dwells in a three-story porch front house located on a main street of a well-known Pennsylvania town, decided to have the parlor of his home enlarged and remodeled for the purposes of a professional office. The dentist consulted with a builder of the neighborhood, and gave the builder an outline of his plan for the proposed improvement, which called for taking over the dining room of the house and adding the floor-space thereby gained to the parlor.

### *How a Dentist Was Pleased*

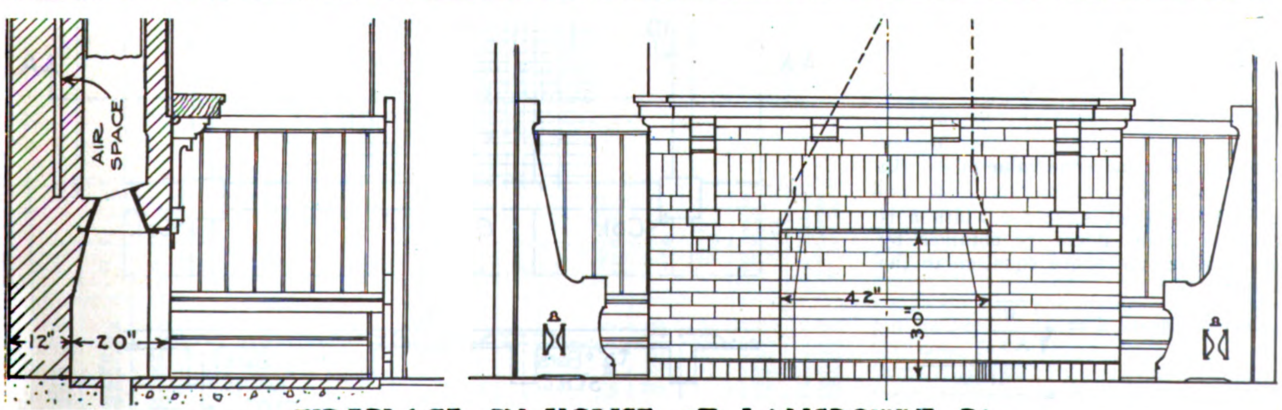
After having made a careful study of the dentist's plans, the builder offered a suggestion for the improvement which was radically different from the dentist's idea. The builder's suggestion was as follows: An enclosed porch, so designed that during warm weather the glass sash at the front and sides of the porch could be lifted out and replaced by fly screens of copper wire. The doorway at one end of the porch was to lead directly to the parlor. At the front of the parlor another door would admit the patient to the enclosed porch where would be installed the dental chair and all of the dentist's mechanical equipment. Glass-and-wood partitions and a door of glass-and-wood would separate the parlor from the enclosed porch, allowing plenty of natural light to reach the parlor which was to be used as a waiting room by the patients. Curtains of light material would be hung on all four sides of the enclosed porch so as to make it a private apartment. On the roof of the enclosed porch was to be built a veranda for the use of the dentist and his family, taking the place of the regular porch.

The dentist was delighted over this plan, and he admitted that the builder's idea was better than his own in more than one way. In the first place, the "enclosed porch dental room" was something new and attractive, in the second place, it would be cool and comfortable in hot weather, and exceedingly well-lighted during all seasons. In the third place, the dentist would not find it necessary to have the dining-room of his house torn out as had been originally intended. The builder received the order to proceed with the work in question. When completed, both the interior and the exterior of the enclosed porch was painted white, and the new addition presented a handsome appearance indeed.

One doctor occupies a three-story brick house located at the corner of two main streets. The house had a porch, in the shape of an L on two sides of it, and recently the physician had a builder enclose this porch with partitions of glass-and-wood, so constructed that fly screens could be set in during the summer time in place of glass windows. This enclosed porch is comfortably furnished with rugs, chairs, tables, etc., and is now being used by the doctor's patients as a waiting room, the parlor of the house being used as a private consultation room. At comparatively small cost this open porch was changed over into a pleasant sun parlor which is of great utility to both the medical man and his patients. Many a builder could readily "sell" this plan of an enclosed porch to doctors, dentists, milliners, real estate dealers, photographers and others who are in a position to conduct business at their homes.

### *The Use of Brains Brings a Good-Sized Contract*

In a certain section of Philadelphia are several rows of fine, big houses having extra large yards in back of them which lead to a street in the rear. Nearly all of the people who reside in these houses are owners of automobiles, but up until about a year ago only a few of the houses possessed private garages. Now through the progressiveness of a certain builder there stands an individual garage in the back yard of almost every home referred to. First, this builder made the plans for a plain but substantial garage, which was to be built of brick and concrete, with roof of corrugated iron, and with two swinging doors, back and front, constructed of wood and glass. Armed with a colored drawing of the proposed garage, the builder called upon the owners of the houses in question and explained that if he could have a dozen orders for garages like illustrated by his drawing, he would erect the twelve buildings for a special low price specified. He received eighteen orders for the garages in the one neighborhood, and he got this business simply because he had sufficient nerve to ask for it.




FIREPLACE IN HOUSE AT LANSDOWNE, PA.

· HEACOCK · & · HOKANSON · ARCHITECTS ·

# Design of Reinforced Concrete Beams and Slabs—II

## *Formulas and How to Use Them—Amount of Reinforcing Steel Required*

By L. Goodman, C. E.

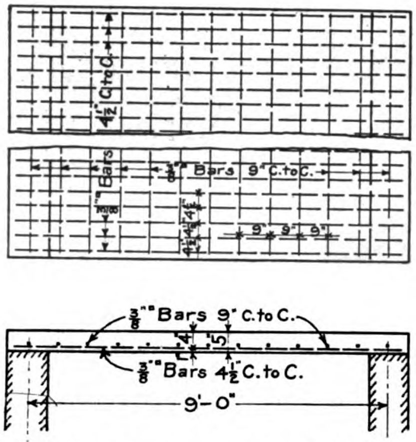



**Fig. 5. Plan and section of slab.**

A SLAB is simply a beam in which the breadth is considerably greater than the depth and the formulæ of Part I are used for its design.

In designing a slab a strip having a width of 12 in. and a length equal to the span of the slab is taken and designed as though it were a beam.

The reinforcement, which is calculated in the usual manner, is obtained for this strip and this reinforcement is then duplicated for each 12-in. width or strip of the slab.

To obtain the weight (dead load) of the slab we have to assume some thickness for the slab. As an aid in estimating this thickness Tables 3 and 4 are given.

Example. Design a reinforced concrete slab having a span of 9 ft. and required to carry a live load of 100 lb. per square foot.

For the given span and loading Table 3 shows that a slab having a total thickness of 5 in. and weighing 62 lb. per square foot will answer the purpose.

The total load on the slab will be 100 lb. plus 62 lb., or a total of 162 lb. per square foot.

For a strip 12 in. wide the bending moment

$$M = \frac{Wl}{8} = \frac{162 \times 9 \times 9}{8} \times 12 = 19680 \text{ in. lb.}$$

From equation $bd^2 = \frac{M}{K}$,

in the case of a beam we can vary both $b$ and $d$ to meet the value of $\frac{M}{K}$. In the slab, however, since the width $b$ is taken as 12 in., $d$ can be obtained by transforming the above equation to the following:

$$\text{Effective depth } d = \sqrt{\frac{M}{Kb}} = \sqrt{\frac{19680}{107.4 \times 12}} = 3.88 \text{ in., say 4 in.}$$

Adding 1 in. for fire protection gives us a slab having a total thickness of 5 in. Our assumed thickness and weight of slab are correct. If they varied materially the moment would have to be revised.

The area of steel required in the 12-in. strip

$$A_s = \frac{M}{f_s jd} = \frac{19680}{16000 \times .874 \times 4} = .351\square''$$

Using ⅜-in. square twisted steel bars the area of which is .1406 sq. in. (see Table 2, previous article), we get a theoretical spacing of the bars

$$\text{Spacing in inches} = \frac{12 \times \text{area of one bar}}{A_s \text{ required per foot}} = \frac{12 \times .1406}{.351} = 4.8 \text{ in.}$$

In practice it would be best to space the bars 4½ in. apart on centers.

To prevent shrinkage cracks, reinforcement is placed in a direction at right angles to that which we have just designed to carry the load.

The area of concrete tending to shrink is 5 in. x 12 in. = 60 sq. in. per foot of length and the Joint Committee recommends shrinkage reinforcement equal to one-third per cent of this, or .20 sq. in. With ⅜ in. square bars the spacing would be

$\frac{.1406 \times 12}{.20} = 8.4$ in. In practice they would be spaced 9 in. apart, and some even place the shrinkage bars as far as 18 in. apart.

*Design of Continuous Slab.*—Where the slab is continuous over several spans, as is usually the case in the floor slab of a reinforced concrete building, the design is modified somewhat to meet the condition of continuity.

Example. Design the floor slab of a reinforced concrete factory building to sustain a live load of 120 lb. per square

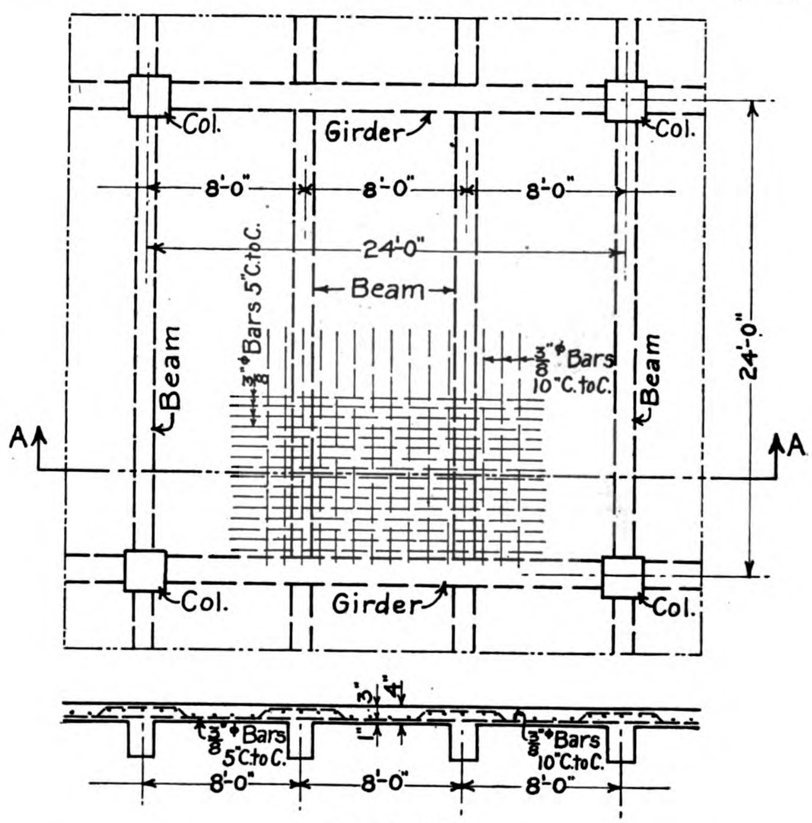



**Fig. 6. Plan of interior bay above, with section on line A A below**

foot. The columns are spaced 24 ft. centers.

The span of the floor slab as shown on Fig. 6 is 8 ft.

From Table 4, for continuous slabs, it is seen that a slab having a total thickness of 4 in. is nearest to our requirement. This is the minimum thickness which should be used for floor slabs.

The weight of the slab is 50 lb. per square foot, so that the total load is $120 + 50 = 170$ lb. per square ft.

Taking a strip 12 in. wide the bending moment, for a continuous beam, is

$$M = \frac{Wl}{12}$$

$$= \frac{170 \times 8 \times 8}{12} \times 12$$

$$= 10880 \text{ in. lb.}$$

The effective depth required is equal to

$$d = \sqrt{\frac{M}{K\,b}}$$

$$= \sqrt{\frac{10880}{107.4 \times 12}}$$

$$= 8 \text{ in.}$$

Use a 4-in. slab with the steel 1 in. above the bottom.

The area of steel required in a width of 12 in.

$$A_s = \frac{M}{f_s jd}$$

$$= \frac{10880}{16000 \times .874 \times 3}$$

$$= .259 \text{ sq. in.}$$

If we use ⅜-in. round bars the area of which is .1104 sq. in., the spacing is

$$\text{Spacing} = \frac{12 \times .1104}{.259}$$

$$= 5.1 \text{ in.}$$

Space the bars 5 in. apart centers.

Slabs which are continuous over the supports, as in the floor slab, have negative bending moments over the supports; these moments are assumed for the purposes of design as equal to the bending moments at center of span.

To provide for the negative bending moment over the supports, each alternate bar is bent up at the quarter point of the span and carried, near the upper surface, to the quarter point of the adjacent span. The remaining bars are allowed to remain and continue through at the bottom.

As this will not provide sufficient steel at the top surface over the supports, the rest of the steel is supplied by carrying back every other bar from the adjacent span. This will provide as much steel, at the top, over the supports, as in the center of the span.

The shrinkage reinforcement required in the other direction is $.003 \times 4 \times 12 = .144$ sq. in. per foot section of slab.

The spacing for ⅜-in. round bars

$$= \frac{12 \times .1104}{.144} = 10 \text{ in. centers.}$$

*(To be continued)*

TABLE 4.—STRENGTH OF SLABS

$f_s = 16{,}000,\ f_c = 650,\ n = 15,\ p = .0077$

Based on $M = \dfrac{Wl}{12}$ for fully continuous.

| Total Depth, Inches (h) | Safe Live Load per Square Foot, Span in Feet (l) | | | | | | | | | | | | Weight of Slab per Sq. Ft. | Depth to Steel (d) | Depth Below Steel (e) | Steel Area in 12" Width, Sq. In. | Safe Moment of Resistance (M), Inch Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | |
| 2½ | 215 | 126 | 78 | 48 | 30 | .... | ... | ... | ... | ... | ... | ... | 32 | 1¾ | ¾ | 0.162 | 3,952 |
| 3 | 370 | 224 | 143 | 94 | 64 | 35 | 27 | ... | ... | ... | ... | ... | 38 | 2¼ | ¾ | 0.208 | 6,536 |
| 3½ | 477 | 347 | 227 | 155 | 108 | 77 | 53 | 37 | ... | ... | ... | ... | 44 | 2¾ | ¾ | 0.254 | 9,770 |
| 4 | 803 | 496 | 329 | 228 | 164 | 118 | 87 | 63 | 45 | 30 | ... | ... | 50 | 3¼ | ¾ | 0.300 | 13,650 |
| 4½ | 933 | 578 | 353 | 267 | 191 | 140 | 102 | 75 | 54 | 38 | 24 | ... | 56 | 3½ | 1 | 0.323 | 15,830 |
| 5 | 1230 | 766 | 513 | 360 | 261 | 194 | 144 | 108 | 82 | 60 | 44 | 30 | 62 | 4 | 1 | 0.370 | 20,680 |
| 6 | 1945 | 1217 | 823 | 585 | 430 | 323 | 248 | 193 | 149 | 116 | 89 | 69 | 75 | 5 | 1 | 0.462 | 32,310 |
| 7 | 2820 | 1774 | 1204 | 861 | 639 | 487 | 380 | 296 | 235 | 187 | 150 | 118 | 88 | 6 | 1 | 0.554 | 46,520 |
| 8 | 3856 | 2433 | 1659 | 1192 | 889 | 681 | 534 | 423 | 339 | 274 | 223 | 281 | 100 | 7 | 1 | 0.647 | 63,320 |
| 9 | 5058 | 3198 | 2186 | 1576 | 1180 | 909 | 715 | 572 | 575 | 490 | 422 | 369 | 112 | 8 | 1 | 0.739 | 82,720 |
| 10 | 6420 | 4064 | 2784 | 2012 | 1514 | 1167 | 923 | 740 | 602 | 494 | 409 | 341 | 125 | 9 | 1 | 0.832 | 104,700 |

# Is the Closet-Bed a Menace to Health?

Alderman Joseph Kostner of Chicago has undertaken to put out of business the apartments with combination rooms, such as those having folding beds. His belief is that these are detrimental to the health of the community because proper ventilation is not provided.

Just what confirms this opinion is his testimony that while building ordinances provide for ventilation in all sleeping apartments, some of the closet-beds used in the so-called trick apartments cannot to reached under the present ordinance. He further states that some of the occupants of these flats do not even take the trouble to make the beds or keep them clean. Each morning the bedroom is turned into a kitchen or dining room, as the case may be, and the bed is shoved back into a dark closet without ventilation. In the night it is again converted into a sleeping room.

That a device like the folding closet bed, conceived in the best of faith to fill an important need should be so abused, is the result of one of the unfortunate twists in the mental makeup of some people. In these days of opportunity in wide education it is amazing and horrifying to believe that this unwholesome perversion of a convenience should occur.

Just how far the alderman's war against the closet bed may meet with success seems doubtful. It is certainly true that people so slovenly in their habits will find an outlet for their carelessness—closet-bed or no closet-bed. The closet-bed slovenly kept is merely an outlet, an indictment of the people rather than the bed. The thing to do is not to condemn the inanimate closet-bed, but rather to impress the people with the need for a decent cleanliness, and teach it through the conventional educational sources and through the agency of salesmen exploiting these doors.

The alderman has brought to light an interesting condition, and it is hoped that a good purpose may be served.—E. R.

TABLE 3.—STRENGTH OF SLABS

$f_s = 16{,}000,\ f_c = 650,\ n = 15,\ p = .0077$

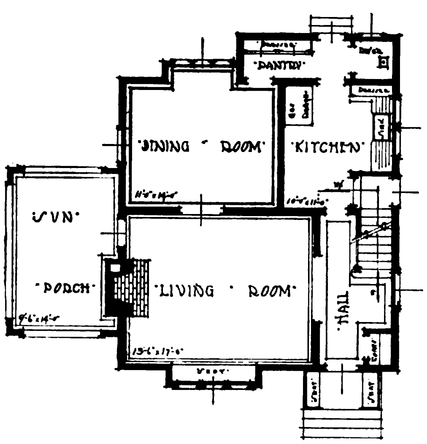
Based on $M = \dfrac{Wl}{8}$ for supported ends.

| Total Depth, Inches (h) | Safe Live Load per Square Foot, Span in Feet (l) | | | | | | | | | | | | Weight of Slab per Sq. Ft. | Depth to Steel (d) | Depth Below Steel (e) | Steel Area in 12" Width, Sq. In. | Safe Moment of Resistance (M), Inch Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | | | | |
| 2½ | 132 | 74 | 42 | 22 | .... | .... | ... | ... | ... | ... | ... | ... | 32 | 1¾ | ¾ | 0.162 | 3,952 |
| 3 | 234 | 136 | 83 | 51 | 30 | 11 | ... | ... | ... | ... | ... | ... | 38 | 2¼ | ¾ | 0.208 | 6,536 |
| 3½ | 363 | 217 | 137 | 89 | 58 | 37 | 21 | 10 | ... | ... | ... | ... | 44 | 2¾ | ¾ | 0.254 | 9,770 |
| 4 | 509 | 314 | 203 | 136 | 92 | 62 | 41 | 25 | 13 | ... | ... | ... | 50 | 3¼ | ¾ | 0.300 | 13,650 |
| 4½ | 603 | 366 | 237 | 159 | 109 | 74 | 50 | 31 | 18 | 6 | ... | ... | 56 | 3½ | 1 | 0.323 | 15,830 |
| 5 | 799 | 570 | 321 | 229 | 153 | 108 | 75 | 51 | 34 | 19 | 8 | ... | 62 | 4 | 1 | 0.370 | 20,680 |
| 6 | 1271 | 787 | 523 | 365 | 262 | 191 | 138 | 103 | 75 | 52 | 35 | 21 | 75 | 5 | 1 | 0.462 | 32,310 |
| 7 | 1850 | 1153 | 774 | 545 | 397 | 295 | 222 | 168 | 127 | 95 | 70 | 50 | 88 | 6 | 1 | 0.554 | 46,520 |
| 8 | 2538 | 1589 | 1073 | 762 | 559 | 421 | 322 | 249 | 193 | 150 | 115 | 87 | 100 | 7 | 1 | 0.647 | 63,320 |
| 9 | 3334 | 2094 | 1420 | 1013 | 749 | 568 | 439 | 344 | 271 | 214 | 169 | 132 | 112 | 8 | 1 | 0.739 | 82,720 |
| 10 | 4238 | 2668 | 1814 | 1300 | 968 | 737 | 573 | 452 | 360 | 288 | 231 | 185 | 125 | 9 | 1 | 0.832 | 104,700 |

# An Up-to-Date Colonial Cottage

## *Sun Porch and Sleeping Porch a Popular Feature—Good Kitchen and Pantry Arrangement*

A TRACE of the Dutch Colonial influence is shown in the handling of the roof of the cottage illustrated in that the overhang of the main roof and also that of the sleeping porch is brought down so as to form a gambled roof effect. This handling is a popularizing




of a design that otherwise might appear a bit too severe for the average person, although the excellent proportions of the house itself might to some make this view appear unnecessary.

The hood that extends across the house is well proportioned to the structure and its overhang is not too heavy for the size of the house. The porch treatment with its two seats is a popular one with this type of house.

The grouping of the three windows in the main part of the first story should be noted, especially as regards their proportioning to the windows in the second story. The flower box gives an effective added touch, especially desirable in the small country houses which receive so much charm through the tasty placing of shrubbery and like accessories.

Most of the better smaller houses here in the East are planned with a sun porch and sleeping porch, and this house presents a good handling of the usual solution of the problem.

The shutters on the second story windows break up the surface of the wall attractively and lend a tasty note of color to this part of the elevation.

One enters directly into a hall that runs back to the kitchen. To the right of the front entrance is a coat closet, an indispensable adjunct of even the smallest house to-day. At the left of the hall is a large living room, the main features of which are a window seat and a brick fireplace. The sun porch is carried back only part way, so as to permit of the dining room having windows on two sides. The dining room also contains a window seat.

Communication between the dining room and kitchen is through a pantry so placed that one cannot see from one room to the other, always a desirable feature. One end of the pantry contains a place for the refrigerator, which compartment has a window so that the refrigerator may be iced from the outside, thus avoiding the necessity for the tracking in of mud when the refrigerator is filled. Entrance from the outside is had directly into the pantry.

The kitchen is provided with a sink placed under two windows, and has a drainboard on either side. The drainboard to the left of the sink has a dresser over it so that dishes may be washed, dried, and placed in the dresser with minimum expenditure of energy. Necessity for another chimney is avoided by using a gas range, as often done nowadays in the small house.

The second story contains three bed rooms, each one provided with a large closet. Although the hall is a central one, it receives plenty of light from a window placed just over the main landing.

This house was erected at Maplewood, N. J., in accordance with plans and specifications prepared by Kenneth W. Dalzell, Architect, Budal Building, Maplewood, N. J.

# Refrigerating Plant That Keeps a House Cool

## *Experiment Proves It Possible to Cool Rooms in Summer as Easily as They Can Be Heated in Winter*

"YOU heat your house in winter; why not cool it in summer?" This idea occurred to Dr. Alexander Graham Bell when the Washington weather became extremely sizzling.

In a communication to the National Geographic Society, Dr. Bell describes how he tricked the thermometer out of some thirty-five degrees.

"We go up to the arctic regions and heat our houses and live," he explains. "We go down to the tropics and die.

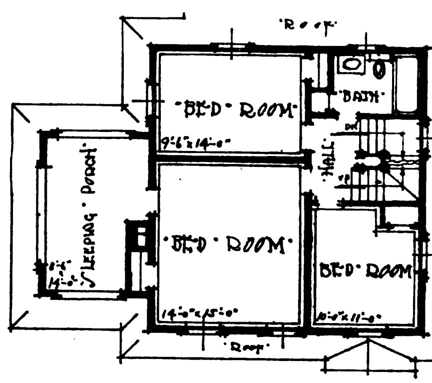
"I have found one radical defect in the construction of our houses that absolutely precludes the possibility of cooling them to any great degree. You will readily understand the difficulty when you remember that cold aid is heavier than warm air. You can take a bucket of cold air, for example, and carry it about in the summer time and not spill a drop; but if you make a hole in the bottom of your bucket, then, of course, the cold air will all run out.

"I began to think that it might be possible to apply the bucket principle to at least one room in my Washington home, and thus secure a place of retreat in the summer time. It seemed to be advisable to close up all openings near the bottom of the room to prevent the escape of cold air and open the windows at the top to let out the heated air of the room.

"Now, it so happens that I have in the basement of my house a swimming tank, and it occurred to me that since this tank holds water, it should certainly hold cold air; so I turned the water out to study the situation. The tank seemed to be damp and the sides felt wet and slimy.

"I reflected, however, that the condensation of moisture resulted from the fact that the sides of the tank were cooler than the air admitted. Water vapor will not condense on anything that is warmer than itself, and it occurred to me that if I introduced air that was very much colder than I wanted to use, then it would be warming up in the tank and becoming dryer all the time, it would not deposit moisture on the sides and would actually absorb the moisture there.

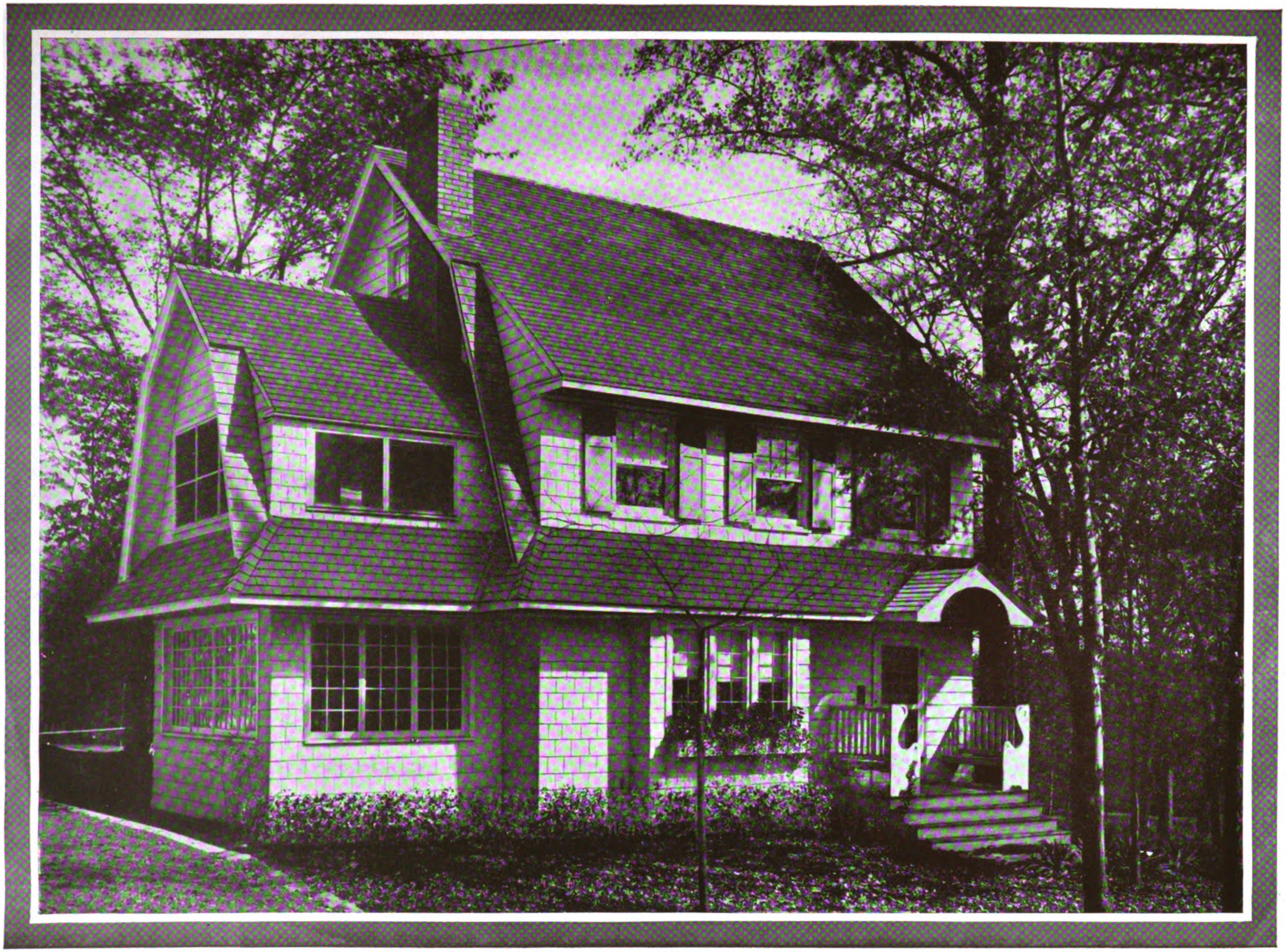
"I, therefore, provided a refrigerator, in which were placed large blocks of ice covered with salt. This was placed in




another room at a higher elevation than the tank, and a pipe covered with asbestos paper was employed to lead the cold air into the tank.

"The first effect was the drying of the walls, and then I felt the level of the cold air gradually rising. At last it came over my head. The tank was

(*Continued on page* 308)





House at Maplewood, New Jersey. K. W. Dalzell, Architect

# Building Costs in England

## *Situation There Affords Valuable Data on Tendencies in This Country*

By John Y. Dunlop

MANY are the attempts that are being made all over England to arrive at the cost of new buildings under: (1) the government schemes of building; (2) by the private builder and (3) by the Garden City schemes which had done such good work previous to 1913.

It is well known that to encourage buildings in this country the government is making a bold effort to hurry on the various housing schemes. The local authorities in every district have power to levy a rate and will receive assistance toward any deficit beyond the yield of one penny in the pound.

### *How the Government Is Assisting*

In the case of the Garden City Associations, the assistance proposed by the government takes the form of a loan to the extent of 75 per cent of the cost at 5½ per cent interest and repayment by instalments in 50 years. The most of Garden City authorities are concerned with the building of four apartment houses of the brick type and, according to the latest particulars to hand from a firm of standing, which has done much work of this kind, a house of four apartments with scullery and bathroom which cost £366 10s. to build in 1913, and which was let at £34 10s., equal to 7 pence per square foot of floorage, cannot be built today under the government public utility societies' scheme to let at less than £65 per annum. This represents an increase of 88 per cent on the rental and raises the rent to an extent that is far beyond anything which will be paid by the tenant.

### *Increase in Rentals*

Taking a house erected at £366 10s. and rented at £34 10s. and basing the estimate of today's cost on an estimated increase of 13 per cent, while the increase is statea in many cases to be over that, the following figure will show how it works out to a rental of about £65, equal to an ncrease of about 88.4 per cent on the pre-war rent of a similar house.

Now, in pre-war days a capable builder in good credit could erect on his own, that is doing all the different branches of the trade and sell as he went along, a six-roomed house for £450.

Today his estimate for the same class of house is £900.

Of course this contracting or speculative builder would be his own architect, his clerk of works, and his own manager; that is the reason why he is able to put his increased cost at 100 per cent only.

The prices for work and material have taken a big jump since 1913, as the most of the building trades in our district have now 1s. and 10 pence (44 cents) per hour, while the same tradesmen in 1914 had 10 pence (20 cents) for the same time.

### *Material Prices Compared With Pre-War Costs*

With material, ordinary bricks are now sold at 60s. per 1000, while cement, which could be had in any quantity at 26s. per ton, is now at 118s. per ton.

Now, with timber. We are paying at the sawmills for 6 x 1⅛-in., tongued and grooved flooring, 7 shillings and 1 penny; previous to the war the price was 18 pence, and many are the thousands of yards I have bought for 16 pence. Our price in pre-war times for material, transporting and laying, and cleaning off was 1s. and 8 pence per square yard.

Of course there are many in this country who consider that these prices are only temporary, but I have my doubts.

Take the brick question. We are today in this country in as good a position as ever to make our own bricks, still brickwork is very expensive.

Brick walls 4½ inches thick used to cost us 1s. and 5 pence, 9-inch work 2s. and 10 pence, 14-inch work, 4s. and 3 pence, 18-inch work 5s. and 3 pence, and in the case of heavy footings, 13s. per cubic yard.

I have had recently to get an offer for some 9-inch work and the price today is 14s. per square yard.

The upward tendency which the prices of material have taken recently have caused the government to organize a large scale buying scheme so as to supply local authorities and other promoters of house-building schemes through the Ministry of Supply. It is thought that they will be able to sell at from 10 to 15 per cent under ruling market prices.

Before this can take place, makers and merchants of such material must quote lower prices to them than those which they will supply the ordinary builder.

### *Manufacturers Unwilling to Contract Ahead*

So far as I can see the greatest difficulty which the building contractor is having today is due to the unwillingness of the manufacturer or the merchant to enter into any binding contracts at any other than the day's price, which is due to the uncertainty as to the cost of labor and the fluctuations of the market.

Almost every week we see further notifications of further rise in wages in compliance with the demand of workers who find that high wages mean the still further rise in prices of articles of general consumption and that the last gained rise in wages disappear almost as soon as it is conceded.

Of course a good number of the building trades are still under control in this country, such as roofing and ridging tiles, earthenware pipes, sanitary ware lead pipes, sheet lead, wallpaper, glass, and Portland cement, while the following are partially controlled: Building bricks, lime, plaster, mortar, gas pipes, electric light fittings, locks, latches, nails, screws, ironmongery, slates, paint and varnish.

The only uncontrolled material, we are told, is timber, partition blocks, and material such as hand bricks, sand, gravel, and granite chips.

There are numerous tales being told in some quarters of the many materials which are vital to the housing schemes being held up with the view to keeping up prices to the consumers.

### *Import Restrictions and Pooling Raise Prices*

Glass, I am told, can only be obtained by waiting for periods of many months, while at the same time the import of glass is severely restricted. The declared object of one of the most powerful of those trade rings is said to be the keeping up of prices to all concerned.

This is to be done by means of pooling arrangements so controlling production that prices will rise naturally and inevitably as they always must do when supply is brought into equilibrium with or is even so little below demand.

As this combine has within its members over 90 per cent of the manufacturers of the class of goods with which it deals, it looks as if there were little chance of much drop in building prices meantime.

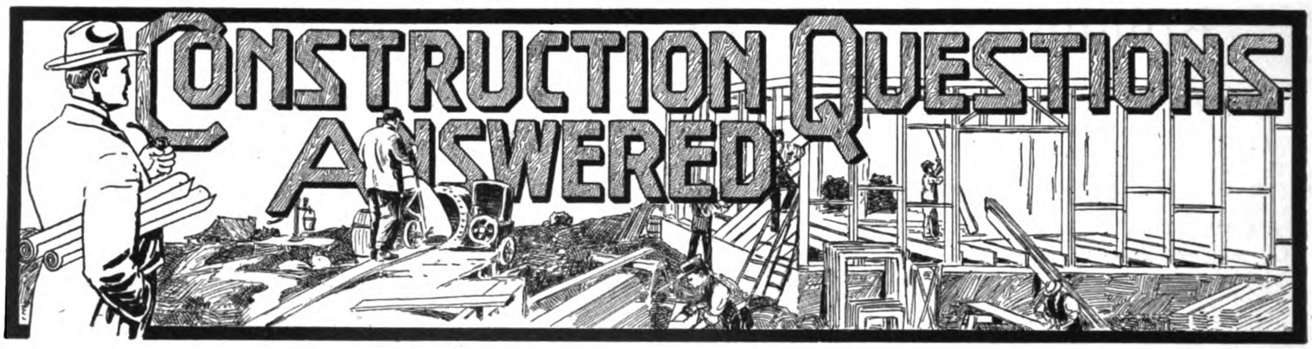
### *High Price of Labor*

Another reason which is given for the high cost of building is the excessive cost of work, mainly caused by the high wages demanded and the restriction of output.

To the latter part I could pay no attention because it is a mistaken view. No doubt there may have been instances of this where work is being hung up to avoid unemployment. But that is not always the fault of the workman, as you find employers encourage that sort of thing if working on a percentage basis.

The assertion that high wage claims are tending to cause stagnation is entirely wrong. Relatively today the building operator in England is worse off than before the war when you consider the purchasing power of his wages. It is unfair to blame the British worker for all the decrease in the output. He may in some instances be to blame but much has to do with the management which is lamentably short of efficiency in many directions.

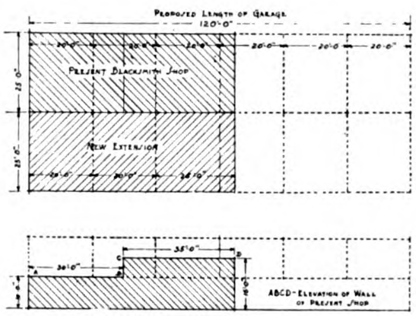
Further it must be recognized that the government is largely responsible for the inflated cost of building by the pernicious system they introduced in building contracts during the war known as profit on cost.




## Roof Framing That Permits Addition Without Dividing Wall

**From R. D., C., B. C.**—I have a building to erect next month to be used as a garage and repair shop. It is to be 25 ft. wide and 65 ft. long as a lean-to against old blacksmith shop. This shop is 10 ft. high for 30 ft. and 16 ft. high the rest of the length. Intended to have wall on outside 9 ft. high and erect wall (temporary) inside 14 ft. high.

Next year the owner, if business is good, intends to wreck old shop and extend this garage so it will be 50 ft. by 120 ft. What I want to ask is the best way to frame that roof so that




Conditions as encountered by the correspondent

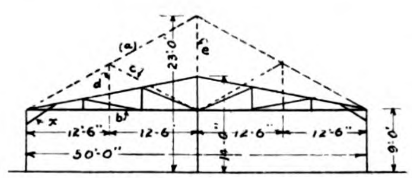
when it is complete I can saw that inside wall off and have no obstruction. The building will have wall of concrete 12 in. above floor on top of which the regular balloon frame sheathed inside and outside and covered with galvanized siding. The roof will have to be strong enough to carry a snow load of 2 ft., also so he can fasten hoist to lift an engine from a car. He says 9 ft. is high enough if I can build it so it will stay up.

Your paper is very good and conveys many valuable ideas. May you produce better ones and more of them. Put them in their place, throw the gage upon them, and spike them where they lie.

**Answer.**—If you desire a high interior the truss is the only logical solution to your problem. The two ways of overcoming your difficulty are shown in the front elevation of the accompanying illustration by full and dotted lines. The truss shown in full lines, hereinafter referred to as scheme No. 1, represents the solution as you would have it, with an outside wall 9 ft. high and an inside temporary wall 14 ft. high. The truss shown in dotted lines, hereinafter referred to as scheme No. 2, embodies a suggestion for the solution to your problem as we would have it.

In scheme No. 1, owing to the limitation of conditions imposed upon us, we had to design a truss that is necessarily low. A low truss is not economical, for not only does it require heavy timbers, but also vertical supports in the center. Furthermore, a low truss is apt to spread out at the ends, and for that reason it is reinforced at these points with heavy braces, as shown at (X).

In scheme No. 2, on the other hand, by retaining the 9 ft. exterior wall but increasing the height of the interior to 23 ft., we obtain a truss that is more economical in construction and stronger than the low type truss just described.




Two types of roof truss, one being shown by the dotted lines, another by the unbroken lines

The greatest advantage, however, of the high truss lies in the fact that the interior supports are done away with, thus resulting in one large, open area, unencumbered by interior posts—a most valuable asset to a garage. A similar clear space may be obtained with the flat truss, but to do so would require abnormally heavy timbers. From the standpoint of economy in cost and in construction, from the standpoint of the advantage accrued in increased height and area, the high truss is much to be preferred.

In either case the truss, whether high or low, should be placed 20 feet apart. But the difficulty encountered in the disposition of the trusses t these distances, is the length of the proposed extension, which is 65 ft. One way out of the dilemma is to set the trusses over the extension 22 ft. on centers. Another way is to keep them 20 ft. apart. The latter arrangement would leave a 25 ft. panel at the farther end; but that would not be very objectionable since this division is but a temporary one. Later on, when the building is extended to its full depth of 120 ft., the specified distances could be maintained and continued at 20 ft. intervals.

Whether the trusses are placed 22 ft. apart or 20 ft. apart only two trusses are needed for the proposed lean-to extension. The ends do not require any trusses, for the gable walls at the extremities of the building act as trusses and are sufficiently strong to carry any superimposed weight.

Our correspondent's problem is still further complicated by the fact that he will put up his garage in sections. He can only erect half a truss over the new extension, for the old building, which is now used as a blacksmith shop, will later be demolished. It would, therefore, be unwise to build a complete truss at the present time. Our correspondent must consequently make provision for the proper connection of the half truss over the extension with the half truss over the 25 ft. area, now occupied by the shop. The best way of securing these half sections is by means of wrought iron straps —a three-way king strap for the head of the truss and a stirrup strap, secured with screw bolts, for the foot of the truss. A fished or scarfed joint, with bolts and indents should be used for connecting the tie beams at the center.

Long leaf yellow pine is the best material for the truss, although local timber, of equal strength, may be substituted. The dimensions of the various members of the high truss are as follows: Upper chord (a), 8 x 10 in.; lower chord or tie beam (b), 6 x 8 in.; inclined members (c), 6 x 8 in.; struts (d), 6 x 6 in.; king post (e), 6 x 6 in. The struts and king post may be made of 1-in. rods.

A cheaper and less complicated solution to your problem is to substitute a girder for the trusses. A 10 x 16 in. girder, resting on 8 x 8 in. posts, placed 20 ft. on centers, would answer your purpose. The floor beams would have to be 3 x 16 in., set 16 in. on centers, their outer edges being supported on an ordinary 4 x 6 in. plate. A still further saving could be effected if you could determine the exact point or portion along the girder along which you intend to suspend the hoist for the engine. In that case that portion only would have to be reinforced, by using 3 x 16 in. beams, placed 16 in. on centers, while the remainder of the area could be spanned with 3 x 12 in. beams, set 20 in. on centers.—A. B. G.

## Which Is More Expensive, Steel Grillage or Reinforced Concrete Footings?

**From P. V. G., New York.**—I am an old subscriber to your valuable paper and would like to know which is the less expensive in foundation work — steel grillage or reinforced concrete.

**Answer.**—Reinforced concrete is less expensive and more economical than steel grillage, the percentage ranging from 20 to 40 per cent.

This is easily accounted for by reason of reinforced concrete footings requiring less excavation, they being not as bulky as the steel grillage footings, which require an additional under footing. A large percentage of steel is also saved because in the reinforced footing only tensile resistance is taken up by the steel, while the concrete takes care of the compression.

In grillage work it is usual and necessary that the steel be protected with at least two inches of concrete. Concrete is also packed in between the beams.

Some authorities claim that reinforced concrete footings are more desirable than steel grillage as the protection of the steel is more complete.—W. G.

## How to Design a Scissors Truss

**From T. J. S., Ala.**—The writer is a subscriber to the BUILDING AGE and is desirous of obtaining some information on a Scissors Truss. I would like to know whether the braces marked A and B, and shown dotted in Fig. 1, are necessary to keep the truss from sagging. Kindly give me the correct information on this and oblige.

**Answer**—The truss shown by the correspondent consists of 2 x 6 in. rafters spaced 24 in. on centers, with each pair of rafters trussed as shown. The sheathing for the roof is supported directly by the rafters, thus saving the cost of purlins and the ceiling is nailed directly to the underside of the trusses

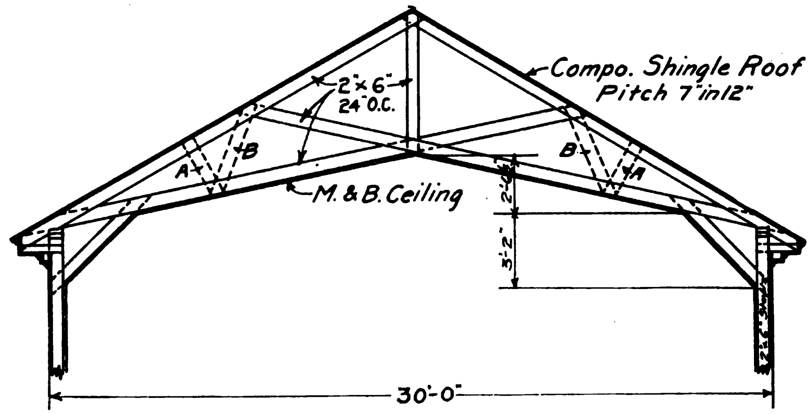



Fig. 1. Cross section of building, showing construction of scissors truss

The truss diagram is shown in Fig. 2. This diagram consists of single lines representing the center lines of the truss members.

To obtain the panel loads, or loads tributary to each of the joints, the weight of the truss is computed and found to be 340 lb. As the area of the roof supported by one truss is 2 x 17 ft. x 2 ft. or 68 square feet, the weight of the roof truss is equal to 5 lb. per square foot of roof surface. The weight of the shingles and sheathing is about 5 lb. per sq. ft., and allowing 30 lb. per sq. ft. for the wind load when combined with the vertical load, a total load per sq. ft. of 40 lb. is obtained. It is not customary to design a roof for less than this total load.

The roof load supported at joint 2 is equal to 8.5 x 2 x 40 or 680 lb. and the roof load supported at joint 3 is 7.75 x 2 x 40 or 620 lb. The ceiling load supported at joint 4 is equal to 14.75 x 2 x 10 or 300 lb.; the ceiling load is taken at 10 lb. per sq. ft. to allow for occasional loads on it.

The panel loads as well as the reactions at the ends of the roof truss are shown on the truss diagram. A member or force on the diagram is designated by the letters on each side of it.

To draw the stress diagram a vertical line *fa* equal to 1140 lb., or half the load on the truss, is drawn to some convenient scale, and from the point *a* draw a line parallel to the rafter, while from the point *f* a line is drawn parallel to the tie beam. The intersection of these two lines is point *g* and the length of the line *ag* gives the stress in the member AG; the length of *ag* scales 3650 lb. and as it acts in a direction toward the joint 1, there is a comprehensive stress of 3650 lb. in AG. The length of *fg*, which acts in a direction away from joint 1, gives a tension of 3250 lb. in the member FG.

At joint 2, we proceed in a clockwise direction from the known stresses to the unknown. Thus we have *ga* and from the point *a* measure downward *ab* equal to 680 lb., then from *b* draw a line parallel to the rafter and from *g* a line parallel to HG. The intersection of these two lines gives the point *h* and *bh* is scaled to be 2700 lb. and acting toward the joint it is in compression. In a similar manner *hg* is found to be 850 pounds compression.

Proceed in a similar manner at joint 3. Thus we have *hb* and from *b* draw downward *bc* equal to 620 lb., then from *c* draw a line parallel to the rafter CI and from *h* draw a line parallel to the vertical IH. The vertical is thus found to have a tension of 2100 lb.

As the truss is symmetrical about the center line and we have the stress in the vertical as well as the members to the left, it is not necessary to carry the diagram any further.

Having obtained the stresses in the various members, they should be designed or investigated in the manner described for the roof truss in the May number of the BUILDING AGE It will

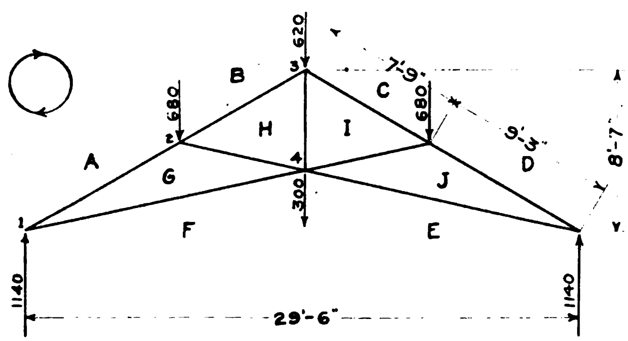



Fig. 2. Diagram of truss, showing calculation of loads

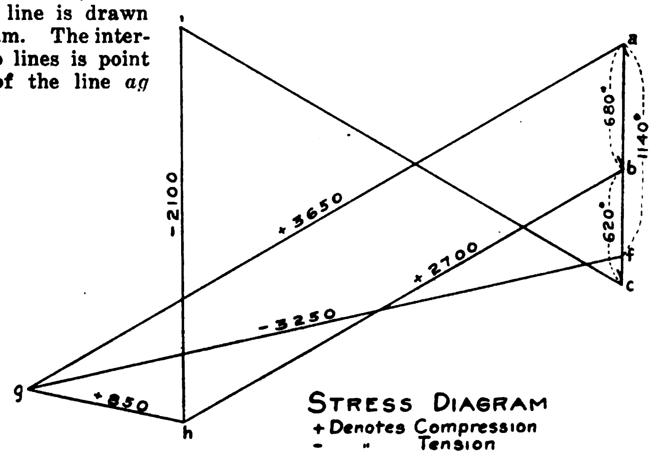



Fig. 3. Diagram of stresses in truss

readily be found that all the members are safe with the exception of the rafter AG. This member has a direct compression of 3650 lb. and as the unsupported length is 96 inches the allowable compression per square inch will be

$$1200\left(1-\frac{96}{60 \times 2}\right) = 240 \text{ lb.; so that}$$

the area required would be equal to $3650 \div 240 = 15$ square inches, or a stick 2.5" x 6". In addition to the direct compression the rafter has a bending moment, produced by the roof load coming directly upon it, of about 5900 inch pounds, and to take care of this bending moment a width of $\frac{6 \times 5900}{1200 \times 6 \times 6} = 0.82$ inches would be required for a 6" rafter. In other words a rafter would be required 3.32" wide by 6" deep or two 2" x 6" sticks.

By introducing the members A and B shown dotted on Fig. 1, the span of the rafter is shortened so that, even though the direct compression is increased somewhat, the 2" x 6" rafter will suffice. It might also be added that as the pitch of the roof is rather flat for a scissors truss joint 2 would have a tendency to sag, as the correspondent fears, unless the braces A and B are introduced.

Special care should be taken in properly designing the joint details to take care of the stresses in the members.

L. GOODMAN, C. E.

# Country House Details

## *Framing Different Kinds of Double Hung Windows in Frame Walls*

### By A. Benton Greenberg, Architect

THE details shown on the plate appearing in the August issue of the BUILDING AGE are applicable to walls with 4-in. studs. For walls of this thickness, however, very little opportunity is given for the introduction of such convenient fixtures as mosquito screens, outside blinds and the like. Such fixtures require the use of thicker studs, say 5 or 6 in.; and the consequent changes and additions wrought by the employment of these thicker studs is the subject of our present discussion.

The window detailed in Fig. 1 shows a window frame with sliding sash for a wall with 6-in. studs. These permit the use of thicker sash (which should be at least 1¾ in) and of the convenient insertion of mosquito screens (A) and of outside shutters (B), as indicated in the section through the head. This drawing also shows the stop bead (C) increased in width at the top and carried across to the inner face of the sash, producing a very neat interior finish. The outside architrave here shown, although stubby and quite plain in appearance, may be indefinitely elaborated to suit the character and requirements of the design; but as explained in the previous article, it should be at least 1⅛ in. thick to accommodate the outside shutter and to serve as a stop for the clapboards or shingles.

#### *How a Weather-tight Joint Between Meeting Rails May Be Had*

The only point that calls for special comment in the section through the meeting rails is the double bevel in the meeting edges. This feature is used only in high class work and forms an absolutely weather-tight joint.

The section through the jamb shows a tongue at the outer edge of the pulley stile. These tongues, at the yoke and the pulley stile, tend to stiffen the entire window frame and thus facilitate the movement of the sashes. Whether these tongues are placed at the front, as shown in the section through the jamb Fig. 4, or at the back, as shown in the section through the head Fig. 1, does not materially matter. The writer, however, prefers the former practice for, in case of shrinkage, no ugly open joints would be visible.

#### *Why the Pulley Stile Is Necessary*

At the outer edge of the pulley stile is the ground casing (D). If this member is omitted, as is done in cheap work, the strain upon the frame when the window is opened or shut is transferred to the inside architrave, which eventually works loose from the plaster and mars the appearance of the interior. The function of the ground casing is to transfer the strain to the studding. Another feature in this section through the jamb showing high character of workmanship, is the flashing at the sides of the window. If this flashing, which may be of tin, copper or galvanized iron, is put on in a single strip, as it is ordinarily done, it is practically useless. To get the maximum efficiency, it should be laid on in separate pieces and should overlap with each course of shingles or siding.

The difficulty of overcoming the extra width of sill necessitated by the use of 6-in. studs is well illustrated in the section through this member. Note the two rebates, one formed by the joint and the other directly in front of it. These rebates are intended to form stops for the bottom of the screen and blinds respectively. The two sections of the sill should be run in white lead to insure a water-tight joint. The bevel on the inner edge of the lower sash, which is cut at an angle of 15 degrees, gives a tight joint when the inner sash is closed against the sill. Now study the excellent stool and apron construction on the interior.

#### *What the Rebate Is For*

In Fig. 2 is shown a section of a double hung window through a wall built of 5-in. studs, together with interior and exterior elevations. The interior is quite elaborate in design, showing a classic Doric column and entablature. The sill is finished on the inside with a moulded panel, forming a kind of pedestal to the interior scheme of columnar decoration. The point which engages our particular attention in the section through the sill, is the rebate under the lower sash. This is a desirable feature, for in addition to preventing the lower sash from getting stuck, it acts as a drain for any water that may have worked itself down to the sill. If the water were allowed to remain in the joint between the sash and sill it would cause all the timbers thereabout to rot. The rebate in the sill directly underneath that of the sash helps the latter in the discharge of its function as a drain. Note also the construction of the double sill. This is simply an alternate to the two-section sill described in connection with Fig. 1. The double sill makes use of small pieces of timber, which is a very desirable feature, since it reduces the possibility of warping or twisting. The two parts, sill and sub-sill, should be well nailed or doweled together to make a water-tight connection.

Occasions may arise when fly screens and exterior blinds are required for walls made of 4-in. studs. How to overcome this difficulty is shown in Fig. 3. By reducing the thickness of the sash to 1⅜ in. or 1½ in. and by placing the outside casing over the sheathing boards instead of in line with it, as is done in all the other illustrations shown herewith, a space is provided for the insertion of the piece "X" to receive the screen. This arrangement also permits of the use of blinds or shutters, as shown.

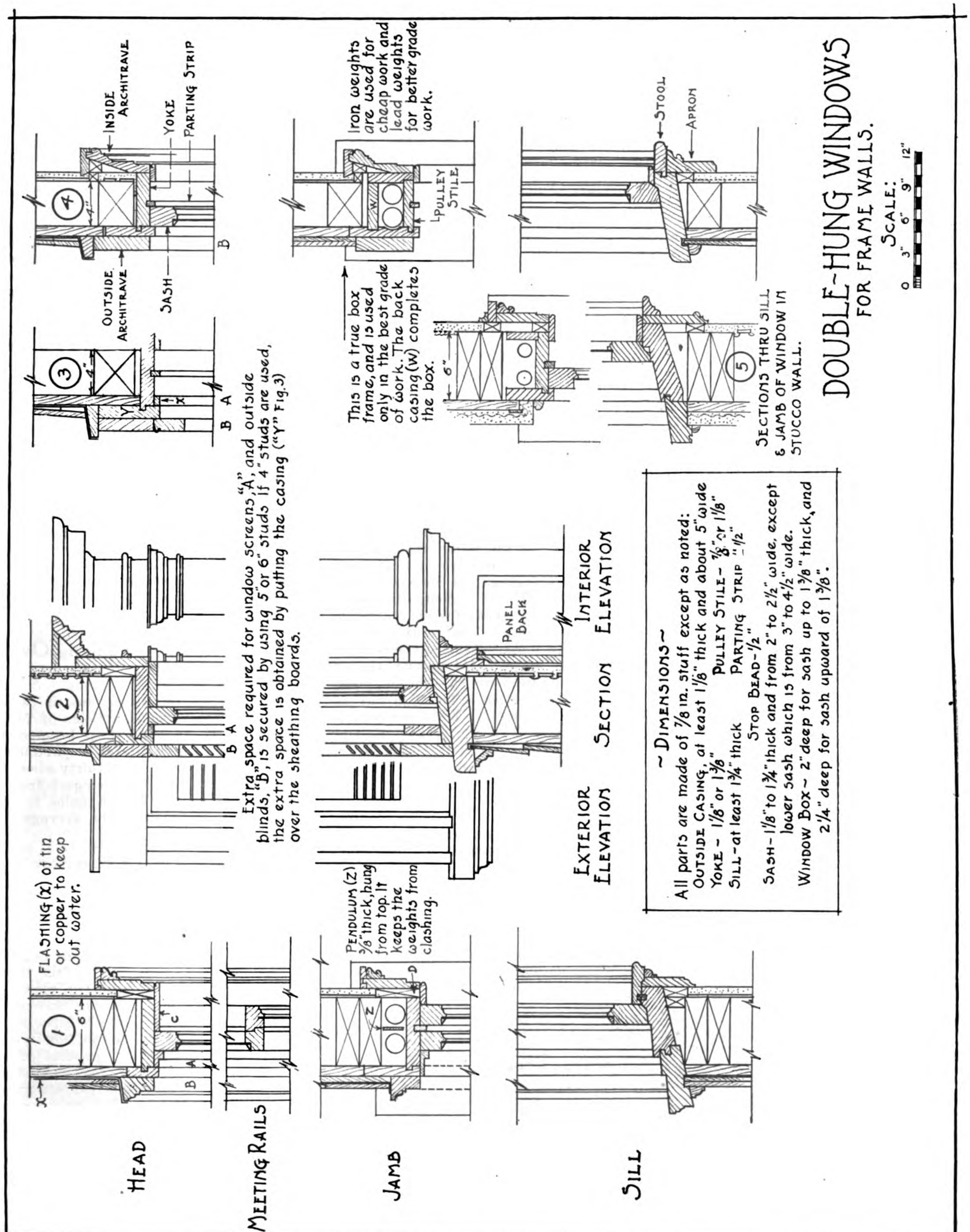
#### *Keeping the Weight Box Free from Dirt*

One of the features that calls for special comment in Fig. 4 is the construction of the weight box. By completely enclosing this space, it is insured not only of freedom from dirt, but of a perfectly rigid frame as well. This construction is known as a "box frame" to distinguish it from the "skeleton frame," the only kind we have thus treated.

Weights are usually made of pig iron from 1½ in. to 1¾ in. in diameter. In better class work, lead weights are used. In very large windows, square weights are used, for they are 30 per cent heavier than round weights of the same diameter and length. In large windows, also, where 1¾ in. sash and plate glass are found, chains are recommended for the suspension of the weights; whereas, in the window, sash cord may be used.

Another feature we find in Fig. 4 is the arrangement of the stool, which is here set flush with the top of the sill, and the stop bead carried completely around the window on the interior.

Fig. 5 represents a double hung construction in a stuccoed frame wall. Study this carefully, observing its peculiar points of design and construction.



## Strikes and High Prices

"Let's strike," seems to be the slogan today. And almost every strike is for more pay and shorter hours. This is the real reason for the higher prices that we are paying today.

The street car men strike for higher wages. They win and the extra cost is passed on to the public. The carpenters strike in order to be able to afford the higher fares, and the street car conductors and motormen find their rent raised to meet the cost of repairs and new construction. The farmer finds himself unable to secure hands except at a high figure, his produce is loaded on cars by men who are continually demanding more money, the cars are drawn by members of the Railroad Brotherhood who say they must have more money in order to live, and then the storage men, truck drivers, and others all demand more wages in order to make both ends meet. This circle is a vicious one, which must break at some point if the whole structure is not to topple over.

Indeed, there is more truth than poetry in the statement of P. J. Connoly, vice-president of the Interborough Rapid Transit Brotherhood, New York City, when he said a few days ago: "They (the members) instructed me and these delegates to ask for a 50 per cent increase, and if we don't get that we will walk out at 4 o'clock Sunday morning. We don't care where the money comes from. We are not interested in an increased fare, but we are interested in getting a living wage so our babies can have milk and our families live without starving. We must know by 6 o'clock. *We are hungry for money and that is all we will be satisfied with*"

That is why prices are high and why they will not only remain high, but will go higher and higher until the circle is broken, or until organized labor realizes that it is exacting something that will prove a bomerang.

If the Federal Reserve System were not in existance the country today would be in the throes of a panic. Such has always been the case in the past and the present would be no exception had not an efficient preventative been provided. And such panics have proved a check to an orgy of strikes and ever-increasing wages, for men do not think of strikes when there is a bread line. Something else, something more wholesome, must serve to check ever higher wages and continually recurring strikes that at first only hamper and then stifle production.

High wages and low prices are only possible through increased efficiency and a lower unit cost. This means the development of machinery so that one highly paid worker can do the work of many cheaper men. Or it means that each man himself must produce more so that the unit cost will not be raised.

Many union men hold that low efficiency per man means that more men will be employed. This is not true. Employment depends on demand, and demand is always less when prices are high than when they are low. The more efficient the production is, the lower are the prices which can be quoted and the more demand there is for that product and for the men who make it.

A strike means that production ceases. And that means a shortage, temporary at least, which will raise prices due to the law of supply and demand. And it means a permanent increase exactly in proportion to the increase in wages. When strikes continually occur throughout the country it means that all production is so curtailed that higher prices are inevitable, especially in view of the higher wages granted. During May, 2 per cent of the people employed in New York State were involved in strikes, and strikes are increasing in number and frequency.

How long will business be able to stand it?

## How a New Church Was Financed

A congregation located in a small but growing community often finds it necessary to erect a new church, but does not possess the necessary capital and finds it impossible to raise. In such cases the architect or builder connected with the project may find the following scheme, worked out by a church at Poughkeepsie, N. Y., to be a good solution of the problem.

A member of the committee, a prominent banker of that city, decided to appeal to the congregation for money with a new plan. He asked members to turn in their Liberty bonds for church bonds, which would pay ¼ per cent more interest. For instance, if the Government bonds were of the issue paying 4¼ per cent the interest on the church bonds would be 4½ per cent. The plan was immediately successful. There was prompt response to the new appeal. Enough bonds were soon obtained to enable the committee to get a loan of sufficient size to allow the work to go promptly toward conclusion. Of course bonds could be bought as well as exchanged, and retired as the church authorities specified. By retiring a certain number of bonds every year the church income would not be unduly taxed.

Other cities have tried this plan with satisfactory results, and the new church financing plan will doubtless prove an aid in many other communities where difficulty in obtaining loans for new construction is being experienced.

## Dangers Arising from the Upward Tendency of Prices

The interview of the representatives of the railway engineers with the President on July 30 has attracted marked public attention. They pointed out the great dangers arising from the upward tendency of prices and of the necessaries of life and indicated that, unless some influence was brought to bear to check this, it might be necessary for them to seek another increase in wages in order to reach a reasonable living scale. This is representative of a general condition. Higher levels of prices follow higher wages in a vicious spiral in which prices always keep in advance of wages, proceeding to a constantly higher level and resulting in instability of business and ultimate disdisaster.

It is the good fortune of the country and to the credit of the construction industry that the prices of building materials and construction in general have increased 23 per cent less than the price of other commodities, and that the prewar dollar will thus go farther in buying buildings than commodities in general. This has occurred in spite of the facts that the prices of building materials have been greatly affected by the prices of other commodities and that freight rates on building materials have as a class been increased twice as much as those on other commodities.

The welfare of this industry depends upon the continued and regular erection of buildings and not upon spasmodic booms. It is thus to the interest of the entire construction industry to maintain the present advantage of price differential in relation to other commodities, in so far as it may be bale to withstand the pressure brought about by the continued advance of raw material, labor, freight, and other essentials.

It is the sincere hope of all thoughtful men that the continued advance of general commodities may soon be checked by increased production. — *Committee on Financial Operations, National Federation of Construction Industries.*

## Increase in Cost of Living Over 1913

Statistics showing the increase in price of twenty-two principal articles of food for June, 1919, over 1913 have been compiled by the United States Department of Labor; the figures cover thirty-nine of the principal cities. The increase ranges from 70 per cent in Los Angeles to 94 per cent in Baltimore. The average is 84 per cent.

## Will Government Investigation Lower Material Prices?

It is not inconceivable that the investigation by the Government of the causes of high prices will reveal the fact that material prices are not unfair in view of economic conditions prevailing throughout the world to-day. This is especially likely when taken in conjunction with the fact that the level of general commodity prices has advanced considerably more than that of materials and construction costs as a whole. Whereas structural materials have advanced 84 per cent, the general commodity advance is 113 per cent, or 29 per cent higher than building material prices.

A short time ago a commission appointed by the State of Illinois investigated material prices in that state. The committee found satisfactory evidence that there was no profiteering. Undoubtedly there have been instances, but these have probably been scattered rather than the result of any concerted movement to unduly raise the price level.

## Should Owners Build Under Present Conditions?

The following statement given out in a recent interview with Mr. Wharton Clay, Commissioner of the Associated Metal Lath Manufacturers of Chicago, covers very fully the present building situation:

Those who are holding off from building at the present time will be sadly left. The general public already understand that prices on building materials are not going to be any lower. The Trade Associations now have the problem of convincing the public that the number of mechanics available in the United States for building construction is far below the normal requirements. This is due to many reasons, chief of which are the natural death rate in the past few years, with practically no addition of apprentices to fill up the depleted ranks. This was particularly intensified by the influenza epidemic of last year. The death rate among building mechanics being very high, due to the exposed conditions under which they are required to work.

Further, thousands have left the building trade and gone into other occupations which have offered them steady employment, and hundreds will never return.

It is entirely possible that the great building boom will bring a shortage of material, and the difficulty of transportation will be greatly magnified, and on the whole, conditions are better for the economical construction of building at the present time than they are likely to be for many years to come.

## Making a Success of Stucco Work

*(Continued from page 285)*

stuccos, and that no mixture should be used in which the proportion of cement is greater than one part to three parts of fine aggregate.

The effect of hydrated lime in cement stucco has also been given considerable attention, and the conclusion which is forcing itself upon the committee is that hydrated lime does not improve the structure of the stucco, but by imparting better working quality to the mortar, reduces the cost of application. On the other hand there is evidence that not more than 20 per cent of hydrated lime, by volume of the cement, should be added to cement stucco if the best results are to be obtained.

There seems to be no good reason for varying the composition of the different coats, but if a variation is to be specified, the scratch coat should logically be the strongest mixture followed by a leaner brown coat, and a still leaner finish. No greater mistake has ever been made in stucco application than the use of a strong brown coat over a weak base or a weak scratch coat. The not uncommon practice of applying a strong brown coat over a lime mortar scratch coat has been responsible for many stucco failures.

The suggestion that the finish coat should logically be leaner than the undercoats immediately brings up the waterproofing question. There are two fundamental points to be considered in this connection; first, that the lean coat is not necessarily lacking in density, and second, that the waterproofing problem in good cement stucco is not one of overcoming permeability, but rather of reducing absorption. The entire question hinges on absorption, and the evidence at hand indicates that a moderate degree of absorption is a much more preferable condition than a surface covered with craze and map cracks produced by the use of a too rich or wrongly manipulated finishing coat. Any waterproofing treatment that alters the natural texture and color of the stucco may be dismissed from consideration, and the merit of any integral waterproofing in stucco is exceedingly difficult to determine.

The question as to number and thickness of coats may be best answered by assuming that each coat of stucco has its own particular function. The scratch coat is the first applied, and its purpose is to form an intimate bond and a secure support for the body of the stucco. On metal lath it also serves as a protective coat, and it should therefore be strong and not too lean. The use of hair or fibre is of questionable value. Hair or fiber should not be used when the space back of the lath is to be filled, and is probably not a necessary ingredient in any case. The committee at the present time would sanction its use only in scratch coats on wood lath, or on metal or wire lath that is to be back plastered, or on metal or wire lath that is applied over furring deeper than ⅜ in. The thickness of the scratch coat should average about ¼ in. over the face of the lath.

The function of the second coat (commonly called the brown or straightening coat) is to establish a true and even surface upon which to apply the finish. It forms the body of the stucco, and must fill the hollows and cover the humps of the scratch coat. For this reason an average thickness of ⅜ in. to ½ in. will usually be required. The brown and finish coats, or the scratch and brown coats, are sometimes combined in two-coat work, which is permissible when the base upon which the stucco is applied is fairly true and even, or when, on account of cost considerations, the best obtainable finish is not required. It is difficult, however, to obtain a satisfactory finish on a coat which runs ½ in. or more in thickness, since the tendency of a heavy coat to bag and slip is likely to produce an uneven surface.

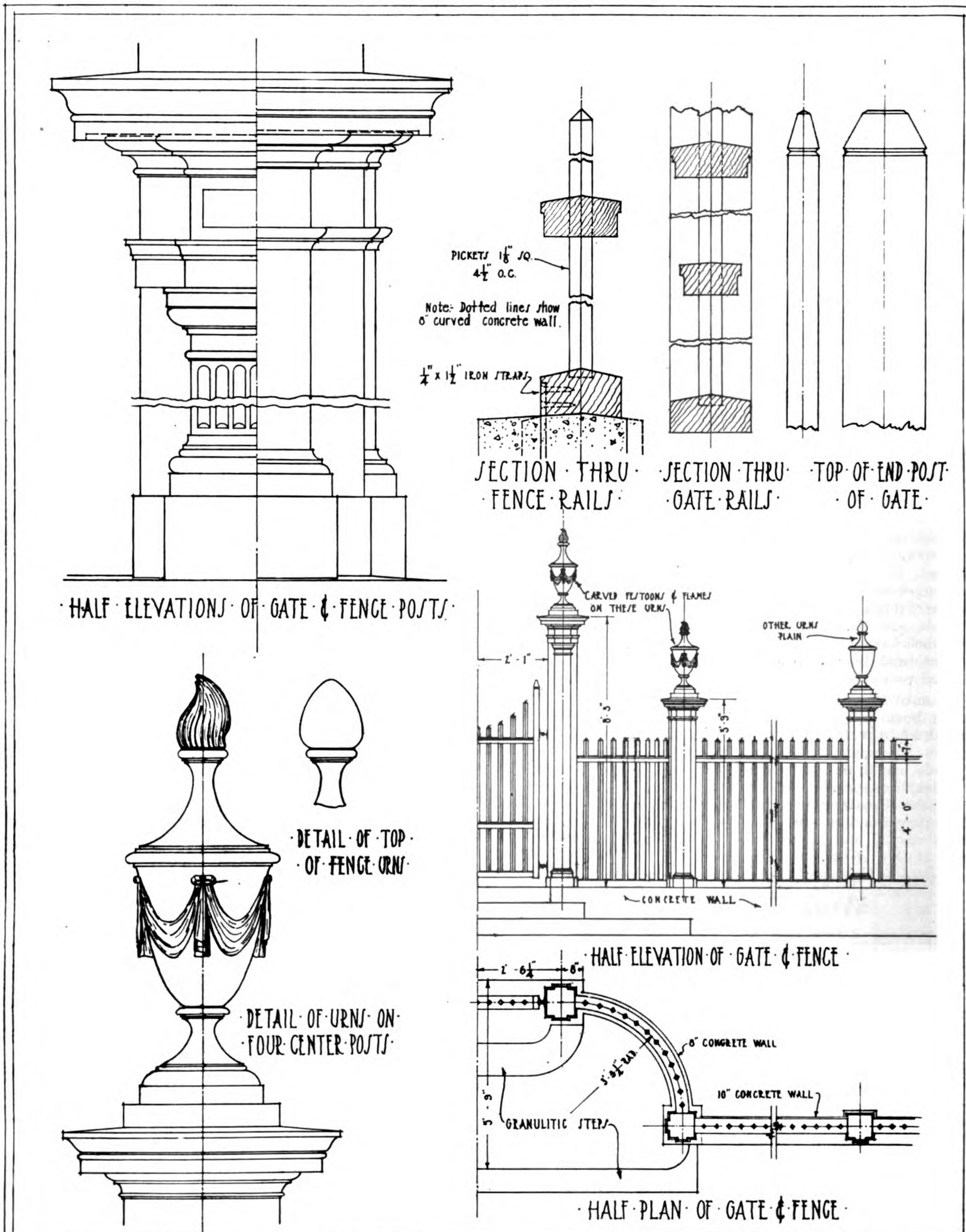
The finish coat serves only a decorative purpose and has no structural value. Its function is solely to provide an attractive appearance, and any mixture or any method of application that may detract from the appearance, or in any way injure its permanency, should be avoided. Herein lies the argument for lean mixtures, which are more likely to be free from unsightly defects than rich mixtures, and are also more likely to improve in appearance under the action of the weather. The finish coat should be as thin as possible consistent with covering capacity, and may vary from ⅛ in. to ⅜ in. in thickness, depending upon the type employed.

It is obvious from the foregoing that first-class stucco should be three-coat work, each coat serving its own particular purpose. The bond between the brown coat and the scratch coat needs to be strong in order to carry the weight of the body of the stucco, and for this reason it is now considered preferable to apply the brown coat the day following the application of the scratch coat. Except in dry or windy weather little wetting of the scratch coat should be necessary when the brown coat is to follow within 24 hours. A slight degree of absorption or "suction" in the scratch coat is probably better than complete saturation, for the brown coat, as well as the others, is necessarily mixed with a larger quantity of water than it requires for maximum strength. The removal of a portion of this excess water by the suction of the undercoat not only improves the quality of the coat, but also insures a better bond by tending to draw the fine particles of the cement into the pores and interstices of the undercoat.

Whereas the interval between the brown coat and scratch coat, as recommended above, is relatively short, the interval before applying the finish coat should be as long as permissible under the conditions of the work. The reason for thus delaying the application of the finish is to enable the body of the stucco to obtain its initial shrinkage and a nearer approach to its final condition of strength and hardness, before being covered with the surface coat. The bond of the latter needs to be intimate rather than of maximum strength, and if the body of the stucco has been allowed to thoroughly set and harden, it may be assumed that the finish coat is less likely to be disturbed by subsequent volume changes in the undercoats. A week or more should elapse between the application of the brown and finish coats.

The finish coat should be applied over a damp, but not saturated, undercoat, for excess water is likely to injure the bond seriously. Certain types of finish, such as the wet mixtures used for sand spraying, or for the "spatter dash" finish, may preferably be applied to a fairly dry undercoat, since suction must be depended upon to prevent streakiness and muddy appearance. The fact that finishes of this type applied in this manner may set and dry out with little strength is not serious; they gradually

*(Concluded on page 308)*




·· DETAILS · OF · COLONIAL · FENCE · AND · GATE ··

COOLIDGE & CARLSON · ARCHITECTS ·

# Legal Department

## Make Sure Owner Has Proper Title to Land

But few builders would spend even as small a sum as $500 in the purchase of a piece of real estate without making sure of the seller's title. And yet a contracting builder after exercising such caution might perform $5,000 worth of work on a building without taking the pains to ascertain whether the person with whom he is contracting has title good enough to support a mechanics' lien.

The lesson we seek to drive home in this short article is that contractors should exercise as high a degree of caution in preserving the groundwork of a mechanics' lien, if there is any likelihood that it may prove desirable to resort to that form of security for the collection of the contract price, as is exercised in investing a like sum of money in the purchase of a piece of property. Make sure that your contract is with the owner or that he consents to the improvement.

The case of Roxbury Painting & Decorating Co. et al. vs. Nute et al., 123 Northeastern Reporter, 391, decided recently by the Massachusetts Supreme Judicial Court, shows how a builder can become entangled in controversy where there has been no clear consent by the owner of property to an improvement on account of which a lien is claimed.

Defendants, two sisters, were joint owners of property in Boston and contracted to sell it to one Hathaway. He paid down $250, but did not make further payments entitling him to a deed or possession as owner. Even before the contract was signed, however, he employed plaintiffs to repair and improve the premises, and considerable work was done under the contracts. Plaintiffs then instituted proceedings under the Massachusetts lien law to enforce payment of the compensation due them. Defendant owners resisted the suit on the ground that they did not contract for the work nor authorize Hathaway to contract for it.

The opinion of the court upholds the lien as against the interests of one of the defendants, Miss Nute, on the ground that she consented to Hathaway making the contracts for the improvements in question. But the lien was denied as against the interest of her sister, because there was nothing to show that she knew that the work was being done or that she assented to it.

The following summary of language used by the court concerning the effect of the Massachusetts lien law applies with full force to the lien laws of numerous other states:

Mere knowledge by one who has contracted to sell a house, but who still holds the title, that the contract purchaser intends to make repairs or improvements, and subquent knowledge that the work is being done, are not sufficient to establish a lien against the selling owner's interest in the property. The mere fact that one agrees to sell a piece of property and places the contract purchaser in possession does not empower the latter to create liens against the former's title.

**If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.**

But, of course, where a contractor makes improvements at the instance of a contract purchaser of property, a lien may be enforced against the equity of the purchaser. That was a feeble remedy in the Massachusetts case, however, because the purchaser never paid more than $250 down on the $5,000 price he undertook to pay for the property.

One of the important rules of law laid down in this case was that where two or more persons own property in undivided interests, a lien can be enforced for improvements against the interests of those who authorize or consent to the improvements.

## To What Extent Is an Architect the Owner's Agent?

When materials or labor is furnished in the construction of a building at the instance of the owner, is he bound by representations made by the supervising architect to the person furnishing such materials or labor as to when payment will be made?

As applied to the ordinary relationship existing between architect and owner, this question clearly must be answered in the negative. To bind the owner, it must appear that the architect was given an agency for the owner broad enough to authorize the former to make such an undertaking on the part of the latter.

"Where an architect is employed as an architect to prepare plans or plans and specifications for a building, and also to supervise the erection of the building, his relation to his employer extends no further than the performance of those services; his powers as agent being limited by his contract. He has authority to proceed in the usual way, and the employer may constitute him his agent generally for all purposes connected with the erection of the building; but apart from an agreement to that effect an architect is not the general agent of the owner, and has no authority to bind the owner by contracts for any work done upon or materials furnished for the structures concerning which he is employed." 5 Corpus Juris, 256.

So it has been held by the courts that under the ordinary employment of an architect, the owner is not liable for injuries sustained by outsiders visiting the building under the architect's supervision, at the architect's invitation. Nor is notice to the architect that a contractor, subcontractor or material man has assigned his claim to pay legal notice to the owner. And, as decided by the Wisconsin Supreme Court, the fact that the owner may entrust a supervising architect with funds to be paid out on a contract entered into by the owner does not establish such general agency as empowers the architect to bind the owner by contracts for the purchase of materials.

## Is Employer Liable for Injuries Incurred in Hazardous Work?

When a building contractor undertakes the dismantling of an old building, or part of it, as a step toward constructive work, is he under any legal duty to his employees to guard them against hidden dangers? If so, what is the extent of the duty?

Hundreds upon hundreds of Appellate Court decisions handed down all over the country leave no room for doubting that a limited duty of this kind does exist. Nor is it open to dispute as a legal proposition that, as said by the Iowa Supreme Court in a very recent case, "that duty is to take reasonable care to have the place in which he directs the servant to work reasonably safe for the doing of the work, and free from latent and concealed dangers."

But what "reasonable care" to make a place of work "reasonably safe" demands in a particular instance is a question of fact which often puzzles courts as the underlying point in issue in suits brought by injured workmen to recover damages. A practical illustration of this difficulty is afforded by the case which was before the Iowa court.

Defendants were building contractors, and undertook to replace a wooden floor at ground level with concrete. Plaintiff, one of their workmen, was directed to assist in removing debris from the old floor. While doing so he stepped into an old well which had just been uncovered through removal of a door from the floor. The accident was not attributable to any failure on his part to "watch his step." Nor did plaintiff or defendants previously know of the existence of the pitfall.

The trial judge who presided when the case was first heard ordered the jury to exonerate defendants, on the ground that there was no proof that they, or their foreman, had failed to exercise all due care for plaintiff's safety.

Since the law made it a pure question whether defendants were negligent, it seems to the law editor of THE BUILDING AGE that this ruling of the trial judge was sound. In other words, we affirm that it is reasonable to say that a dismantling contractor should not be held to be careless because he does not cause a special inspection of the premises to be made for the purpose of discovering whether some such extraordinary condition as the existence of dynamite, or an uncovered well, underlies a floor.

But the Supreme Court did not agree with this view when the case was carried before it on appeal. It ordered a new trial, holding that the jury should have been permitted to find whether there was carelessness or not. In other words, it is held that the circumstances would sustain a finding of negligence.

The higher court concedes that the law does not exact the exercise of supercare on the part of an employer, nor require that he anticipate every possible contingency that may happen. The opinion also approves the legal rule that an employer is not liable for a defect of so secret or latent nature as to escape discovery on reasonable inspection. But it is said that the foreman in this case might be regarded as negligent in failing to ascertain what lay beneath the debris covering the floor, before directing plaintiff and other workmen to remove it.

Hence, it follows that the employer who would guard himself against legal liability in cases of this kind must bestow particular care to see that his workers are not exposed to peril—all the care that a high conception of prudence dictates.

The courts have engrafted upon the safe-place-of-work rule an exception to the effect that the rule does not apply where the work itself creates the danger. A fair illustration of this exception exists where a brick wall is being dismantled, and an employee on the job is injured by brick falling as a direct result of the work. The same exception applies where a dangerous condition is produced in excavating ground. In either case the employer cannot be charged with a duty to provide a safe place of work, for the employee himself makes his own place of work as he proceeds with the removal of brick or earth.

It was sought in the Iowa case to bring that suit within the exception noted. But the Supreme Court said that the case was not taken out of the general rule, because the danger caused by the well was not created as a necessary incident to removing the floor, but rather through its previously undiscovered existence.

## Is Architect Entitled to Compensation When Owner Refuses to Accept Delivery of Plans?

An architect prepared building plans for a client, but before they were delivered to him the latter announced his intention not to proceed with the building. He listed the land with a broker for sale and refused to pay the architect compensation for his services. Must the architect deliver, or offer to deliver, the plans to the client before suit may be maintained on the claim?

As a matter of precaution, and to minimize opportunity for quibble in any litigation that may follow, the architect should, it seems, offer to deliver to the owner what he claims compensation for preparing. But, as a strict matter of law, I am of the opinion that the architect is not bound to offer delivery, in view of the client's definitely expressed purpose not to use the plans. It was so decided by the Iowa Supreme Court in Bowell vs. Draper, a case involving this precise point.

## Must Architect Take Notice of Legal Limitations on Public Officials' Authority?

In an important legal aspect a contract employing an architect in connection with public buildings differs from contracts for private work. The distinction lies in the well settled rule of law that public officers cannot bind the political body which they represent by any contract in excess of their official authority. Anyone dealing with a public official or board is bound to take notice of all limitations upon that official or board's powers.

So, where a city charter provides for the appointment of a municipal architect, charging him with the duty of preparing plans and specifications for all structures erected by the city, it is generally held by the courts that no valid contract can be made for the rendition of such services by a private architect.

But where there is no such provision for an official architect, employment of a private one for particular work need not be expressly authorized by law. As held by the New York Court of Appeals in the case of Peterson vs. New York, charter power given a city council to erect a building implies authority to secure reasonably necessary services of an architect.

In the same opinion it is declared that although a committee or branch of a city council may be without legal authority to make a binding contract for the preparation of plans and specifications, the agreement will become binding upon the city council expressly or impliedly ratifying the unauthorized ratification. This decision involves an application of the fundamental rule of law that ratification of an unauthorized act is equivalent to an original conferring of authority.

In the Illinois case of Egan vs. City of Chicago, the municipality unsuccessfully sought to avoid liability for compensation of architects retained to determine the safety of the foundation walls of a federal building in course of construction in the city. It was argued that the Chicago city council was without power to contract with reference to a building under the control of the federal government. But the validity of the employment was upheld on the ground that, although the city authorities were probably powerless to interfere with the method of construction, they were nevertheless empowered to safeguard the public safety by ascertaining whether danger of collapse of the walls existed, and by warning the public, if peril appeared.

A Massachusetts town voted to erect a building according to previously adopted plans and specifications. But the same vote authorized the building committee to make "any slight alterations" that might be deemed proper. Holding that the committee might retain an architect in connection with alterations, the Supreme Judicial Court of the commonwealth said:

"Slight alterations in the exterior might require the hand of an architect to arrange and adapt the various parts thereto, and present a model for the builder."

One of the most important rules under this general subject is that which precludes a municipal board or body from binding a city, county, or other political subdivision, by employing architects to prepare plans and specifications for a building before funds have been made available for the purpose. For example, it was decided in a New York case that an armory board was not warranted in retaining architects to provide plans, etc., for a building, until authority for incurring indebtedness on that account had been conferred upon the board.

Applying the principle that an architect is presumed to be conversant with all public records pertaining to the work which he undertakes, it was decided in the case last mentioned that where a resolution providing for the construction of a public building limits the cost thereof, an architect engaged to prepare plans and specifications cannot plead ignorance of that limitation.

It follows that architects in taking public contracts should prudently consider whether the officials with whom they are bargaining are acting within the scope of legally conferred authority.

# Uncle Ezra Is Played for a Sucker

## *The Flim-Flam Variety of Subordination Mortgage Is Worked on Him to Perfection*

By Dudley Pollard

IT'S almost a crime nowadays to quote the old saying of the shoemaker sticking to his last. Them adages ain't fashionable any more, but I don't know of better dope or a more useful motto for any builder to stick in his hat.

It's all right to know the other fellow's business better than he does himself, that's one of them little kinks in human nature that can't be accounted for in any intelligent way, but it don't do nobody no particular harm so long as you take it out in thinking and maybe talking a little bit. It may get you the reputation of loose talking—garrulity, I believe they call it. A whole lot of folks have to answer to that heathen name.

But don't go no further than talking about the other fellow's business—don't ever try to play his game. If you do, in chastened language, you'll find that you have made a shining example of a damphool out of yourself.

Now one more little observation before I tell you a story in which the persevering and humble little shoemaker with his last was forgot all about.

No man ever gets into much trouble while he is in his working clothes. All the good sense the good God gives us seems to abide with us while we are garbed in the habiliments of our craft, but just let a man doff his overalls and adorn himself with a silk hat, dogskin gloves and a walking stick, the top of his head seems to blow off and he is as susceptible to trouble as a hound pup is to fleas.

The little thing I'm going to tell you about happened so long ago that I can afford to be honest about it now.

The "green goods" men say suckers are born every minute and that there's always some guy who will take a chance on a gold brick. I guess that's always been so, but there's one sure bet—just mention a subordination mortgage to a crowd of fairly prosperous builders—men a little short on hair and long on rotundity—and more'n one of them will squirm just like there's a bee in the seat of his pants.

I was one of the original come-ons in the subordination mortgage game. Not that a subordination mortgage ain't a good thing in its place, but I'm telling you about the flim-flam variety.

I took the bait, the hook and the line. I was dandled about by as slick a crook as ever dabbled in the building game, and, believe me, that's going some.

I had picked up at a bargain a nice piece of property—about ten building lots—and was holding it as a purely speculative proposition. Now our town had been growing a right smart and was developing into an industrial center.

And the two specious crooks painted the most wonderful pictures, pictures that centered around the beneficent Ezra.

The property was in the factory district and nothing was more natural to my mind than that somebody would come along and want to build homes for the workers.

I had only expected a fair profit on my investment, but one day, down at the exchange, some of the fellows got to joshing me about my property. Bullheaded like I blurted out that I intended to hold it until I got a couple of thousand more than I had ever thought of asking for it. Alas and alack the day! The door was open and I went in.

In a few days a gentleman from Boston appeared. With him was an architect with a bundle of blueprints and plans and we three sat down together.

My friends, when anybody starts to mix up philanthropy and uplift talk in a purely business proposition, beat it—beat it quick, while you've got a leg to run on. Them things are all right in their place, but they don't fit in with business any more'n grape juice will mix with a glass of ten-year-old rye.

If you ever try to mingle 'em—I mean philanthropy and business—somebody will say to you some day, "Well, he was a good fellow at one time and had prospects, but—"

These men from Boston were interested in workingmen's houses. Their principal, they said, was a man whose sole pleasure in life was in alleviating the hardships of the horny-handed sons of toil. They intended to build the very last word in workingmen's cottages, replete in every way with everything


It was the old story of the spider and the fly, all over again.

worth having, heat units to a scientific nicety, sanitation galore and a-plenty of fresh, sweet air to refresh the sweated brow of the worker after he had wended his weary way to his vine-clad cottage.

There were to be chickens, flower gardens and little children were to play in the tiny yards with their doggies.

I almost cried when I thought of the terrible injustice I had done them roughneck factory workers I had known.

Well, these cottages were to be sold to the workers for a small payment down and monthly installments; the philanthropist to take the matter into his own hands when the houses were complete. The proposition was to be financed through our local bank. I was to receive five per cent of the purchase price on giving title, a subordination or second mortgage, twenty per cent when they got their building loan, and the balance when Lord Bountiful came on to take over the house and start his eleemosynary activities.

#### *Why Uncle Ezra Fell*

Now could any honest man ask for a better proposition? I was in no need of ready money, and there I sat like a big fat spider waiting for flies to come to my web. And, glory be, I was to take a trip down to Boston—at the expense of the philanthropist!

Now I'll go back to my second observation. Off came my overalls, but I hesitate to tell how I arrayed myself. Suffice it to say that anybody would have had to look some to have outshone me as I stepped high along Beacon Hill one bright spring morning.

It was all just as those fellows had said. They were located in one of the big Washington Street buildings and there a breath-absorbing elevator shot me up about forty stories before I could say "Whoa!" even to myself and into a suite of offices that were just dazzling.

#### *And the Web Was Ready*

Black robed, demure little chickens flitted back and forth, smiling sweetly all the while, and oh, boy! there I stood, clad in all my glory.

"Yes, Mr. Ezra Brown was expected."

A gentle breeze was blowing in from the harbor and a hurdy-gurdy was playing somewhere down in the street. It was all mighty pleasant up there. I even remember what that organ was playing. This is the darned thing:

> If you laika me as I laika you,
> Or we laik the same, you see,
> I'd laik to say,
> This very day,
> I'd laik to change your name.

Then I was ushered into the sanctuary, marched into the whited sepulcher, into the presence of the generalissimo of the workingmen's uplift society.

Oh, he was good. You could tell that by just looking at him. About sixty years old. White of hair and benevolent of countenance. The man fairly oozed righteousness.

He called me Brother Ezra and, after a while, when we had become interested in our talk, I called him Deacon. A bright, complacent smile lit up his wrinkled face when he saw I had recognized his white saintliness. But I know now that that wasn't the exact meaning of his illuminatin' smile.

#### *Pity the Poor Workingman*

Then he explained everything to me. He had no heirs and all about how his great delight laid in helping the poor workingman. His time, he said, was too valuable to bother about the preliminary phases of construction work. That he delegated to his agents. And so on and so on.

After those houses had been completed—that was another matter. Then the real joy of life became his own. I'll tell you this much—if at any time during this palaver the Deacon had said, "Let us pray," I'd have flopped down on my marrows and shouted, Amen. Sure! Amen to whatever he prayed for or praised.

The papers were all signed that day and at night we had a big dinner and then went to a theatre. That's where I heard a little Irish girl sing the ditty the hand organ was playin' that morning. "Under the Bamboo Tree" it was called. I bought the music the very next day so I would have something to remind me of the occasion and the season.

Back home things went with a rush. I know a little something about building, but believe me no ground was ever ripped up, foundations thrown in, and houses roughly enclosed in half the time that the bunch of roughnecks took for that job. A war contract was like a one-legged man in a Marathon by way of comparison. Then, just as suddenly, operations came to a halt and there was nothing doing. Just nothin' on ten as fine cottages as a builder ever cast envious eyes upon. Them gorillas folded their tents like they say the Arabs do and quietly stole away. I knowed then there wa'n't no use going to Boston.

And there stood I a-waitin' at the church as the anthem says. There was rumors of rumors, then real rumors and finally the bonafi-i-dey facts. One fine morning I was informed that the First National Bank had begun foreclosure proceedings.

Our dictionary is a big book and there are a lot of words tucked away there for general and special use. There are also certain expressions not recorded in books of reference and there are occasions when the English language is inadequate and a feller has to hunt around for fittin' sentences. Ours does not seem complete as a cussin' tongue.

#### *How It Ended*

I reckon that was about the shape of my mind that morning as I stood up in the Exchange and paid over my own good money for my own property in the foreclosure proceedings. Oh, I realized the silly poverty of the English language and longed for command of some foreign lingo that I might let go in proper style and ease up my ragged feelings.

There were liens and liens and still more liens on the property. Every poor little devil of a sub-contractor in the town had near broke his neck to get in on the job. Their equities didn't warrant any single one of them taking part in the proceedings so there they stood, each one holding a little bag, trusting to Providence and my Hooliganism for their money, for you know I didn't have to pay nary one of 'em.

Well, this subordination mortgage business was a mighty sore subject with me for a long time, but the wind was tempered to the shorn lamb. A new factory bobbed up in the immediate neighborhood. I completed the houses and sold every one of them, thank you, with nary a thought of uplift nor any more ozone than was good for the lungs of workingmen. They are mighty good houses and are standing over there now.

So, while I managed to get through by the skin of my teeth, you'll understand what I mean when I say that the shoemaker sticking to his last is good dope.

Now there is just one more little thought I want to leave with you until we meet again. There's plenty of work and there's plenty of money in the building game, but—play it straight.

There ain't no way for the ordinary man to make money but by hard work and by honest investment. When you meet anybody who tells you there is, and wants you to go outside your regular line, just remember you are about to enter the charmed circle of the bunch of whom the poet wrote:

> A tarantula climbed on a centipede's back,
> And chortled with ghoulish glee,
> I'll puncture this crooked son of a gun,
> If I don't, he'll puncture me.

## Protecting Plaster Corners

WHERE a plastered corner projects into a room, it is liable to be chipped and cracked, especially if near a doorway. Such chipping can be prevented by a corner bead such as shown in the illustration. This was placed on a plaster corner between the living room and sun parlor, where trouble with the plaster being broken was likely to be experienced.

The strip started at the top of the base mold and was carried up about three ft. six in., the illustration showing the top half of the device, the lower half being a duplicate of the upper. If desired, the strip could be made plain instead of molded.

## Post No Bills

> When a postman to my portal
> Comes with dunning notes galore,
> I'm not prone to shout and chortle;
> On the other hand, I'm sore,
> This the painfullest of shocks is,
> 'Twould relieve my mental ills
> Should they place on all mail boxes
> This injunction—POST NO BILLS!

—*Republic Item.*

# What the Cost-Plus-a-Fixed-Fee Means to the Contractor

By A. E. Wells*

THE last decade has seen the rise and fall of many building contractors, large and small. The cause, in the majority of cases, lies in the fact that the contractor is expected to build not only according to specifications and within the time limit, but to gamble that his cost will come within a fixed contract price notwithstanding the variables such as the forces of nature and the conditions of labor. Therefore failures are many.

Most business men will agree that it is not within the province of the contractor to gamble. He is retained as an expert to assemble materials into a finished whole. It is not difficult for an able concern to finance itself for this work but if in addition it must carry insurance for owner that it will perform within a definite contract price, the financing is more difficult.

In competitive bids, the cost of this insurance is paid generally by the low bidder out of profits, or, as frequently happens, out of his capital, for the reason that he is more likely to get the contract as he scales down his allowance for contingencies. A competitive bid which includes a safe allowance for insurance against contingencies was seldom low under pre-war competitive conditions. The inevitable results were the bankruptcy of the contractor and an additional cost to owner or the surety company to complete the unfinished contract.

It is apparent, however, that an owner feels more sure if he is able to know in advance closely what a certain project will cost. A careful estimate, made by a reliable contractor and checked by the owner's architect and engineer, is certain to be more satisfactory than a competitive bid in which the result may show only which contractor is willing to take the longest chance against the possibility of costs higher than estimated. A bank, for instance, may issue certain bonds for a power house and if the cost runs above their total, additional financing is necessary. This should be avoided and yet, why should the contractor be asked to underwrite the accident of greater cost.

At the Chicago meeting of the Associated General Contractors of America, this topic was thoroughly discussed and Brigadier-General R. C. Marshall, Jr., Chief of Construction Division, War Department, U. S. A., pointed out clearly the fault of the usual pre-war basis of contract. He showed the impossibility on recent war department work of asking for competitive bids, because speed was the essence and detailed plans and specifications were never complete at the time when construction must start. On such work it was therefore out of the question for a contractor to bid on a flat contract price basis. It would have been fair to neither side. There was developed, therefore, a form of contract known as the Cost-plus-a-sliding-scale-fee contract.

General Marshall stated that early in the spring of 1918, the program of work before the Construction Division was so extensive that it seemed advisable to have the merits of this form of contract again passed upon, and a committee of eminent business men unqualifiedly endorsed this form of contract. In General Marshall's own words at the convention of General Contractors:

"No contractor should be called upon or permitted to undertake the performance of any contract that within the four-corners of the paper upon which it appears is, or may be written the financial bankruptcy of the contractor. It is unjust, it is unequitable, it is uneconomic The great lesson of this war on the subject of the relationship between the contractor and the owner is the cost-plus contract. This represents the only equitable basis under which a contractor may perform constructive and economic services for the owner. It is the only form of contract which affords protection to both parties. To me, all the energies, the thought and the experience of this country within its own continental lines during the past year and one-half of this world struggle shall have been in vain unless out of it shall grow, as a permanent institution, solidifying the economic relationship between the contractor and owner, the cost-plus contract."

My company has built extensively under both forms of contract and our most satisfactory work, to both owner and ourselves, has been on the cost-plus basis. For such concerns as Montgomery Ward & Co., Butler Brothers, The William Davies Company, Limited, Toronto, The Robert Simpson Company, Limited, Toronto, we have operated on this plan, have been able to start construction work much sooner than would otherwise have been possible and therefore given early occupancy. Almost without exception we have made savings for the owner below the preliminary of cost.

The fact that money tied up during construction work earns nothing makes quick construction attractive in practically all field of building. When we are given the opportunity to work with the owner, architect and engineer at the very inception of plans and to begin foundations as soon as the general contour of the building and equipment are determined upon, we are able to give the owner a service which is impossible under the lump sum price contract as this requires the long delay necessary for the completion of plans and taking of competitive bids, all of which may be extremely costly to the owners.

But we do not believe that the cost-plus fixed fee basis of contract is applicable only to work where speed is the first essential. In the years to come it will doubtless prove to be the most equitable basis for all classes of construction and upon that basis our company is now operating. The owner properly reaps the benefit of any saving which may be made below the estimate, thru the combined and cooperative effort by owner, architect, engineer and contractor.

The major manufacturing operations are conducted upon this plan. The Ingersoll dollar watch is now a thing of the past. While that watch "Made the dollar famous," it now retails for considerably more because of conditions beyond the control of the maker. That watch is now made on a cost-plus fixed fee basis, if you please, for the price is going up with the cost of manufacturing.

In the field of the automobile we do not find manufacturers gambling was a fixed price. From season to season, costs vary and selling prices follow.

That the contractor, supposedly an expert in building matters, should be called upon to absorb the risk entailed in any form of contract other than that based upon cost-plus fixed fee is to me unbusinesslike, unfair and unAmerican.

War conditions furnished the opportunity and the necessity for testing out more generally than ever before this form of cost-plus-fixed-fee contract and results prove that the great majority of the building industry met the test adequately and honorably. Post-war reconstruction conditions will be met to the best advantages to both owner and contractor if the cost-plus-a-fixed-fee contract is generally used.

*President Wells Brothers Construction Co.

## Selecting Hardware That Matches Trim

IN selecting hardware, one should keep in mind the fact that its appearance may be greatly marred if it is not chosen with due regard for the kind of trim that it is to be used in connection with. A table that will help secure proper harmony was prepared by an expert in interior decoration for the McKinney Mfg. Co. and is as follows:

**Oak, Maple, Chestnut or Cypress**—Antique copper, antique brass, statuary copper, Bower Barff (black), statuary bronze, bronze plated, olive green, Verdi antique.

**Mahogany or Cherry**—Bronze or brass, statuary brass, dull brass, dull gold, gold plated, silver plated, satin silver.

**Flemish or Mission Oak**—Bronze or brass, antique brass, dull brass, statuary brass, gold plated, Bower Barff (black), Verdi antique.

**White Enamel**—Brass, dull brass, dull gold, gold plated, satin silver, nickel plated.

The more common finishes are bronze, brass, statuary bronze, statuary copper, antique copper, dull brass, Verdi antique, and Bower Barff.

## Amortization of Loans Proving Popular

Periods of reconstruction are intensely satisfactory from the point of view of those who advocate methods as opposed to the inertia of custom. For this reason much satisfaction is expressed for the progress that the American Bankers' Association is making to advance the methods of institutional investors in real estate loans as opposed to custom.

Amortization of loans, which is the gradual paying off of a mortgage at so much each year, is the principle upon which emphasis is placed as a method which will:

(1) Make available a greater turnover of funds for reinvestment in the renewed activities of the building industry.

(2) Remove that element of speculation from the risk of investment that so often relies in vain upon an appreciation in the value of land to offset depreciation in the value of structures.

(3) Replenish the reservoirs of financial capital, by encouraging thrift in the borrower, so that the supply of investment funds will flow uninterruptedly in response to requirements of the builders of national wealth.

Of marked significance is the fact that the American Bankers' Association Committee in charge of the campaign for amortization includes amongst its members a prominent representative from the United States League of Building and Loan Associations. This is as it should be, for the reason that the funds for investment in real estate loans provided by the Building and Loan Associations of the United States, both in respect to the amount of capital contributed, and in respect to its direct effect upon the prosperity of the building industry, is relatively as important as the amount contributed by the State Banks and Trust companies combined, or the Insurance companies alone.

Rapid changes are developing, not only in methods of banking technique that touch the public. Changes within the banking system itself due to the tendency for banks of all types gradually to merge their activities into the style of the Federal Reserve System, give rise to the belief that funds destined for investment in mortgages no longer will follow old channels in their customary volume. These changes are said to be the cause of reduced investments by new member institutions in real estate loans.

The United States League of Building and Loan Associations have been particularly active in impressing upon the government the need for a new medium to be called the Home Loan Banks that will standardize mortgage collateral and create a broad market for the securities based thereon. It is gratifying to know harmony of interest prevails between the American Bankers' Association and United States League of Building and Loan Associations in the matter of amortization, and we may not be very far from the mark when we infer the possibility that the points upon which these two interests agree may ultimately include the need for establishing a Federal Mortgage Bank.

## Insufficient Windows Make Dwellings Unhealthy

In the farm districts there are often localities in which tuberculosis has gained a foothold, from which it apparently can often not be dislodged. Such a condition is generally not the result of climatic conditions but of the unsanitary condition of the house itself. Disease has established itself in the house and, due to the lack of sufficient window space and sunlight, the germs have gained a foothold that tends to infect all the subsequent occupants.

Older houses often were planned with insufficient window space and rooms are dark and poorly ventilated. In such rooms especially are disease germs likely to be found, and the only remedy is a thorough cleaning and an increasing of the window area so that the room may be made healthy through the help of that most healthful agent, fresh air. Cross ventilation is especially desirable.

Builders in such localities will often be able to obtain profitable repair jobs by suggesting to owners that if the houses are provided with more window space, expensive sickness will be avoided and the entire household be made more healthy. Such alterations are inexpensive and can be made with a good margin of profit to the builder.

## Labor Demands Unfavorable to Foreign Trade

The present disposition of labor organizations to seek relief from the high cost of living through wage increases rather than through increased production leads the National Foreign Trade Council to view with concern the future of our foreign trade in all parts of the world. The experience of Great Britain during the last fifty years offers an example of a similar unsound economic policy the fruits of which are now becoming apparent. It has been the belief of English labor that the greater the restriction of output, the greater the number of men to be employed, and therefore the greater prosperity for all. In reality, restricted production has resulted in profits so small as to leave no room for wage increases. The net result has been underpaid labor and poor working conditions. In the main, this course has been unopposed by the British Government. Instead of hitting at the root of the evil and eliminating restrictions on output, the policy has been to palliate social unrest with unemployment and old age pensions. The Government has thereby countenanced an economic situation in which increased wages, if granted, would lead to no greater production and would render the British manufacturer unable to compete with other nations in foreign trade. Therefore the wage increase never came, and England drew for herself a red-ink overdraft on the future.

Exceptional war conditions upset all customs, resulted in huge wage increases, but affected only slightly the old ideas about restriction of output. So England now finds herself in the difficult position of trying to sell goods abroad in competition with foreign nations (and her whole industrial future depends on her success in the effort), when the labor costs of production have been enormously increased with but little compensating increase in output. To add to her difficulties, the payment of recent "unemployment doles" has served only to make the state of unemployment attractive rather than otherwise.

If the foreign markets of the world in many lines of goods are not to be lost to the United States in the future, two things are obvious: (1) Increased production is a condition precedent to all increases of pay and decreases of working time; (2) the policy of our Government must be modelled more along lines which keep maximum production in view than on any system of benefits tending to make labor less self-dependent, or on any theory of decreased hours of work designed fallaciously to provide work for more people, but in reality resulting in more pay for same number of workers.

## Refrigerating Plant That Keeps a House Cool

*(Concluded from page 294)*

full, and I found myself immersed in cool air. I felt so cool and comfortable that it seemed difficult to believe that Washington stood sizzling outside. I climbed up the ladder in the swimming tank until my head was above the surface, and then found myself breathing a hot, damp, muggy atmosphere. I therefore speedily retreated into the tank, where I was perfectly cool and comfortable.

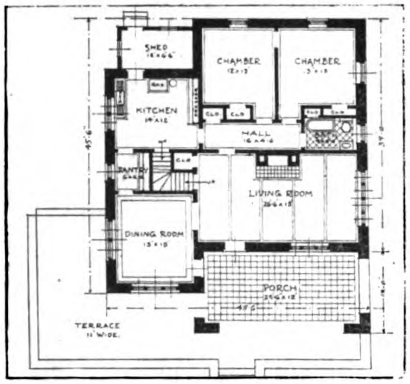
"Guided by this experience, I tried another experiment in my house. I put the refrigerator in the attic and led the cold air downward through a pipe covered with asbestos into one of the rooms of the house. The doors were kept shut and the windows were opened at the top. The temperature in that room was about 85 degrees.

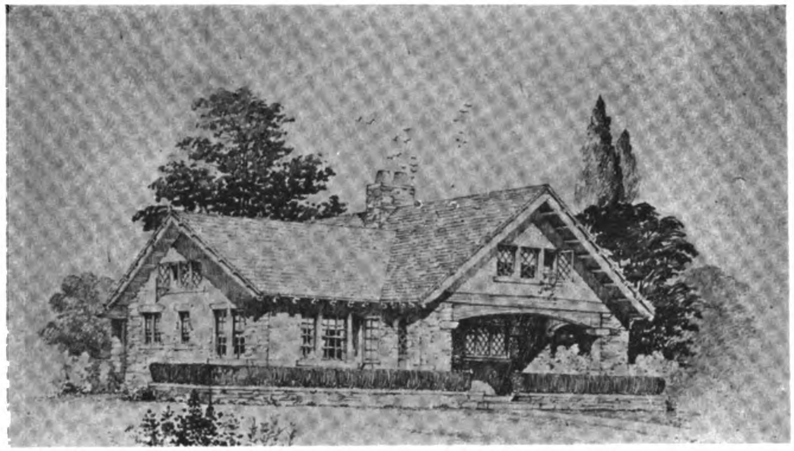
## Making a Success of Stucco Work

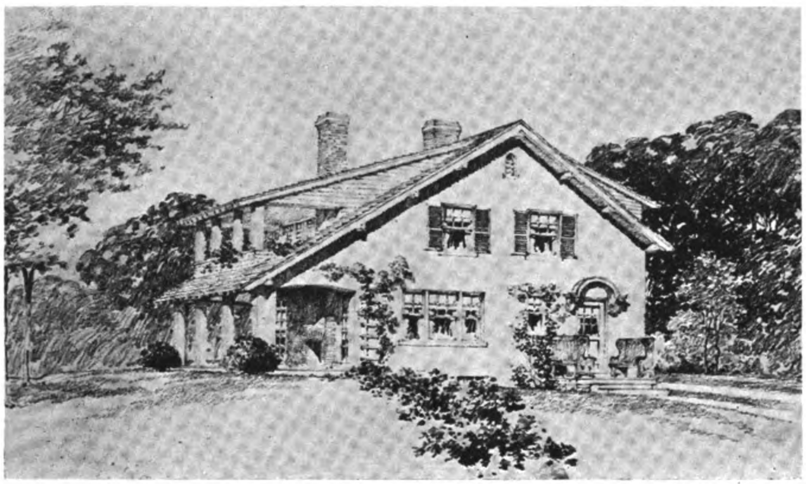
*(Concluded from page 301)*

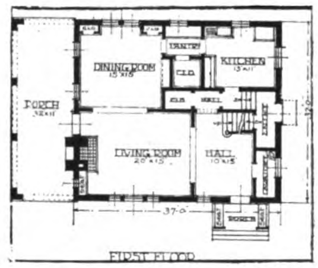
attain sufficient hardness with exposure to the weather.

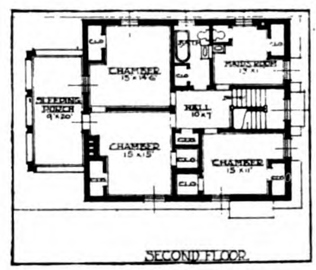
Curing of the undercoats by sprinkling, and protection of finish coats against sun, wind, rain and frost by means of tarpaulins are always to be recommended. This is not always feasible, however, and the architect should be content to specify and insist upon reasonable precautions. The application of cement stucco in freezing weather should be avoided, and in fact temperatures slightly above the freezing point may allow frost to form on a damp wall. The application of stucco under such conditions is likely to result in failure.








# *Two Small Cottages*

C. E. Schermerhorn, Architect

# New Publications

**Design of Factory and Industrial Buildings.**—By Ernest G. W. Souster.—Factory acts, legislation, and building by-laws, together with the spirit and influence of welfare work, have contributed much to the designing of factory and industrial buildings. The necessity for a plan that will facilitate the progress of work through the building, thus lowering production costs, has brought forth many worth while ideas in the past few years. Such ideas are presented in the book under review.

This book treats of the general conditions relative to factory and industrial buildings, showing how production may be speeded up and welfare work introduced. The main types of industrial buildings are explained, together with the consideration of a site and the most effective placing of the buildings thereon. Construction, lighting, ventilation, heating, and sanitation are all dealt with fully.

A chapter is devoted to warehouse and storage buildings and another one to buildings for industrial and scientific research. The subject of fire protection is gone into, as well as the plan of buildings which may be devoted to welfare work.

In keeping with the tendency of today to provide architectural excellence for all types of buildings, a separate chapter is devoted to the architectural character of industrial buildings together with the preparation of the proper drawings.

Especially valuable to many will be the 50-page chapter devoted to representative factory and industrial buildings, wherein are illustrated photographs and plans of prominent buildings which have been successful.

This book is fully indexed, contains 158 pages, size 5½ x 8½, has 90 illustrations of factory buildings and plans and is published by Scott, Greenwood & Son. This is volume one of a series to be known as the Broadway Architectural Hand Books.

# How to Build and Fireproof with Hollow Tile—XVII

## *Analysis of Specifications for Hollow Tile—Drawings and Details Necessary*

By J. J. Cosgrove

THE specifications for any work are a very important part of the directions prepared by the architect to show how he wants the work to be done, and should be studied not only carefully and thoroughly by the prospective bidder, but understandingly as well if he expects to make money on his contracts. The contract for fireproofing a building generally stipulates that the plans and specifications are part of the contract, so it is well for a builder to know in advance just what he binds himself to do when he signs a contract.

A specification should be full and complete, and state specifically just what the contractor will be called upon to do. It is a "salvation clause" or "catch clause" when an architect states that the work must be done according to his wishes, and he is to be the judge as to the meaning of the drawings and specifications. If the architect knows just what he wants done, it is a simple matter to state it in his specifications. If he does not, he is not likely to know more about it when the work is to be done, or is being done, and is liable to be unreasonable in his demands. At all events no one can estimate intelligently on what another man has in mind but does not state, so the only safe way is to make liberal allowance for all salvation clauses.

Local building codes differ so from one another that any form of specification drawn for general use is liable to be in conflict with provisions of the code in some localities. A formal specification, therefore, should be written to conform with the requirements of the code where the building is to be erected.

For reference and analysis, a form of specification for hollow-tile fireproofing is here incorporated, not as a suitable specification for all occasions, but as a guide for those who have specifications to write, and as a help for those who have specifications to interpret. This form has been extensively used throughout the United States. With suitable modifications to meet local conditions it will be found perfectly satisfactory.

### Specifications

#### General Provisions

The contractor for the fireproofing shall furnish all material and labor of every description required to install the work complete in all details, and shall furnish all necessary special shapes for the proper fitting of the steel work. The contractor shall study the plans and details for the general construction, and especially the steel diagrams and details showing connections between the steel work and the tile. He shall furnish all the tools, machinery, hoisting apparatus and centering necessary to carry on the work at the rate of progress stipulated in the contract.

#### Details

When requested to do so, the contractor shall furnish large size details or full size drawings for all special shapes, column coverings, lintel covers, girder covers and general type of arch; which shall be submitted to the architects for their approval.

#### Tile

All the tile required for this work shall be of the best quality of uniformly hard-burned hollow tile. This tile to be well manufactured. No badly split, cracked or warped tile will be permitted to be used in the construction of the building.

All the tile work for the floor construction shall be laid in mortar composed of one part Portland cement of approved brand; three parts of sharp clean sand, and one part of lime paste all thoroughly mixed together. Hydrated lime shall be used, or if lump lime, it shall have been slaked at least four weeks before using. The sand and cement shall be mixed together dry, and sufficient water added to thoroughly wet same, after which the lime paste shall be added, and the whole mass is then to be thoroughly tempered.

All other tile work is to be laid in mortar composed of the following materials and proportions: One part of approved Portland or natural cement, three parts of clean sharp sand free from loam or clay, and one part of lime paste, thoroughly mixed in the manner just described. All the tile shall be laid with full flush joints, plumb to a line, with horizontal beds uniformly level in each course. All the joints and crevices between the tile and steel frame shall be well filled with mortar carefully slushed in.

The arches for the floors in general shall be — inches deep, of flat (or segmental) construction. The tile shall be of the end (side or combination side and end) type, and the skewbacks shall be carefully bedded in place against the beams.

The soffits of all beams shall be protected with slabs of tile or soffit tile at least 1½ in. in thickness.

The arches for the main roof are to be 6-in. flat (or segmental) arches similar to those specified for the floors.

Roofs of pent houses; roof over projecting portion of second story; floors of bulkheads, and other portions indicated in detail as book tile, shall be built of 3-in. book tile set in place between T beams. The T beams for this construction shall be furnished by the contractor for the steel work.

#### Partitions

All partitions must start on steel beams or on fireproof floor arches. Partitions shown on the plans are to be built the thicknesses indicated in figures. If no dimensions are given, the following sizes will govern: Partitions for all corridors, also for all ceilings over 12 and not more than 16 ft. in height, shall be 4 in. Partitions over 16 ft. in height to be 5 or 6 in. in thickness, and all cross partitions 12 ft. or less to be 3 in. thick. Partition walls shall be built straight, true, plumb and well bonded with break-joint bond on each alternate course, and all joints shall be thoroughly flushed up with mortar and shall be well wedged with slate all along the ceiling line.

#### Furring Tile

Where indicated on plans, 2-in. furring tile are to be built against the outside walls of the building. These tile are to be secured to the brick walls with ten-penny nails at every second course, driven into the brickwork at intervals not greater than 36 in. apart horizontally; or metal wall ties anchored to the brickwork may be used.

The curb wall in basement shall be furred with 3-in. tile extending up to the under side of the plate along edge of curb wall and properly fitting around all beams.

The contractor for the carpenter work shall furnish and erect the rough wood frames at all openings in partitions and furring.

#### Column Covering

All column covering shall start directly from the tile floor arches. Column coverings shall be designed to properly fit the columns, and all corners of square columns shall be square (round).

Column coverings shall be wired once (twice) in each course in height or secured together with clamps. Tiles must be set to break joints.

### *Nailing Blocks*

Furnish and set where required for nailing trim, blocks of wood, porous tile or porous blocks well bedded in cement mortar. The blocks shall be so spaced that there will always be a nail hold wherever two pieces of trim are joined together.

### *Covering Exposed Steel Work*

All beams, girders, channel irons or steel members of any description that show below the under side of the ceiling are to be encased on all sides with at least 1½ in. in thickness of fireproofing tile secured to the steel in the usual manner. If required, special designs must be submitted to the architects.

All soil, vent, water pipes and inside downspouts shall be boxed in, using 3-in. tile, starting from the floor tile in all cases. This boxing shall not be done until the pipes have been properly tested and covered by another contractor. There shall be no openings into boxes except for outlets at the various floors. Where these outlets occur, small wooden frames furnished by the carpenter shall be set by the fireproofing contractor.

### *Bulkheads and Toilet Room Floors*

All bulkheads shown on the plans shall be built of 4-in. tile; the structural iron contractor furnishing all necessary tees for supporting the tile. Provide 4-in. tile for the end of the bulkheads where intersected by the entrance door.

All toilet room floors where shown on plans are to be raised approximately 8 in. with fireproof supports so arranged as not to interfere with the piping of the rooms.

The contractor shall build the walls of pent houses with 4-in. hard or glazed tile, laid in Portland cement mortar, with all joints thoroughly flushed.

The curbs of all skylights shall be built of 4-in. hollow tile.

### *Floors and Beam Filling*

After the floor arches have been set in place, and at such tiles as may be designated by the architects, the contractor for the carpenter work shall furnish and set the 2 x 3-in. wood sleepers required for nailing the finished wood floor, where wood floors are called for.

After the strips have been set, the fireproofing contractor must fill in between the sleepers with concrete fill. This concrete is to be composed of one part Portland cement of approved make or brand, and ten parts broken tile, stone, gravel or clean coal cinders, thoroughly mixed together dry, then tempered and mixed and tamped in place. In no case shall cinder concrete be allowed to come in contact with structural steel parts, pipes, conduits or steel parts.

The contractor shall do everything necessary to finish the entire work in a thorough and substantial manner, and shall remove promptly from the premises all the tools, scaffolding, unused tile, and debris as soon as the work is completed.

### *Specification for Long-Span Arches*

The floor construction shall be of the type known as the combination hollow tile and concrete floor arch construction, consisting generally of 4-in. reinforced concrete beams spaced 16 in. on centers with hollow tile between, or the hollow tile laid on a 1-in. bed of 1 to 3 cement and sand with metal fabric bedded therein, all to have at 'east 4-in. bearing on walls.

All concrete used in floor construction shall consist of one part Portland cement, two parts clean sharp sand, and four parts broken stone or gravel of such size as will pass through a ¾-in. ring. Concrete will be of wet mixture and must be well tamped and worked around reinforcing steel after pouring.

Steel rods for floor construction must be of such type as will offer a mechanical bond with the concrete; corrugated, twisted or similar types will be acceptable. Steel must have an elastic limit of at least one-half the tensile strength. Rods must be clean and free from rust scales before placing in position and must be placed not over one inch above the bottom of floor.

The depth of hollow tile fillers and size of steel reinforcement shall be regulated by the span of arch and load to be carried, and shall be of the size indicated on the plans. All tile must be wet before concrete is placed t insure a good bond with the concrete.

Centers must be of such size and strength that they will not deflect under the load of the wet concrete, and must be provided in such quantity as to insure of speedy work. Care must be taken not to remove the centers before the concrete is hard, and under long spans a center line of supports must be maintained for at least three weeks after the concrete has been poured. In cold weather the centers must be left in place until directed by the architect to remove them.

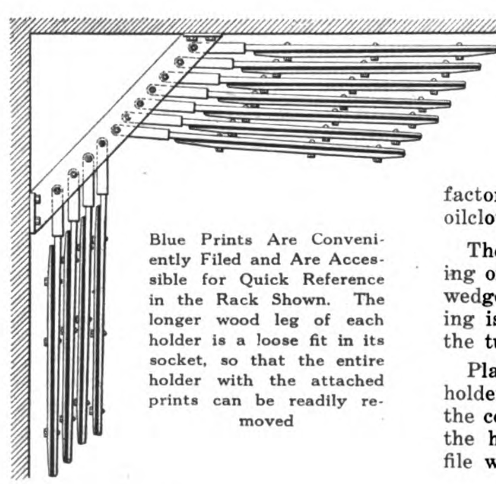
The foregoing specification is a complete primer of instruction in hollow-tile fireproofing. Even without the general drawings and details, anyone skilled in mason work ought to be able to do a very creditable job by following the printed instructions, and when there is added to this the working drawings prepared for every building, there is no possibility of going wrong.

It will be noticed that everything that is to be done is told in clear decisive language, which there is no misunderstanding. "As directed," "according to instructions" and similar indefinite terms are conspicuous by their absence.

*(To be continued)*

# Filing Rack That Makes Blue Prints Quickly Accessible

One of the most difficult problems in an engineering office, drafting room or shop has been to obtain a filing rack for quick reference blue prints. The common filing cabinet has strong objections, as it is necessary to index each file, and it is also necessary in locating a complete assembly to go through an entire file of different sized drawings before an assembly is found. The illustration shows in detail a convenient and practical filing rack. It can be made in the average shop or factory at less cost than the average filing cabinet. The most convenient location is the corner of a room, as it is out of the way and occupies very little space. If used in a dusty factory, it may be desirable to make an oilcloth covering.



Blue Prints Are Conveniently Filed and Are Accessible for Quick Reference in the Rack Shown. The longer wood leg of each holder is a loose fit in its socket, so that the entire holder with the attached prints can be readily removed

The sockets are made from steel tubing of 1⅝-in. outside diameter. A steel wedge is made tapered slightly, the tubing is heated and the wedge driven into the tubing.

Plain hexagon nuts are used on the holder in place of wing nuts to eliminate the convenience for the person that is in the habit of removing prints from the file without authority.—*Iron Age.*

# THE EDITOR'S PAGE

## Strikes and Socialism

Socialism, like every movement of similar character, advances certain ideas that are sound and logical, ideas that every thinking man would unhesitatingly subscribe to. These ideas give many people a very good impression of the Socialistic movement, an impression that causes them to urge the doctrine as a whole. But those who reason forward to results and the means whereby they will be achieved by the movement as a whole find that there is where the rub of the whole movement is to be found.

Socialism at its best, in its present ramifications at least, offers nothing more than the submission of ourselves to a class rule based largely on unreasoning prejudice. Listen to a radical speaker or read a radical paper and note how largely its so-called reasoning is based upon prejudice, pure and simple. It seizes upon an idea which we all abhor and endeavors to create a remedy founded on blind, unreasoning prejudice. regardless of the rights of those in the way of its achievement.

Some years ago a typical radical orator was addressing a street crowd. His subject was the insufficiency of the average wage to afford good living conditions. Now all of us want enough money to live on decently, and are usually fair-minded enough to believe that other people are entitled to the same. But how many of us who are thinking, unprejudiced men, subscribe to the statement made by this representative radical orator in answer to the question, "How high are you going to take wages?"

"We're going to raise wages until we wipe out the profit of the capitalist. He can't keep on raising prices forever. We'll absorb all his profits in wages and then he'll have to turn over his factory to us, the men who are the real producers."

That theory is to-day in grave danger of being made a working reality. The railroad men, with the vast power that they wield and with the consciousness of success behind them, are trying to force this very thing through the Plumb bill. Nationalization of industry *forced* by the workers is the idea behind this movement, only thinly disguised. It is the attempted beginning of a dictatorship of a class which has shown that it will ride rough shod over the rights of others, regardless of who or what it may injure. Many of the strikes to-day seem to have this idea in back of them.

The Engravers' Union in New York City has been successful in establishing minimum prices which their employers may charge. Any employer charging below this scale will incur the displeasure of the union, which may be manifested in various ways. If he is suspected of cutting prices, he must open his books for investigation by a representative of the union. In selecting apprentices, preference is given to the sons or relatives of union members. Class dictatorship.

This is akin to the guild system, formerly so powerful in Europe in days gone by. These guilds were given special charters carrying special rights and privileges, such as exemption from taxes of one sort or another, the exclusive right to engage in their particular trade, etc. Men were born to membership in these guilds, and joined them after having served an apprenticeship. As the guilds grew powerful, they established armies, coerced governments, and finally grew so unbearable that the system was broken up. A few of the old guilds still exist, but they have long since been shorn of their power.

The capitalist system, even at its worst, has always encouraged individual initiative and rewarded the man who was willing and able to produce. Witness Andrew Carnegie. It has never confined man to one class through accident of birth, and has never held lineage against him. Remember that modern capitalism is of comparatively recent growth, and is not feudalism.

Even the cleverest man may be swayed by his prejudices, class or otherwise. Brains that aid the present day movement, brilliant minds that paint pictures for their less gifted fellows, these form the most dangerous of the Red propagandists. Endowed with reason, they are swayed, partly at least, by a prejudice that causes them to hold fast to ideas whose fallacy they would clearly perceive could they only rid themselves of the class prejudice that fogs their vision.

This editorial is not a defense of the capitalist system, which has its faults and plenty of them. Nor is it an indictment of labor. It merely attempts to show some of the present day tendencies and their ultimate danger, a danger that will curtail individual liberty and achievement to no small extent.

## Who Pays for Advertising?

Good advertising costs nothing.

That may seem a far-fetched statement, yet it is a true one.

Almost all advertising men agree that good advertising will so lower unit costs by increasing sales that lower prices will be possible than without advertising.

This fact will be taken to heart by the builder. At present most of the smaller contractors work only part of the year and must make enough during the busy months to tide them over the winter. Except in the more prosperous years many are busy some weeks, idle during others. If they were busy all the time they could even afford to take a lower profit on each job with the certainty that the total profit would be greater.

That's common sense, isn't it? A builder will often willingly pay a commission to the man who swings a contract his way, yet will hesitate to advertise because it costs money.

It always costs money to get business. One might as well spend that money so as to get a lot of business. And advertising, good advertising, will get that business.

Of course, at first the advertising must be paid for out of the builder's pocket, even though it is a part of the cost of doing business. Since prices charged in the building business are largely governed by what competitors get, the cost of the advertising can hardly be added to the total of each estimate. Rather should the cost of the first advertising be deducted from the profit. Later, the lower overhead will more than make up the difference.

Now, suppose that this fall you expect to get ten jobs with an average profit of $200 each. That's a total profit of $2,000. But suppose that you decide to spend as much as $200 for advertising. Your profit, if the advertising has not been good, will be $1,800. But if the advertising is good, you can count on securing at least three jobs that you would not otherwise have had. You will have secured 13 jobs instead of 10; at $200 each this gives a total profit of $2,600. Subtracting the $200 for advertising and you have $2,400, or $400 more in your pocket than if you had not advertised.

Get the point?

# Car Shortage and Price Advances Feature Lumber Market

NOW that prices have become somewhat stabilized, another "bugaboo" has come knocking at the lumber dealer's door. This "bugaboo" goes under the name of car shortage. One of the most serious car shortages in the history of the lumber industry is threatened during the coming winter, as shown by developments of the past month.

Present indications are that the crops to be moved this year will be decidedly greater than those of last year. This means that more engines, more coal, more crews will be needed.

The products of American soil in 1919 may be conservatively estimated at $18,000,000,000 to $20,000,000,000, or from $2,000,000,000 to $4,000,000,000 more than the 1918 value.

Estimates of this year's crop vary, but a fair idea may be obtained from the following figures:

| | Value of 1918 Crop | Estimated Value of 1919 Crop |
|---|---|---|
| Wheat | $1,856,825,000 | $2,823,024,000 |
| Oats | 1,201,378,000 | 1,029,952,000 |
| Barley | 345,600,000 | 252,880,000 |
| Rye | 166,617,000 | 153,010,000 |
| Hay | 1,548,552,000 | 2,682,800,000 |
| Apples | 274,920,000 | 393,420,000 |

These figures point out two distinct things to the observing lumber dealer and the builder—not only will there be an intense car shortage for shipment of building materials, but also the farmer will furnish much business for both the builder and the lumber dealer.

One of the most gratifying occurrences of the past month has been that the stabilization movement started by one of the largest manufacturers of Southern Pine has spread and is now in vogue to a considerable extent. Manufacturers of Northern Pine, Western Pine and Southern Pine are now listed among those who guarantee their prices from thirty days to even some that guarantee them for a period of three months.

The car builders and railroads must of necessity buy immense quantities of lumber in the near future. The Railroad Administration officials are out scouring the country now trying to buy lumber to finish up the cars which were bought a year ago last June, and are having a hard time in filling their requirements.

Prices in general are firm with a decided upward trend. Price advances in practically the entire lumber market was the rule since our last review. There is absolutely no weakening nor is there likely to be.

Labor troubles predominate at mill points. Stocks are low and badly depleted. Some mills are "sold up" for from thirty to ninety days. Mills in some parts of the country were badly handicapped by heavy rainfalls.

There is practically no item in the entire list of lumber and lumber products in which there is a supply equal to the demand. This condition will grow steadily worse as the export business, which is just beginning, gets into full swing. General business is gaining in volume and strength. The housing situation has been relieved in some localities, but, as a whole, the country is far behind in homes. In the meantime, production cannot be increased because of the scarcity of labor. If the manufacturers of lumber were to pay high enough wages to induce labor to leave other lines and fill up their forces, the price of lumber would have to be increased 20 or 25 per cent. As it is now, some of the mills are seriously considering a shutdown, as they cannot make any money, even at to-day's prices, with volume of business so curtailed. The fall and winter demand will probably be as strong as the weather will allow in the building lines.

Prices are probably 10 to 15 per cent higher than they were a month ago on the average, and the probabilities are that there will be further advances of as much more in the next sixty days.

—A. C. S.

# Increased Cost of a Concrete Building

THE same architect has charge of the construction of a concrete building in Memphis now of the same form of construction as one which he designed and superintended five years ago. He is one of the most efficient and experienced architects in the city.

The same contracting firm has charge of it that had charge of the previous building. It is one of the best contracting firms in the country, and has made money competing not only here but in larger cities.

The cost of the forms into which the concrete is poured for the new building is 30 cents for the same unit which cost 5 cents on the former building. During that time lumber, such as is used, has increased not over 100 per cent, and labor hardly so much. The architect and the contractor ascribe the other 400 per cent in the cost to the difference in efficiency in the class of labor now available and that then obtainable. Of course there is some labor in Memphis just as good as is to be had anywhere, but there is such a strong demand for it in the rapid expansion along all lines that any one contractor can secure only a small percentage of this really skilled and industrious labor, and the class from which he has to recruit lowers his efficiency.

Wages should be higher than they were a few years ago, both because it costs more for the worker to live and because of the natural law of supply and demand, but when the man who is paying out the money is glad to go ahead at 100 per cent increase in cost of material and cost per day of labor, he has a right to expect an increased cost of the finished product at a figure close to 100 per cent increase above the former figure, and not 600 per cent, as in the present case. The remaining 500 per cent is a loss. Whoever occupies the building must pay it, and he must add it to the cost to the final consumer of the products handled in the building, and hence it becomes a factor in the high cost of living.

Not only the wage-earner and his immediate family profit by a good scale of pay for him. The world at large is benefited by the wider diffusion of money. But we have not yet come to the point of socialism, where every man, regardless of his qualifications, of his time, money and energy spent in fitting himself for a particular work, and the efficiency which he displays, should draw the same wage. The man who moves dirt with a pick and shovel should not be paid as much as the man who does equally as laborious and far more skilled work of welding metals to a certain degree of strength and a specific shape.

Society is best off when it pays good wages, but insists that the man who is paid the good wage produces what is a fair day's work for an efficient man in that line.—Memphis *News Scimitar*.

# Building Activity During July

NEW construction for which permits were granted during July, 1919, total $142,831,424, a gain of 224 per cent as compared with the July, 1918, total of $44,161,331. Out of 174 cities reporting, only 7 show losses as against 167 showing gains. This large gain is in itself of little significance, for during this period last year government requirements were curtailing building operations very considerably. The total for July, 1917, however, was about $57,500,000, which is nearly a third less than the corresponding period of 1919.

Eastern cities report a gain of 291 per cent, middle state cities 169 per cent, southern cities 340 per cent, and western cities 108 per cent.

The really remarkable thing about construction activities is that the demand is growing in spite of price increases practically all along the line. Even labor troubles have not curtailed construction as much as one would imagine, especially in country house work, where people in many localities are practically being driven to build homes owing to the shortage of desirable apartments and dwellings. In large commercial work there is a tendency to hold off until labor troubles are settled, as many owners are not desirous of running the risk of having a

**large amount of capital tied up in a half-finished building.**

**There is more than a possibility that wage increases will be granted, raising the cost of building 25 or even 40 per cent. In order to secure this increase strikes may occur similar to the recent ones in Chicago and New York. This unrest is merely a reflection of that prevailing in other lines, and will likely smooth out when the labor question in general becomes more settled.**

**Loans are being made more freely and the financial situation in general is more encouraging.**

CITIES IN EASTERN STATES

| | July, 1919 | | | | July, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Albany, N. Y. | 43 | $184,745 | 216 | $186,160 | 10 | $4,400 | 113 | $56,705 |
| *Allentown, Pa. | 35 | 361,594 | 18 | 11,950 | 7 | 32,400 | 10 | 18,900 |
| *Altoona, Pa. | 23 | 64,885 | 78 | 49,332 | ... | ........ | 51 | 21,105 |
| *Atlantic City, N. J. | 23 | 298,436 | 83 | 50,906 | 7 | 13,915 | 36 | 5,865 |
| Auburn, N. Y. | 17 | 10,735 | ... | ........ | 16 | 26,055 | ... | ........ |
| *Binghamton, N. Y. | 76 | 140,666 | 148 | 50,175 | 49 | 149,498 | 68 | 10,116 |
| *Bayonne, N. J. | 48 | 555,025 | ... | ........ | 24 | 56,300 | ... | ........ |
| *Boston, Mass. | 146 | 2,243,461 | 470 | 653,939 | 52 | 311,330 | 364 | 327,920 |
| *Bridgeport, Conn. | 150 | 459,510 | ... | ........ | 107 | 320,526 | ... | ........ |
| *Brockton, Mass. | 31 | 65,042 | 29 | 27,955 | 21 | 14,070 | 12 | 7,285 |
| *Buffalo, N. Y. | 677 | 1,458,000 | ... | ........ | 344 | 72,000 | ... | ........ |
| *Burlington, Vt. | 9 | 13,000 | 11 | 11,000 | ... | ........ | ... | ........ |
| *Camden, N. J. | 102 | 565,085 | ... | ........ | 58 | 95,025 | ... | ........ |
| Cambridge, Mass. | 95 | 496,640 | ... | ........ | 58 | 1,176,033 | ... | ........ |
| *Chelsea, Mass. | 32 | 68,325 | ... | ........ | 17 | 19,750 | ... | ........ |
| *Easton, Pa. | 14 | 66,930 | 25 | 13,453 | 5 | 17,225 | 9 | 3,115 |
| *Erie, Pa. | 102 | 182,620 | 58 | 117,303 | 81 | 150,148 | 35 | 56,775 |
| *Fall River, Mass. | 28 | 183,075 | 36 | 18,799 | 21 | 120,235 | 17 | 11,695 |
| *Fitchburg, Mass. | 37 | 81,095 | 14 | 16,240 | 8 | 1,417 | 13 | 6,960 |
| *Harrisburg, Pa. | 56 | 428,035 | ... | ........ | 25 | 22,485 | ... | ........ |
| *Haverhill, Mass. | 38 | 130,000 | ... | ........ | 4 | 1,750 | ... | ........ |
| *Hoboken, N. J. | 4 | 7,700 | 16 | 25,200 | 4 | 5,170 | 13 | 7,975 |
| *Holyoke, Mass. | 56 | 244,965 | ... | ........ | 6 | 11,050 | ... | ........ |
| *East Orange, N. J. | 80 | 416,137 | ... | ........ | 30 | 196,248 | ... | ........ |
| *Elizabeth, N. J. | 46 | 392,158 | ... | ........ | 23 | 54,787 | ... | ........ |
| *Lancaster, Pa. | 13 | 72,875 | 21 | 38,800 | 4 | 3,650 | 6 | 6,450 |
| *Lawrence, Mass. | 32 | 223,910 | 23 | 53,275 | 18 | 85,885 | 7 | 47,575 |
| *Lowell, Mass. | 49 | 108,040 | 48 | 132,275 | 19 | 12,210 | 36 | 18,535 |
| *Lynn, Mass. | 61 | 135,910 | ... | ........ | 27 | 17,945 | ... | ........ |
| *Manchester, N. H. | 27 | 222,627 | 40 | 19,215 | 20 | 12,800 | 39 | 37,855 |
| *McKeesport, Pa. | 36 | 97,405 | ... | ........ | ... | ........ | ... | ........ |
| *Mt. Vernon, N. Y. | 37 | 261,460 | 17 | 10,840 | 17 | 48,550 | 5 | 3,050 |
| *Newark, N. J. | 304 | 1,531,582 | ... | ........ | 179 | 635,772 | ... | ........ |
| *New Bedford, Mass. | 77 | 1,338,050 | ... | ........ | 34 | 57,437 | ... | ........ |
| *New Britain, Conn. | 68 | 401,795 | 36 | 52,160 | 43 | 34,345 | 21 | 8,050 |
| *New Haven, Conn. | 188 | 1,540,770 | ... | ........ | 97 | 110,689 | ... | ........ |
| New York: | | | | | | | | |
| *Manhattan | 37 | 4,018,575 | 361 | 3,008,205 | 13 | 495,800 | 239 | 1,239,845 |
| *Bronx | 124 | 2,518,125 | 278 | 223,295 | 19 | 760,507 | 154 | 71,716 |
| *Brooklyn | 536 | 6,367,195 | 584 | 591,610 | 261 | 1,893,331 | 793 | 636,955 |
| *Queens | 1324 | 7,123,396 | ... | ........ | 577 | 542,056 | ... | ........ |
| *Richmond | 170 | 385,647 | 63 | 59,250 | 65 | 188,684 | 34 | 20,970 |
| *Niagara Falls, N. Y. | 92 | 320,041 | 22 | 46,000 | 39 | 103,085 | 21 | 23,515 |
| *Nutley, N. J. | 18 | 50,400 | 18 | 2,387 | 1 | 2,000 | 5 | 375 |
| *Passaic, N. J. | 24 | 64,370 | 12 | 14,650 | 10 | 3,150 | 11 | 12,075 |
| *Paterson, N. J. | 58 | 332,490 | 85 | 60,175 | 28 | 103,796 | 60 | 22,137 |
| *Philadelphia, Pa. | 1658 | 6,693,785 | ... | ........ | 576 | 1,141,045 | ... | ........ |
| *Pittsburgh, Pa. | 282 | 1,151,662 | 128 | 210,387 | 155 | 834,963 | 117 | 143,679 |
| *Portland, Me. | 85 | 558,355 | 38 | 51,485 | 12 | 61,965 | 17 | 11,950 |
| *Quincy, Mass. | 111 | 202,360 | ... | ........ | 53 | 75,447 | ... | ........ |
| *Reading, Pa. | 61 | 134,200 | 160 | 72,175 | 26 | 180,850 | 136 | 13,525 |
| *Rochester, N. Y. | 247 | 1,059,805 | 155 | 133,552 | 50 | 30,815 | 63 | 29,740 |
| *Salem, Mass. | 43 | 80,661 | ... | ........ | 32 | 32,631 | ... | ........ |
| *Schenectady, N. Y. | 69 | 213,425 | 29 | 27,385 | 41 | 121,992 | 31 | 13,535 |
| Scranton, Pa. | 55 | 68,440 | ... | ........ | 20 | 91,047 | ... | ........ |
| Somerville, Mass. | 54 | 84,360 | ... | ........ | 21 | 132,200 | ... | ........ |
| *Springfield, Mass. | 158 | 776,540 | ... | ........ | 84 | 124,035 | ... | ........ |
| *Stamford, Conn. | 59 | 159,313 | ... | ........ | 22 | 10,740 | ... | ........ |
| *Syracuse, N. Y. | 154 | 351,708 | 136 | 92,905 | 53 | 92,095 | 67 | 69,830 |
| *Trenton, N. J. | 122 | 395,954 | ... | ........ | 38 | 31,060 | ... | ........ |
| *Troy, N. Y. | 2 | 73,500 | 38 | 22,210 | 21 | 9,250 | ... | ........ |
| *Utica, N. Y. | 41 | 646,325 | 14 | 102,710 | 23 | 156,875 | 8 | 22,500 |
| *West Hoboken, N. J. | 20 | 16,000 | ... | ........ | 5 | 3,200 | ... | ........ |
| *Wilkes-Barre, Pa. | 83 | 243,892 | ... | ........ | 61 | 40,335 | ... | ........ |
| *Worcester, Mass. | 153 | 518,016 | 94 | 71,280 | 100 | 168,969 | 46 | 78,018 |
| *Yonkers, N. Y. | 51 | 278,700 | ... | ........ | 22 | 30,800 | ... | ........ |
| *York, Pa. | 23 | 134,010 | 43 | 7,923 | 6 | 10,770 | 26 | 2,891 |
| | 8774 | $50,109,548 | 4643 | $6,336,609 | 2864 | $11,419,776 | 2683 | $3,049,191 |

CITIES IN WESTERN STATES

| | July, 1919 | | | | July, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Berkeley, Cal. | 27 | $114,638 | 63 | $25,241 | 8 | $19,150 | 40 | $12,557 |
| *Boise, Idaho | 8 | 969,000 | 42 | 22,570 | 2 | 12,000 | 12 | 4,300 |
| *Butte, Mont. | 12 | 63,000 | 35 | 14,000 | 58 | 42,000 | ... | ........ |
| *Col. Springs, Col. | 13 | 42,009 | 14 | 16,220 | 8 | 3,700 | 9 | 3,640 |
| *Denver, Col. | 195 | 878,880 | 113 | 87,230 | 105 | 181,550 | 83 | 41,750 |
| *Eureka, Cal. | 10 | 7,250 | 4 | 900 | 4 | 1,556 | 6 | 5,050 |
| *Fresno, Cal. | 93 | 343,949 | 57 | 51,710 | 57 | 158,000 | 43 | 16,183 |
| *Long Beach, Cal. | 269 | 491,681 | ... | ........ | 274 | 290,574 | ... | ........ |
| *Los Angeles, Cal. | 675 | 553,267 | 393 | 334,342 | 317 | 719,935 | 239 | 100,545 |
| *Missoula, Mont. | 9 | 18,304 | ... | ........ | ... | ........ | ... | ........ |
| *Oakland, Cal. | 270 | 533,549 | 111 | 62,979 | 203 | 386,021 | 70 | 42,370 |
| *Pasadena, Cal. | 50 | 136,501 | 84 | 45,123 | 14 | 11,622 | 47 | 25,652 |
| *Phoenix, Ariz. | 34 | 248,567 | 23 | 27,490 | 47 | 197,181 | ... | ........ |
| *Portland, Ore. | 362 | 551,480 | 395 | 171,115 | 252 | 267,360 | 266 | 114,195 |
| Pueblo, Col. | 57 | 47,475 | ... | ........ | 48 | 134,164 | ... | ........ |
| *Salt Lake City, Utah | 143 | 447,990 | ... | ........ | 51 | 119,430 | ... | ........ |
| *Sacramento, Cal. | 61 | 189,270 | ... | ........ | 61 | 61,982 | ... | ........ |
| *San Diego, Cal. | 94 | 128,501 | 64 | 21,420 | 32 | 48,885 | 59 | 35,715 |
| *San Francisco, Cal. | 122 | 1,389,173 | 437 | 403,527 | 43 | 639,933 | 278 | 210,090 |
| *San Jose, Cal. | 43 | 65,539 | ... | ........ | 26 | 69,980 | ... | ........ |
| *Seattle, Wash. | 1168 | 1,574,235 | ... | ........ | 1080 | 912,985 | ... | ........ |
| *Stockton, Cal. | 67 | 190,712 | ... | ........ | 70 | 56,430 | ... | ........ |
| *Tacoma, Wash. | 176 | 307,955 | 181 | 93,597 | 187 | 220,858 | 86 | 24,013 |
| | 3918 | $9,233,925 | 2016 | $1,377,454 | 2947 | $4,546,355 | 1238 | $636,060 |

CITIES IN MIDDLE STATES

| | July, 1919 | | | | July, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Akron, Ohio | 652 | $3,611,692 | 103 | $601,715 | 152 | $389,390 | 51 | $43,325 |
| *Canton, Ohio | 255 | 793,885 | ... | ........ | 74 | 115,612 | ... | ........ |
| *Cedar Rapids, Iowa | 72 | 408,000 | 14 | 16,000 | 15 | 133,000 | 7 | 8,000 |
| *Chicago, Ill. | 606 | 7,714,700 | ... | ........ | 292 | 4,885,600 | ... | ........ |
| *Cincinnati, Ohio | 1194 | 1,562,890 | ... | ........ | 919 | 395,748 | ... | ........ |
| *Cleveland, Ohio | 446 | 4,694,500 | 902 | 470,575 | 184 | 1,108,600 | 689 | 273,800 |
| *Columbus, Ohio | 264 | 533,000 | 95 | 125,710 | 66 | 99,260 | 56 | 30,645 |
| *Danville, Ill. | 20 | 68,350 | 4 | 4,700 | 1 | 1,200 | ... | ........ |
| *Davenport, Iowa | 142 | 384,278 | ... | ........ | 94 | 99,887 | ... | ........ |
| *Dayton, Ohio | 345 | 1,032,324 | 95 | 52,021 | 118 | 244,019 | 48 | 80,250 |
| *Decatur, Ill. | 52 | 228,375 | 11 | 11,300 | 20 | 70,485 | 6 | 5,850 |
| *Des Moines, Iowa | 140 | 698,350 | ... | ........ | 61 | 602,585 | ... | ........ |
| *Detroit, Mich. | 1889 | 7,338,485 | 576 | 741,480 | 450 | 1,682,090 | 386 | 704,290 |
| *Dubuque, Iowa | 22 | 168,394 | ... | ........ | 6 | 6,720 | ... | ........ |
| *Duluth, Minn. | 246 | 533,245 | ... | ........ | 127 | 283,190 | ... | ........ |
| *East St. Louis, Ill. | 52 | 309,825 | ... | ........ | 22 | 170,825 | ... | ........ |
| *Ft. Wayne, Ind. | 49 | 143,475 | 25 | 30,725 | 17 | 91,000 | 18 | 30,600 |
| *Grand Rapids, Mich. | 189 | 285,418 | ... | ........ | 132 | 109,692 | ... | ........ |
| *Hamilton, Ohio | 43 | 177,956 | 11 | 10,003 | 8 | 15,336 | 22 | 121,044 |
| *Indianapolis, Ind. | 784 | 1,746,357 | ... | ........ | 483 | 651,808 | ... | ........ |
| *Jackson, Mich. | 61 | 213,224 | 18 | 27,070 | 18 | 8,500 | 15 | 10,725 |
| *Joplin, Mo. | 10 | 11,365 | 4 | 2,950 | 10 | 10,310 | 5 | 1,410 |
| *Kalamazoo, Mich. | 20 | 120,650 | 19 | 41,915 | 7 | 13,950 | 4 | 4,050 |
| *Kansas City, Kan. | 32 | 87,615 | 26 | 15,305 | 35 | 36,975 | ... | ........ |
| *Kansas City, Mo. | 441 | 1,521,950 | ... | ........ | 178 | 245,650 | ... | ........ |
| *Lansing, Mich. | 157 | 334,205 | 22 | 15,770 | 11 | 4,500 | 3 | 650 |
| *Lincoln, Neb. | 62 | 141,366 | ... | ........ | 33 | 63,360 | ... | ........ |
| *Milwaukee, Wis. | 514 | 1,314,705 | ... | ........ | 232 | 516,532 | ... | ........ |
| *Minneapolis, Minn. | 683 | 2,163,220 | ... | ........ | 388 | 1,118,000 | ... | ........ |
| *Omaha, Neb. | 138 | 398,465 | ... | ........ | 111 | 320,840 | ... | ........ |
| *Peoria, Ill. | 52 | 260,900 | 43 | 11,275 | 29 | 55,055 | 29 | 33,785 |
| *Quincy, Ill. | 7 | 29,000 | ... | ........ | ... | ........ | ... | ........ |
| *Richmond, Ill. | 11 | 10,800 | 9 | 4,228 | 6 | 9,150 | 9 | 3,200 |
| *Saginaw, Mich. | 220 | 270,837 | ... | ........ | 69 | 98,798 | ... | ........ |
| *St. Louis, Mo. | 443 | 2,883,397 | 444 | 419,140 | 199 | 966,040 | 296 | 193,495 |
| *St. Joseph, Mo. | 63 | 196,720 | ... | ........ | 34 | 51,900 | ... | ........ |
| *St. Paul, Minn. | 326 | 1,652,436 | ... | ........ | 167 | 362,747 | ... | ........ |
| *Sioux City, Iowa | 96 | 1,275,525 | 22 | 96,750 | 32 | 217,800 | 18 | 23,410 |
| South Bend, Ind. | 218 | 251,387 | ... | ........ | 107 | 310,850 | ... | ........ |
| Springfield, Ill. | 89 | 271,905 | ... | ........ | 47 | 48,295 | ... | ........ |
| *Springfield, Ohio | 77 | 800,145 | ... | ........ | 19 | 19,700 | ... | ........ |
| *Springfield, Mo. | 16 | 15,925 | 23 | 13,200 | 4 | 5,825 | 15 | 10,860 |
| *Superior, Wis. | 110 | 232,215 | ... | ........ | 76 | 34,399 | ... | ........ |
| *Terre Haute, Ind. | 28 | 40,305 | 37 | 30,145 | 37 | 38,805 | 30 | 17,947 |
| *Toledo, Ohio | 403 | 620,229 | ... | ........ | 153 | 449,922 | ... | ........ |
| *Topeka, Kan. | 25 | 84,140 | 22 | 9,490 | 9 | 14,075 | 6 | 4,300 |
| *Wichita, Kan. | 132 | 405,685 | ... | ........ | 50 | 144,400 | ... | ........ |
| *Youngstown, Ohio | 225 | 697,750 | 38 | 19,990 | 195 | 492,250 | 26 | 11,975 |
| *Zanesville, Ohio | 1 | 4,500 | 6 | 6,900 | 2 | 4,700 | 5 | 165 |
| | 12,122 | $48,134,064 | 2569 | $2,778,357 | 5199 | $17,253,375 | 1739 | $1,614,476 |

CITIES IN SOUTHERN STATES

| | July, 1919 | | | | July, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Atlanta, Ga. | 247 | $1,457,691 | 76 | $76,617 | 113 | $320,635 | 87 | $118,433 |
| *Augusta, Ga. | 19 | 116,900 | 149 | 49,920 | 5 | 29,785 | 84 | 13,555 |
| *Baltimore, Md. | 1003 | 3,051,820 | 842 | 252,600 | 169 | 300,000 | 533 | 106,500 |
| *Birmingham, Ala. | 127 | 542,685 | 236 | 64,813 | 44 | 45,958 | 218 | 32,031 |
| *Charleston, S. C. | 31 | 237,975 | 12 | 9,575 | 13 | 23,725 | 11 | 6,225 |
| *Chattanooga, Tenn. | 172 | 13,282 | ... | ........ | 154 | 10,660 | ... | ........ |
| *Covington, Ky. | 14 | 32,050 | 10 | 3,680 | 5 | 3,300 | 3 | 2,850 |
| *Dallas, Tex. | 156 | 2,000,000 | ... | 228,810 | 50 | 40,000 | ... | 54,870 |
| *El Paso, Tex. | 101 | 236,170 | ... | ........ | 87 | 45,224 | ... | ........ |
| *Fort Smith, Ark. | 16 | 82,475 | 9 | 5,300 | ... | ........ | ... | ........ |
| *Fort Worth, Tex. | 114 | 1,551,215 | 66 | 493,750 | 34 | 179,229 | 26 | 18,995 |
| *Galveston, Tex. | 577 | 47,962 | ... | ........ | 308 | 16,195 | ... | ........ |
| *Jacksonville, Fla. | 31 | 171,931 | 26 | 63,075 | 17 | 79,523 | 34 | 50,355 |
| *Houston, Tex. | 131 | 610,130 | 277 | 37,674 | 60 | 221,532 | 119 | 25,602 |
| *Huntington, W. Va. | 83 | 288,530 | ... | ........ | 31 | 115,980 | ... | ........ |
| *Knoxville, Tenn. | 39 | 234,931 | 93 | 81,063 | 6 | 14,250 | 62 | 33,135 |
| *Louisville, Ky. | 64 | 258,250 | 123 | 179,965 | 26 | 174,505 | 80 | 33,270 |
| *Lexington, Ky. | 16 | 94,000 | 86 | 14,000 | 3 | 4,000 | 35 | 4,235 |
| *Little Rock, Ark. | 113 | 283,216 | ... | ........ | 78 | 79,260 | ... | ........ |
| *Memphis, Tenn. | 197 | 803,150 | ... | ........ | 38 | 42,405 | ... | ........ |
| *Miami, Fla. | 101 | 393,600 | ... | ........ | 47 | 144,000 | ... | ........ |
| *Nashville, Tenn. | 232 | 180,622 | 133 | 33,000 | 10 | 24,000 | 136 | 30,000 |
| *Oklahoma City, Okla. | 180 | 758,875 | 62 | 20,705 | 31 | 299,430 | 44 | 16,800 |
| *Pensacola, Fla. | 20 | 47,100 | 124 | 18,072 | 6 | 18,075 | 85 | 11,808 |
| *Pine Bluff, Ark. | 22 | 49,095 | ... | ........ | 6 | 7,098 | ... | ........ |
| *Richmond, Va. | 91 | 546,166 | 93 | 153,146 | 22 | 25,405 | 60 | 45,147 |
| *Roanoke, Va. | 96 | 182,295 | ... | ........ | 14 | 19,780 | ... | ........ |
| *San Antonio, Tex. | 253 | 518,955 | ... | ........ | 240 | 189,178 | ... | ........ |
| *Savannah, Ga. | 61 | 322,815 | 39 | 61,225 | 7 | 4,300 | 14 | 5,870 |
| *Shreveport, La. | 86 | 297,460 | 61 | 36,872 | 22 | 124,808 | 28 | 14,050 |
| *Sioux Falls, S. D. | 36 | 170,305 | 14 | 5,150 | 10 | 20,275 | 7 | 32,500 |
| *Tampa, Fla. | 23 | 35,415 | 69 | 15,930 | 10 | 22,715 | 49 | 11,312 |
| *Tulsa, Okla. | 171 | 1,122,855 | 28 | 38,770 | 75 | 292,225 | 25 | 19,016 |
| *Washington, D. C. | 266 | 1,910,835 | 443 | 316,370 | 88 | 297,210 | 255 | 134,968 |
| Wheeling, W. Va. | 37 | 2,416,800 | 31 | 732,000 | 19 | 1,395,400 | 30 | 36,113 |
| *Wilmington, Del. | 137 | 656,537 | ... | ........ | 93 | 164,411 | ... | ........ |
| | 5128 | $21,807,180 | 3115 | $3,004,287 | 1941 | $4,794,471 | 2026 | $847,637 |

*Indicates increase.

# New Catalogs of Interest to the Trade

**152. McKinney Swinging Garage Set.** McKinney Mfg. Co., Pittsburgh, Pa.—Folder describing this garage set for swinging doors. Gives illustrations of hardware used.

**153. Barrett's Everlastic Slate-Surfaced Roofing.** The Barrett Co., 17 Battery Place, New York City.—Illustrated folder describing this slate-surfaced roll roofing, also strip shingles made four at a time.

**154. Dehn's Sanitary Safeguards.** Compound Injector & Specialty Co., 419 North Laramie Ave., Chicago, Ill.—Illustrated booklet describing various kinds of guards, traps, closet bends, garage floor drains, etc.

**155. Parry Universal Multi-Service Bodies.** Martin-Parry Corporation, Indianapolis, Ind.—Illustrated folder describing various types of bodies which can be used by contractors, etc.

**156. Perfection Lettering and Drawing Pen.** New York Blue Print Paper Co., 102 Reade Street, New York City.—Folder describing this pen, which comes in such sizes as to give both fine and heavy lines.

**157. The Eclipse Low Pressure Air Brush.** Eclipse Air Brush Co., 79 Orange St., Newark, N. J.—Illustrated folder describing this air brush, used to apply protective or finishing coatings.

**158. Contractors' Pumps.** Bulletin No. 147. The American Well Works, Aurora, Ill.—Illustrated folder describing portable power driven pumps, also contractors' pump accessories.

**159. Oil Sprinklers, Tar and Asphalt Kettles.** Acme Road Machinery Co., Frankfort, N. Y.—Describes apparatus of interest to contractors needing machinery in the building of tar, bituminous or maeadam roads; also pouring pots, dumping wagons, etc.

**160. Acme Portable Gravel Screener.** Bulletin No. 104. Acme Road Machinery Co., Frankfort, N. Y.—Illustrated folder describing this gravel screener and unloading plants.

**161. McKinney Butts for All Doors.** McKinney Mfg. Co., Pittsburgh, Pa.—Describes why three butts are advisable. Gives valuable data on what kind of finished hardware to use in connection with various woods.

**162. Jennings Patent Automatic Dump Bodies for Auto Trucks.** The Columbia Wagon Co., Columbia, Pa.—Folder describing these dumping bodies.

**163. The Dutch Boy Painter.** National Lead Co., Pittsburgh, Pa.—House organ giving valuable information on painting.

**164. Heat for Your Home.** Vesuvius Heating Corporation, 7 West Forty-second St., New York City.—Describes the Vesuvius steam heating unit that burns gas and regulates itself automatically. This is a steam heating plant located in the cellar that sends steam up to the radiators, gas being used for fuel instead of coal. Can be used in either new or old installations.

**165. The Concrete Builder.** August number. Portland Cement Association, 111 West Washington St., Chicago, Ill.—Contains interesting information for concrete contractors, together with drawings of a covered concrete manure pit with cistern also an article on "Testing Sand for Organic Impurities."

**166. Miami Trailers.** The Miami Trailer Co., Troy, Ohio.—Illustrated catalog describing various kinds of trailers which can be used by contractors.

**These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the number of any catalogs on a postal and mail it to Building Age, 243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.**

**167. Economy Drawing Tables and Sectional Filing Cases, Catalog N.** Economy Drawing Table & Mfg. Co., Adrian, Mich.—Illustrated booklet describing various types of drawing tables with and without drawers; also filing cabinets, stools, "T" squares, parallel ruler attachments, etc.

**168. Foot and Hand Power Wood Working Machinery.** Catalog No. 77. W. F. & John Barnes Co., Rockford, Ill.—Illustrated booklet describing various types of circular saws, boring attachments, rip saws, combination machines, fluting attachments, scroll saws, lathes, etc.

**169. Slate Roofs Can't Burn or Wear Out.** Vendor Slate Co., Bangor, Pa.—Illustrated folder describing recent fires in areas covered by wooden shingle roofs. Also gives pictures of buildings covered by slate.

**170. Flat Roofs Surfaced with Slate.** Vendor Slate Co., Bangor, Pa.—Describes wood roofs surfaced with this material which can be walked on, thus rendering it possible to use the roof for various purposes, such as playground, sleeping porch, or any purpose that requires roof space.

**171. Revolutionizing Modern Construction.** Paul W. Koch & Co., 19 South Wells St., Chicago, Ill.—Illustrated folder describing Jiffy Jacks and Jiffy column clamps, together with cost data showing economy obtained by their use.

**172. Permanent Furniture for Your Home.** Curtis Service Bureau, Clinton, Iowa.—Illustrated folder describing various kinds of woodwork and its construction.

**173. Bigger Furnace Business.** R. J. Schwab & Sons Co., 283 Clinton St., Milwaukee, Wis.—Illustrated folder describing this type of pipeless furnace.

**174. One Machine in Operation Does Work of Several Machines in Several Operations.** S. A. Woods Machine Company, Boston, Mass.—Illustrated folder describing these moulding, surfacing, planing and matching machines, which run as many as eleven mouldings in one operation.

**175. The Pease-Vertical Blue Printing Equipment.** The C. F. Pease Co., 213 Institute Place, Chicago, Ill.—Illustrated booklet describing this electric blue printing machine, also a print sheet washer.

**176. Investment Paying 20 per cent to 40 per cent Per Year.** The Diamond Metal Weather Strip Co., 626 Kerr St., Columbus, Ohio.—Illustrated folder telling of the fuel economies possible through the use of weather strips.

**177. Low Down Concrete Mixer.** Elite Mfg. Co., Ashland, Ohio.—Illustrated booklet describing various kinds of concrete mixers, scaffold brackets, etc.

**178. Waterproofing Cement.** Advance Waterproof Cement Co., 175 W. Jackson Boulevard, Chicago, Ill.—Folder describing how to waterproof old and new walls.

**179. Evans "Almetl" Fire Doors and Shutters and the Famous "Star" Ventilators.** Merchant & Evans Co., Philadelphia, Pa.—Illustrated booklet describing these fire doors, together with data that must be furnished when quotations are requested. Drawings show doors meeting various conditions.

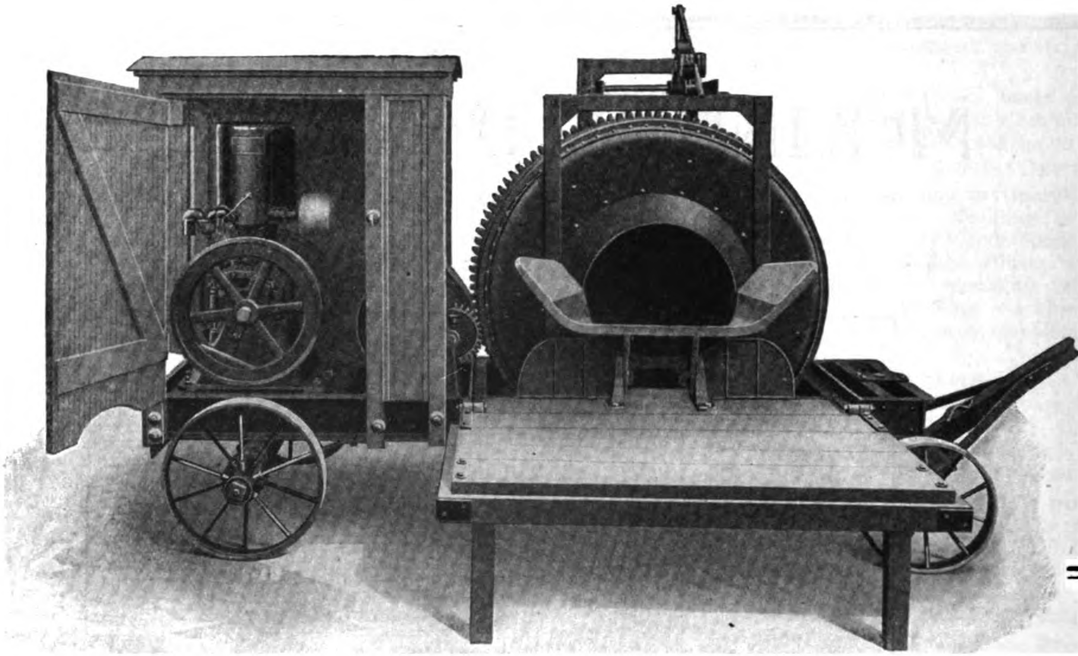
**180. Door Latches.** National Mfg. Co., Sterling, Ill.—Illustrated folder describing door latches for sliding and swinging doors.

**181. The Greatest Announcement Ever Made to the Contracting Field.** Oshkosh Mfg. Co., 508 Buck St., Oshkosh, Wis.—Describes the Oshkosh service plan and the location of service stations. Also gives illustrations and descriptions of various types of concrete mixers.

**182. Contractors' Atlas.** August number. Atlas Portland Cement Co., New York City.—House organ of interest to contractors. This number describes how to prevent dusting of concrete floors and pavements, advertisements of contractors and an interesting article on the cost-plus fee with bonus for efficiency.

**183. A National Campaign of Education and Business Building for Common Brick.** The Common Brick Manufacturers Association of America, Chicago, Ill.—Handsomely gotten up brochure describing how to increase the use of brick. Gives interesting designs of brick houses.

**184. Possibilities in Advertising.** Reprint of address by John W. Hansell, Philadelphia, Pa., before the first annual meeting of The Common Brick Manufacturers Association, which publishes it. Tells how advertising can be used by the building industry.



# AND NOW

## The New Model Improved "The Standard" is

## Perfect—Simpler—Faster—Cleaner

THE above picture illustrates the new improved "The Standard" LOW CHARGING Concrete Mixer. You will note that many radical changes and improvements have been made in both its mixing principle and general design.

We have abandoned the process of blade mixing and have evolved a simpler and faster one. The new drum contains a series of lifting pockets that run from end to end; as the drum turns these pockets carry the bunched contents over center of gravity where it tumbles down, causing a cataract-like motion that occurs 6 or 7 times during one revolution of the drum. The result thus obtained is a perfectly mixed batch in the LEAST POSSIBLE TIME.

This mixing excellence, plus a dozen other new advantages that cannot be detailed here, should make "The Standard" your choice. Its ability to reduce your mixing costs is greater now than ever—so great that we claim "The Standard" to be the highest class mixer on the market.

Write for catalog today and compare "The Standard" Merits with those of other machines.
We have the utmost confidence in your keen judgment.

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# METAL LATH

## For Fire Prevention

FIRE Prevention Week, under the auspices of the National Fire Protection Association, and Metal Lath Week, under the direction of the Metal Lath Manufacturers Association, will be held concurrently this year, during the week of October 6th.

Fire resistive construction is the crying need of this country. Our fire losses, the great percentage of which would be avoided by fire resistive construction, have reached such staggering figures annually as to call for concerted action and cooperation among all who have to do with designing, building and supplying materials for structures, to enlist the active interest of building clients and communities in fire prevention through better construction.

No greater national service could be rendered by architects, engineers, builders and suppliers of materials, than to combine their influence and efforts to center public attention on Fire Prevention and Metal Lath Week, October 6th.

Will you join us during that week in telling the people of your community how to build fire-safe homes and public buildings, and how to save the vast wealth which is being destroyed by preventable fires each year?

**You'll find the Herringbone Catalog very helpful—write for it today.**

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WATERPROOFINGS AND TECHNICAL PAINTS

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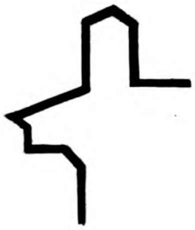
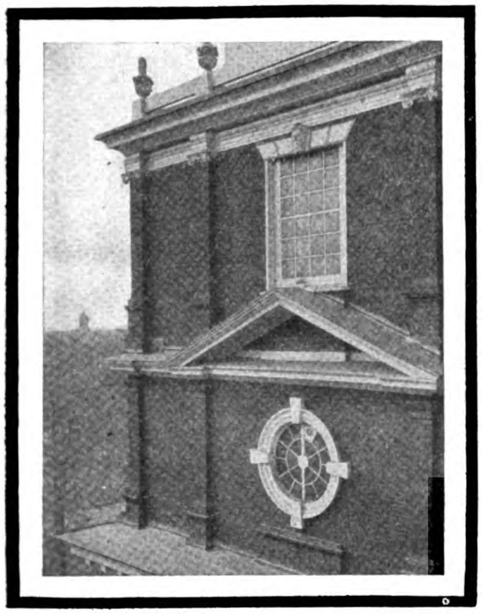


IC TARGET & ARROW REGISTERED TRADE MARK N. & G. TAYLOR CO. PHILADELPHIA

## TARGET & ARROW ROOFING TIN

# No 7~ Coping & Cornice Roof Designs



Wood Pediments and Cornices on the Tower of Independence Hall protected by Roofing Tin.

THE top of wood or masonry Copings and Cornices is nearly always made in sections, butted or joined together, leaving on the upper side a series of exposed joints.

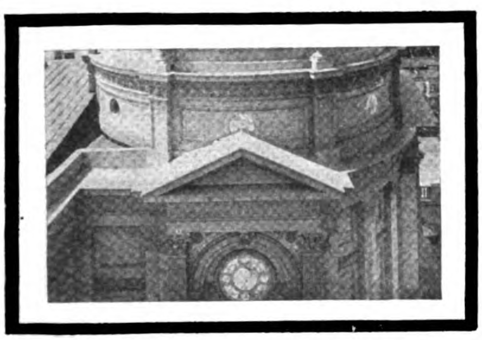
These joints are either "grouted," "buttered" or "filled" with some more or less waterproof material and might remain weatherproof if there was no expansion and contraction of the Coping or Cornice, or if the building supporting them was not subject to uneven settlement or vibration of any kind.

But let even so small a crack or crevice be formed allowing the entrance of only a few drops of water in freezing weather, and serious trouble is sure to follow.

Ample protection can be assured by covering all jointed Copings and Cornices with the proper kind and weight of Roofing Tin, which, owing to its flexibility, can be made to conform to any contour, while its thinness avoids distortion of the original design of the mouldings it protects.

As Roofing Tin can be painted, or painted and sanded, any desired color, it can be made to blend perfectly with the Coping or Cornice it covers.

*For details of general application and color suggestions, see* "Service Sheets" 1, 2, 3, 4, No. 18. *Sent on request.*



Metal covering on all masonry Pediments and Cornices of St. Ignatius Church, San Francisco, California.

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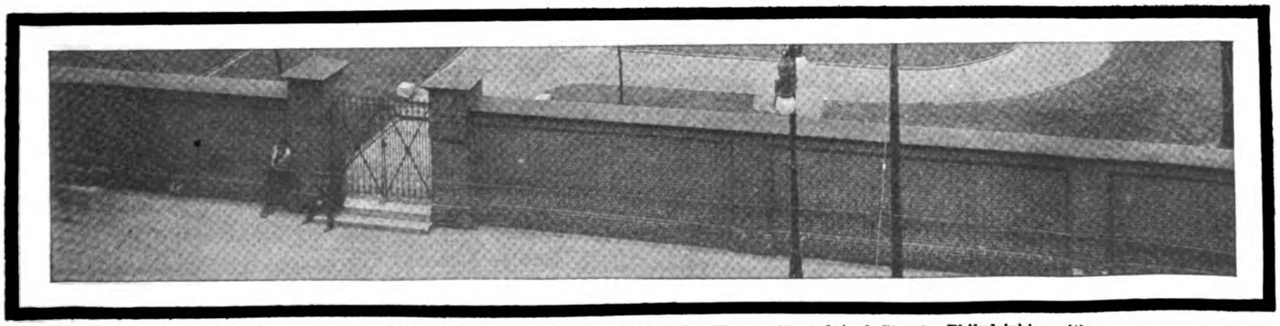
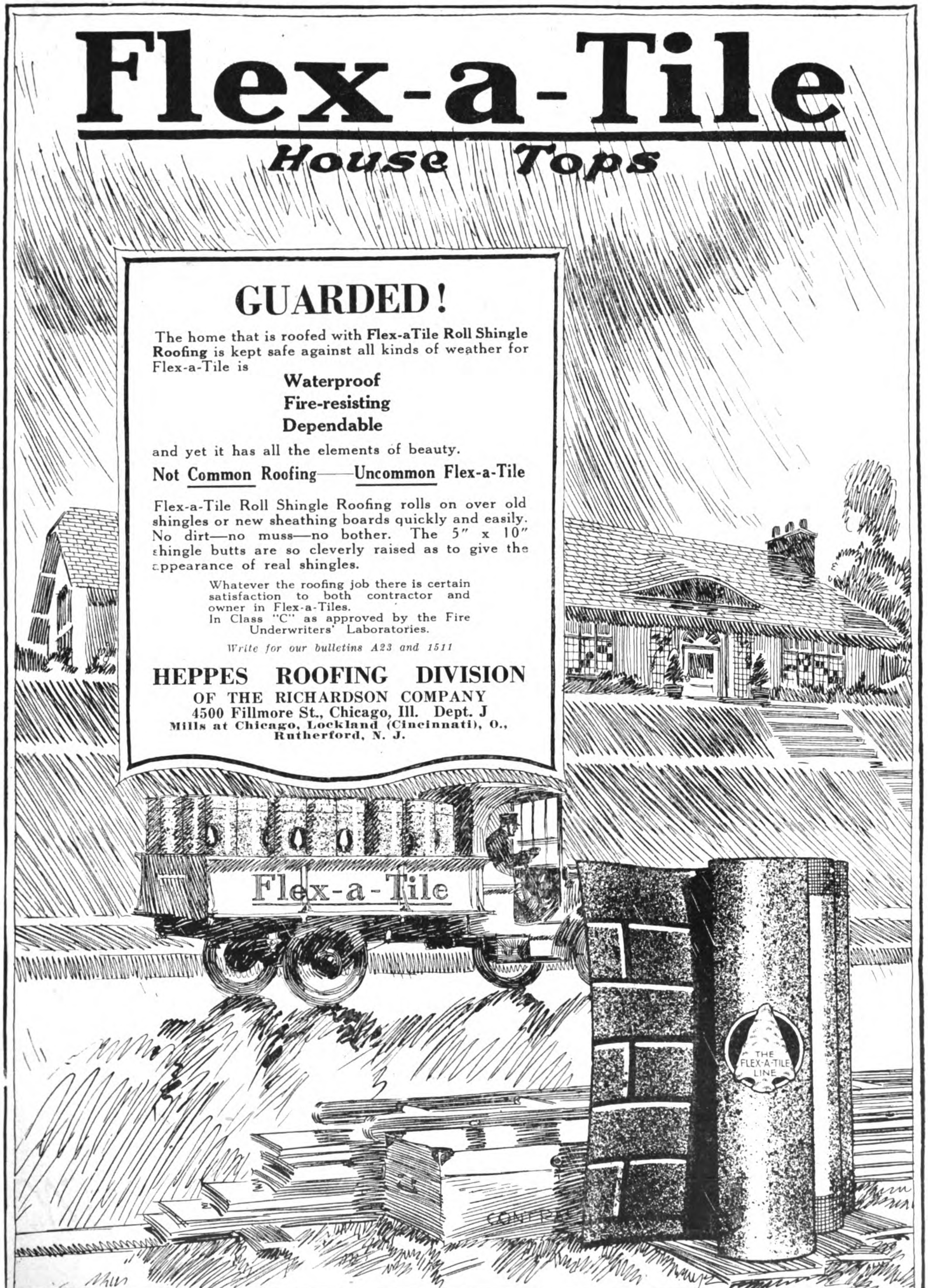


A well preserved brick wall surrounding the Old Friends Meeting House, 4th and Arch Streets, Philadelphia, with the entire coping protected by Roofing Tin.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*THEY DON'T KNOW* what you know—that old soft-wood floors can be refloored with three-eighths OAK FLOORING.

*WE CAN HELP* you tell them about it and get this desirable business, and will send you a supply of attractive cards about how to get a stylish OAK FLOOR, and these cards can be telling a lot of other folks about it while you are laying the first one.

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*MAKE A LIST* of the houses you know where they have old soft-wood floors and money to pay for handsome OAK FLOORS. Write your name and address on a post card if you prefer—mail it to the address below and the cards will come without charge by first mail. We will also back you up with convincing literature *to your prospect direct*. That'll help, too. Tell us the name of your favorite lumber dealer. Send the post card now It means more business for us both. *(SURE YOU CARE).*

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# BUILDING AGE

NEW YORK, OCTOBER, 1919

# Washington's Headquarters at Valley Forge Adapted to the Needs of Today

## *Small House Derived from the Famous Old Design Shows Possibilities of Adaptations to Modern Domestic Architecture*

A HOUSE that is frankly a modern adaptation of Washington's Headquarters at Valley Forge is the subject of this article. The elevation is changed but little, the design merely being reversed and two dormers added, a porch being used instead of the old extension. Although it is quite usual to adapt the pretentious buildings of the old world to commercial requirements in the new, as done so often by McKim, Meade & White, yet it is rare that the direct inspiration for a successful home design is taken from old work.

As this house is located near Philadelphia, a section where stone is largely and effectively used in domestic architecture often at little greater expense than would be the case if wood were used, the house quite naturally is of that material, as was its famous prototype. Anyone familiar with Colonial architecture in this country is forced to the conclusion that the old craftsmen showed a rare sense of beauty in the delicacy and refinement of their moldings and the spirit of the exterior design. And indeed one cannot help but remark at the exceptionally fine proportion and scale in this adaptation.

The doorway is simply designed, the popular porch seats being placed at each side and forming a center of interest in the elevation.

The windows are of the familiar Colonial type. It should be noted that the second story windows are not so high as are those in the first story, only two horizontal rows of panes being placed in each sash as against the three horizontal rows in the sash of the first story.

Interest is also lent by the use of shutters on the first story and blinds on the second floor. The dormers are well proportioned to the main part of the house, and their circular heads harmonize well with the cornice. The placing of the leaders should also be noted, for putting them at either side of the house like this makes a symmetrical arrangement that does not detract from the design, as is often the case when leaders are carelessly placed.

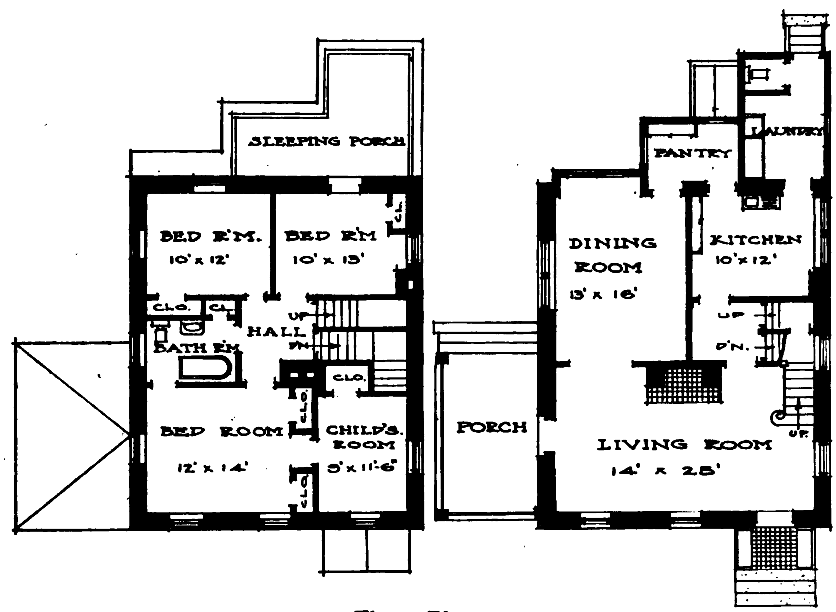
Entrance is had directly into the living room, the main feature of which is a brick fireplace with a typical Colonial mantel. To the right of the fireplace is the familiar Colonial stair. Indeed the entire trim throughout this house shows the strong influence of Colonial designs.

The porch at the left of the living room is a necessary feature these days, and so is included in place of the original addition.

The dining room and kitchen are placed in accordance with the prime necessity of keeping kitchen odors from penetrating to the dining room and shutting off a view of the kitchen from guests at dinner time. In some designs the pantry placed in this manner is made larger and serves as a breakfast nook and pantry combined.

Both the kitchen and the pantry are provided with a large dresser. At the rear of the kitchen is the laundry, which communicates with the exterior through an entry containing a toilet.

The Dining Room. Note the typical colonial mantel and stairs




Floor Plans

The second floor contains three main bedrooms and a child's bedroom off the master's room. As is desirable, the master's bedroom is provided with two closets.

This house was designed for Mr. Finley at Chestnut Hill, Pa., in accordance with plans and specifications prepared by Magaziner and Eberhard, architects, 603 Chestnut Street, Philadelphia, Pa.

# How to Finish Common Woods

## *Hints That Will Get Better Results in Preparing Specifications*

By A. Ashmun Kelly

*Ash.*—Fill with light colored paste filler, rather stiff; finish same as described for oak, which see. An open-pore wood.

*Beech.*—Does not require paste filler. Surface it with shellac varnish, white shellac for light finish, orange shellac for darker finish. Stained walnut, cherry or mahogany, it looks well. There is a curly, quarter-sawed variety. When finished natural the last coat of varnish should be a full gloss. If stained, use water color or spirit stain; an oil stain is quite good. As its markings are very delicate care must be exercised not to apply stain too dense. Use a transparent stain. If a pigment stain is employed, wipe off soon as applied. It is a close-grained wood.

*Birch.*—This wood is nicely adapted for imitating other and more expensive woods, the curly variety being especially handsome when stained. But the natural finish, in both the red and white birch, is very handsome, and when this form of finish is adopted the last coat of varnish should be rubbed dull. Many finishers think this wood is spoiled by staining. It may be stained to imitate oak, mahogany, golden oak, green oak, chocolate, etc. Like beech, birch is a close-grained wood, hence requires no paste filling, but needs surfacing with shellac. From one to five pounds of shellac gum to the gallon of alcohol may be used. Finishers differ as to this matter. Usually, however, shellac is preferred quite thin. The last coat is a polished varnish effect.

*Butternut.*—Same as for ash, which see.

*Cherry.*—This wood requires extra attention in the wood-working room, for it must be perfectly smooth and level if the best results are desired in the finishing of it. Also it must be free of dust. In the natural it looks well, but staining greatly enhances its richness. Burnt sienna, or an aniline color, Bismarck brown, makes a good stain, and alkanet and dragon's blood also may be used. The sienna is, of course, more permanent than the aniline stain. Cherry goes well with a mahogany stain. Usually this wood is surfaced, not paste filled, though some finishers do use paste filling, rather thin. Surface with shellac. When you use water stain be careful not to let any laps form, but should this occur, simply wet the edges of the laps with clear water, also some of the adjoining parts, and then apply the stain. The stain on cherry should be freely applied; avoid making air-bubbles.

*Cypress.*—In general terms the finishing of this wood is identical with cherry or birch; surface it with shellac, then sandpaper it, then more shellac, two or three coats, followed each time with sandpapering. If water stain is to be used, better first size with gelatin or very thin shellac varnish, because water raises the grain of the wood; many prefer staining with turpentine stain. Some mix the staining material with strong vinegar, applying to the bare wood, followed by a thin coat of shellac. Oil should not be used on cypress wood. With straight grained cypress a fair imitation oak of the Mission style may be made. The stain may be made with japan drop black with a bit of rose pink; mix with some interior varnish to a paste, which thin out with turpentine to the proper stain consistency. The stain may be made any tone by the addition of black or addition of turpentine, as to change desired. Dark chrome green gives a greenish oak effect. Imitation antique oak may be made with Vandyke brown two parts and raw umber one part, with a little drop black, just a very small bit, using japan colors. Mix to a paste with varnish and thin out with turpentine. The final finish is with varnish, rubbed down, or with flatting varnish.

*Chestnut.*—Has a very coarse and deep pore and requires a heavier or stiffer paste filler than oak; otherwise it may be finished the same as oak. It may be finished natural or be stained, light or dark.

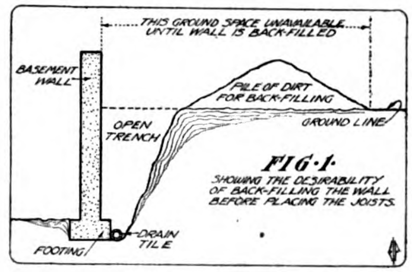
*Elm.*—Has a large pore, but one that is not as deep as that of oak or ash, and it is easier filled than those woods. Its worst feature is its fuzz, technically known as whiskers. This fuzz exists in spots, it catches the stained filler and makes patches of darkness, which give a muddy or uneven effect. The way to overcome this trouble is as follows: Take some paste filler of medium antique oak shade and thin it with turpentine to form a surfacer or liquid filler. Then add an equal quantity of the paste filler to this, thin again with as much turpentine as will equal in quantity the combined fillers. Stir it well. You can now change the color to suit, using burnt umber, or burnt sienna, or both mixed. Apply this with a 2½-inch chiseled soft bristled brush, apply carefully, spread uniformly, and wipe off edges. In about 15 minutes rub as usual, removing surplus filler. In 12 hours more it will be ready for sandpapering lightly with No. 0 sandpaper; made the surface smooth, and then give it a coat of thin liquid filler or primer, let stand 12 hours, rub down smooth, and apply the finish coat

(*Continued on page* 346)

# Using Concrete to Best Advantage for Foundation Walls

## *Calculating Thickness to Insure Stability—Economy Obtained by Minimum Thickness*

By Ernest Irving Freese




FIG·1· SHOWING THE DESIRABILITY OF BACK-FILLING THE WALL BEFORE PLACING THE JOISTS.

WHEN the following conditions exist, either singly or in combination, basement excavations must necessarily be of greater width than the width, out to out, of the basement itself:

First—When the bank of the excavation is not firm enough to stand vertically.

Second—When waterproofing is required on the outer face of the wall.

Third—When the wall-footing projects beyond the outer face of the wall.

Fourth—When an underground drain is required at the outer base of the wall.

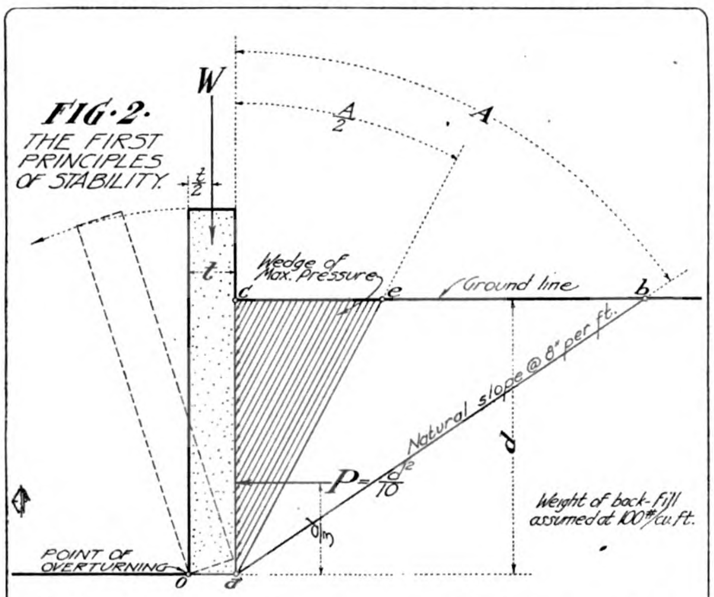
It is plain to be seen that if all of the above-named conditions were operative, then the added width of the excavation, beyond the face of the wall at the ground line, would be equal to the projection of the footing, plus the space required for the drain tile, plus the horizontal projection of the natural slope of the earth. This maximum case is illustrated in Fig. 1. And it is not uncommon. In any case, however, the wall must be back-filled. Hence, if this back-filling is done before the floor joists are laid, then the wall must either possess sufficient stability to act, temporarily, as a *retaining* wall, or it must be braced from the inside to prevent its overturning.

But braces and shores are expensive, and their degree of security is uncertain. Yet, on the other hand, back-filling the wall before the carpenter work is started, is always desirable, for it eliminates the obstructing pile of loose dirt—and the open trench—that encircles the foundation, thereby greatly expediting the work of laying the floor joists. In other words, it makes for economy and safety, and renders available the ground-space adjacent to the building. Therefore, if the wall were constructed in such a way as to safely withstand the lateral pressure of the back-fill without the aid of inside bracing, and without increasing the thickness of the wall beyond that needed otherwise, then the condition that reduces the cost to a minimum would be obtained. And this desirable condition can be brought about by constructing the foundation of monolithic concrete, that is to say, by casting the footing and wall either as a unit, in one operation, or by doweling the two parts together in the manner herein to be shown.

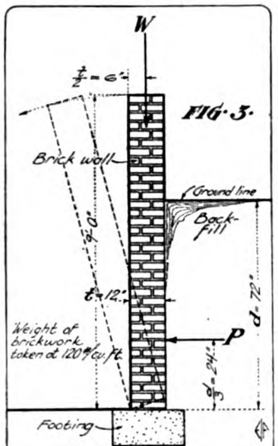
The engineering principles involved in calculating the stability of a wall against overturning are very few and very simple. The same thing, however, cannot be said about the formulas for earth pressure that are "on the market." Nevertheless, by employing a very little common sense coupled with the same amount of common arithmetic, a simple formula for the lateral pressure of an earth fill against the back of a foundation wall can be arrived at that will serve the purpose as well, and better, than the most complicated mathematical fabric ever devised by a theorist. Moreover, the simple formula will be on the side of safety, which is as it should be, for no amount of mathematics will ever prevent a wall from overturning. Earth pressure, unlike water pressure, is uncertain and variable, and cannot be defined by any law. Hence, *all* formulas for same are in error. And the best that can be done is to err on the side of safety.

Dry earth, sand or gravel, when loosely piled, will not stand vertically. The particles composing the pile will tend to "flow," or work downward, toward the base of the pile. And the slope of the surface of the pile, after each particle has finally come to rest, is termed the natural slope of the material. No one can predict, with accuracy, what this slope will be. It is exceedingly variable. Ample experience, however, has demonstrated that a safe value to use in earthwork calculations is a slope of eight inches per foot. This value is used in the following calculations.

Now, referring to Fig. 2, consider the inclined line *ab* as representing the natural slope that the back-filling would assume if the retaining wall were suddenly overturned. It is thus made plainly evident that the overturning pressure against the wall is exerted solely by the particles of earth contained within the triangular area *abc;* that is to say, each and every particle within this area is endeavoring to slide downward, by the force of gravity, toward the base of the wall. But there is no known law by which the exact amount and distribution of this pressure can be determined. Consequently, it is assumed that, somewhere within this area, there exists a *solid wedge of material* that tends to slide down a frictionless inclined plane toward the point *a*, and that this wedge presses against the back of the wall by the force of its own gravity. Calculations then show that the wedge which exerts the maximum amount of pres-




*In the above diagram, all dimensions are to be taken in inches.*
*W= weight, in pounds, of one lineal ft. of wall.*
*P= pressure, in pounds, of back-fill, against one lineal ft. of wall.*
*Hence, since $P=\frac{d^2}{10}$, the overturning tendency $=\frac{d^3}{30}$ inch-pounds, while the resisting tendency $=\frac{Wt}{2}$ inch-pounds, per lineal ft. of wall.*
*If the former is greater than the latter, the wall will overturn.*




$P = \frac{d^2}{10} = \frac{72 \times 72}{10} = 518$# per lineal ft.
$W = 120 \times 9 = 1080$# per lineal ft.
Overturning tendency = 518 × 24 = 12432"#
Resisting tendency = 1080 × 6 = 6480"#
Hence, the back-fill would overturn the wall.

sure is the one formed by the triangle **aec**, when the plane *ae*, upon which it is assumed to slide, divides the angle *A*, between the natural slope and the back of the wall, into two equal parts. This wedge **aec** is termed the *wedge of maximum pressure*. As a matter of fact, no such wedge exists. It is purely an assumption. But it is an assumption that results in the maximum possible pressure, and is therefore on the side of safety. On this basis, allowing 100 lb. per cu. ft. for the weight of the back-filling, the formula for earth pressure is reduced to the following simple equation:

$$P = \frac{d^2}{10}$$

In the above formula, *P* represents the total *horizontal* pressure of the back-fill, in *pounds per lineal foot of wall.* And *d* is the depth, in *inches*, from the ground line to the point about which overturning of the wall would take place. And this pressure, *P*, against the back of the wall, may be considered as concentrated at a point distant one-third of *d* above the point of overturning. Hence, the leverage of the overturning pressure is $\frac{d}{3}$ inches, as the diagrams indicate.

Now, returning to Fig. 2, it is seen that the resistance of the wall against overturning, about the point *O*, is equal in this case to the weight of the wall acting downward with a leverage of half the thickness of the wall, since the weight of the wall may be considered as concentrated at its center of gravity, as shown. Hence, this *resisting* tendency must at least be equal to the overturning tendency, or the wall will not remain vertical. In other words, the pressure *P*, of the earth fill, times its leverage $\frac{d}{3}$, must not exceed the weight *W*, *of* the wall, times its leverage $\frac{t}{2}$. These tendencies, being *pounds multiplied by inches*, are measured in *inch-pounds.*

Fig. 3 represents a cross section of a basement wall built of brick, resting upon a concrete footing. Will this wall have enough stability to safely resist the pressure of the back-fill? Let us see. In the first place it is plain to be seen that the footing, being in no way a part of the wall, does not contribute toward its stability. The footing is, in this case, merely a base upon which rests the wall. Hence the depth of fill from the ground line to the top of the footing is the depth, *d*, to be used in the determination of the overturning pressure *P*.

Therefore, $d = 72$ inches.

$$P = \frac{d^2}{10} = \frac{72 \times 72}{10} = 518$$

pounds per foot of wall.

$$\frac{d}{3} = \frac{72}{3} = 24 \text{ inches.}$$

Hence, the *overturning* tendency is equal to 518 pounds times 24 inches, or 12,432 inch-pounds.

Now, taking the weight of brickwork at 120 pounds per cubic foot, makes the weight of the wall equal to 120 times 9, or 1080 pounds per lineal foot. The thickness, *t*, of the wall is 12 inches.

Therefore, $W = 1080$ lb. per ft. of wall.

$$\frac{t}{2} = \frac{12}{2} = 6 \text{ inches.}$$

Hence, the *resisting* tendency of the wall is equal to 1080 pounds times 6 inches, or 6480 inch-pounds.

It is thus found that the *overturning* tendency of the wall is greater than the *resisting* tendency. Hence, it would be unsafe to back fill this wall until after the floor joists were laid. In fact it would be safest not to back fill it until a considerable portion of the weight of the superstructure comes upon it.

Now consider the concrete wall illustrated in Fig. 4. This wall is of the same size, and subject to the same conditions as the brick wall just analyzed. But, in this case, the footing and wall are cast in one piece, that is to say, this wall is monolithic. The wall does not merely *rest* upon the spread footing, but is a *part* of it. Hence, its stability is vastly increased, as the following analysis will show.

In this case, $d = 84$ inches.

$$P = \frac{d^2}{10} = \frac{84 \times 84}{10} = 705$$

lb. per ft. of wall.

$$\frac{d}{3} = \frac{84}{3} = 28 \text{ inches.}$$

Hence, the *overturning* tendency is equal to 705 pounds times 28 inches, or 19,740 inch-pounds.

The weight of the concrete wall and footing, at 150 pounds per cubic foot, is equal to 150 times 11, or 1650 pounds per lineal foot. The leverage of this weight is equal to the horizontal distance from the inner edge of the footing to the center of gravity of the wall, or 12 inches, as shown in the figure.

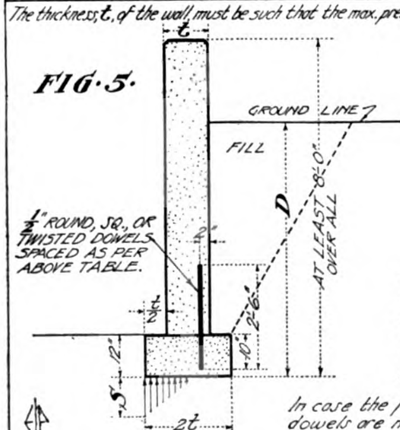
The weight of the column of earth resting directly upon the outer projection of the footing also contributes, in this case, to the stability of the wall, since this column of earth must be lifted before the wall can overturn. At

DATA FOR THE DESIGN OF CONCRETE BASEMENT WALLS WITH DOWELED FOOTINGS

| DEPTH—*D*—OF FILL, FROM GROUND LINE TO BOTTOM OF FOOTING. | 4'-0" | | | 5'-0" | | | 6'-0" | | | 7'-0" | | | 8'-0" | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| THICKNESS—*t*—OF CONCRETE WALL | 6" | 8" | 10" | 8" | 10" | 12" | 10" | 12" | 14" | 12" | 14" | 16" | 14" | 16" | 18" |
| SPACING OF DOWELS, CTR. TO CTR. | 22" | 32" | 44" | 14" | 20" | 30" | 10" | 14" | 16" | 8" | 9" | 10" | 6" | 7" | 8" |
| MAX. SOIL PRESSURE—*S*—IN TONS PER SQ. FT. | 2.11 | .80 | .60 | 2.65 | .95 | .70 | 3.40 | 1.15 | .80 | 4.75 | 1.40 | .95 | 8.45 | 1.70 | 1.10 |

The thickness, *t*, of the wall must be such that the max. pressure, *S*, will not exceed the unit bearing power of the soil.

FIG·5·




NOTES:
In the use of the above table, the proportions given in Fig. 5 should be followed... The tabulated values and the figured dimensions apply only to basement walls that are to act, temporarily, as retaining walls to hold the back-fill until the floor joists are laid..... In no case should this table be used for the design of permanent retaining walls, for the factor of safety against overturning is sufficient only for the purpose herein stated....

The maximum soil pressure—*S*—given in the table, is the unit pressure under the inner toe of the footing, caused by the lateral thrust of the back-fill. After the floor joists are laid, the wall ceases to act as a retaining wall; hence the unit soil pressure thereby becomes greatly reduced and evenly distributed over the footing area.

In case the footing and wall are cast as a unit, the dowels are not required, but the proportions of the wall should remain the same as given above.....

100 pounds per cubic foot the weight of this 6-inch column is equal to 300 pounds. The leverage of this weight is equal to the horizontal distance from the inner edge of the footing to the center of gravity of the column, or 21 inches, as shown.

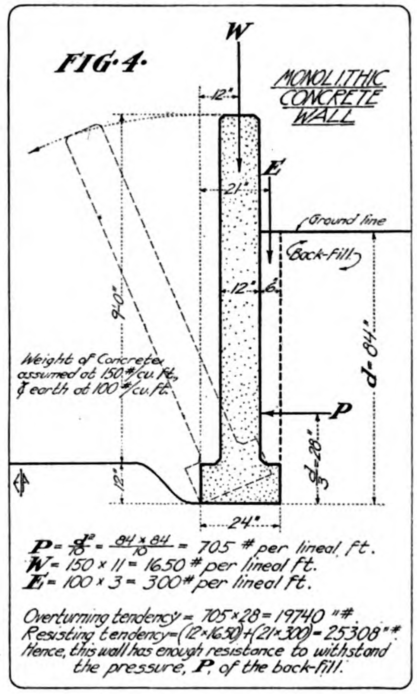
Hence, the total *resisting* tendency of the wall, against overturning, is equal to the *sum* of the resisting tendencies of these two weights, or 1650 pounds times 12 inches, *plus* 300 pounds times 21 inches, which is 25,308 inch-pounds, or, by formula:

Resisting tendency $= 12W + 21E =$
$(12 \times 1650) + (21 \times 300) =$
$19800 + 6300 = 25308$ inch-pounds, as above.

It is thus found that the monolithic concrete wall shown in Fig. 4 would safely withstand the pressure of the backfill without overturning, since its *resisting* tendency is considerably greater than its *overturning* tendency. Hence, it would be safe to back-fill this wall before the floor joists were in place, and without the necessity of inside shoring.

In some cases, however, it is either uneconomical or impossible to cast the wall and footing as a unit. In this case, the same amount of stability as that of a monolithic wall, can be obtained by doweling the footing and wall together, as is illustrated in Fig. 5. The dowels tie the footing and wall together and thus cause the two parts to act as one unit in the same manner as the monolithic wall. In other words, if the wall tips over, it must pull the footing with it. And this "pull" is taken directly and entirely by the dowels. Hence, they should be placed near to the *outer* face of the wall, say within 2 inches of same, in all cases. Moreover, the dowels should be not less than ½-inch diameter, 2 ft. 6 in. long, and embedded to a depth of at least 10 inches in the concrete footing. For the latter reason, the footing must be at least 12 inches thick, as shown, irrespective of the thickness of the wall. The spacing of the wrought iron or steel dowels, lengthwise of the wall, can then be taken from the table given in connection with Fig. 5. This table will also prove of value to the builder because of the fact that it gives the minimum thickness of wall, for any given depth of fill, that will insure the stability of the wall against overturning, provided, of course, that the filling is not done while the concrete is "green." It is to be noted that the width of the footing, in all cases, is equal to twice the thickness of the wall, and that the height of the wall, from top of same to bottom of footing, is at least equal to 8 feet.

Finally, it must not be overlooked that there are other factors affecting the stability of basement walls aside from those above considered. For instance, the tension in the back of the wall might become so great that the wall would break in two rather than overturn; or the resistance against sliding might be so slight that the wall would move bodily out of place; or the soil pressure under the inner edge of the footing might become such as to exceed the bearing power of the soil and thus cause the wall to lean inward. However, in the type of walls here discussed, the latter possibility is the only one that need be considered. Hence, in choosing a certain thickness of wall, for any given height of fill, care must be taken to see that the corresponding maximum soil pressure, $S$, given in the table, will not be greater than the allowable bearing power of the soil. For instance, the table gives 10 inches as the minimum thickness of wall to withstand a fill of 6 feet, and the maximum soil pressure corresponding to this thickness of wall is 3.40 tons per square foot. If this pressure is greater than the allowable bearing power of the soil, then a 12-inch wall should be chosen, as the pressure under the footing is thereby reduced to 1.15 tons per square foot, as the table indicates. The table shows very clearly that a very slight increase in the thickness of the wall results not only in increased stability but in a greatly reduced and more uniformly distributed soil pressure, $S$, under the footing.




## China Closets Placed at Sides of Window Seat

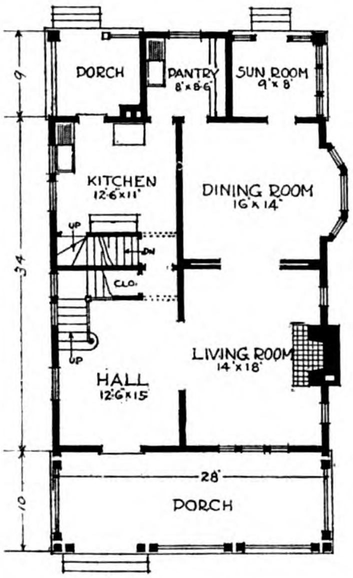
*By Charles Alma Byers*

IN the accompanying illustration is shown a somewhat unusual and quite effective arrangement of china closets for the dining room. As will be observed, there is a deep ledge beneath the group of three windows, and it is on this ledge that the china closets rest, one at each end. They are of the built-in kind, and, being three cornered, are provided with diagonal-set doors composed of small panes of glass to match the windows. In fact, the doors are of the same width and heighth as the windows. The closets have three shelves each, and enable the making of a very attractive display of china. The deep ledge beneath the windows naturally serves for an enhancing display of potted plants.

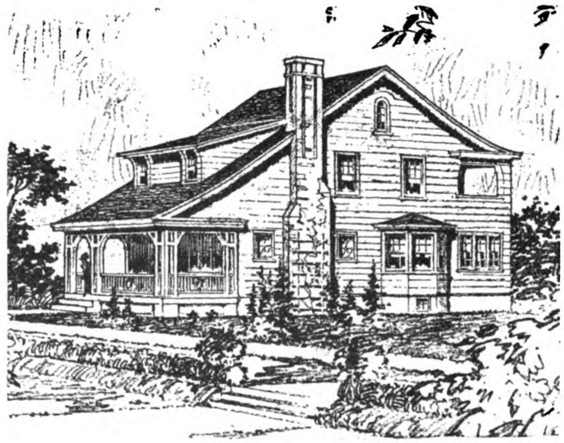
The china closet is one of the most important features of the dining room, and this arrangement is especially effective

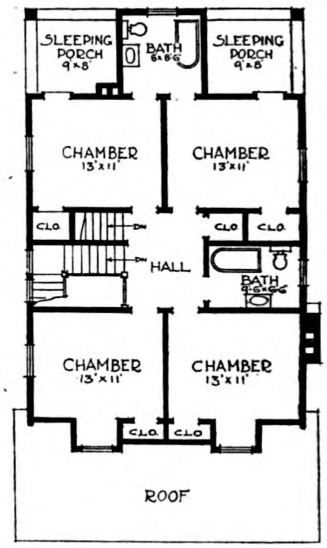
### Light Weight Concrete

During the war the Concrete Ship Section, Emergency Fleet Corporation, developed a special light weight aggregate for concrete, thereby obtaining a concrete of considerable strength weighing as little as 99 lbs. per cubic foot. This aggregate has attracted considerable attention, and much speculation has been entered into as to its use in building construction.




FIRST FLOOR

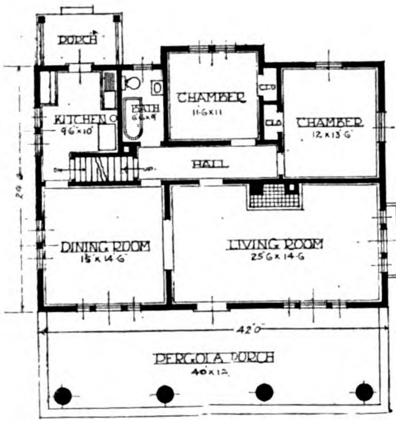





SECOND FLOOR

## *Two Country Homes With Up-to-date Features*

*C. E. Schermerhorn, Architect*




# Removing Efflorescence from Brickwork

## *Property Owners Welcome Builders Who Can Remove and Prevent This Defacing Feature*

By A. Redfern-Cornwell, A.R.I.B.A.

THE coating of white salts which frequently appears on the surface of brickwork, and which is called efflorescence, detracts considerably from the appearance of the brickwork, while the crystallization of the salts within the pores of the bricks tends to cause disintegration by action similar to that of frost. Furthermore, efflorescence may cause damp places on the brickwork so affected, destroying plaster and paint applied after the process has commenced.

I will first deal with the remedy in the case where the cause of efflorescence is due to the brick itself and its ingredients. In cases where efflorescence manifests itself in spite of all reasonable precautions, the first thing to do is to stop any means of water leakage into the brickwork, and if the trouble is caused by the penetration of rain from the outside, the brick surface can be treated by the application of alternate washes of soap and alum solutions; the former in the proportion of 2.2 lb. of hard soap per gallon of water, and the latter in the proportion of 1 lb. of alum per gallon of water. It is more economical and efficacious to employ aluminum sulphate ($Al_2 3SO_4$) in the alum wash instead of common alum or potassium aluminium sulphate ($K_2Al_2 4SO_4$). Where surface deposits are due to calcium sulphate and therefore not washed off by the rain, they can be removed by scrubbing the face of the brick with hydrochloric acid diluted with about five times its volume of water. Care should be taken that before the acid is applied the brick surface should be thoroughly moistened and all traces of acid removed, after treatment, by washing the surface with water.

In the case of where brick clays are the cause through their containing magnesia, which is converted into sulphates in the process of being burnt, add one ounce of barium carbonate to every hundredweight of clay, thoroughly well mixed. The action is prevented, barium sulphate being formed, which is non-hygroscopic. Experiments should decide the exact amount to add by testing the results, as the proportion is governed by the percentage of salts contained in the clay, although the weights given will doubtless be found sufficient.

In the case of where the mortar is the cause of the efflorescence, it should be treated by mixing the mortar with some animal fatty matter in the proportion of 8 lb. or 12 lb. to 100 lb. of quicklime and 300 lb. cement powder.

To remove the efflorescence which has already made its appearance, the surface should be well brushed over in dry weather with a stiff broom and the brushing repeated as it reappears until all salts have been removed.

There are cases where efflorescence is due to the extreme porosity of the brick, which readily absorbs moisture containing salts of magnesia or sodium. Oftentimes in new brickwork it makes its appearance, including the leaching out of certain lime compounds upon the surface. The remedy for the work already completed, providing the damp course is sound, is time alone.

As to the causes: Efflorescence is largely due to a large percentage of salts, which during the burning of the clay have been converted into sulphates. The effect of efflorescence is produced by what is termed saltpetring, and is firstly evident in new buildings or even in older walls exposed to much damp.

The deposit is generally white, but is sometimes green or yellow, according to the composition of the clay used in brick manufacture. It is a sugarlike deposit of soluble salts carried by the moisture or water from the interior to the exterior of the bricks, and in time made manifest by crystallization or evaporation of the water or moisture.

Analysis shows that the composition of the crystals varies according to conditions.

These crystals consist of sulphate such as sodium sulphate ($N_2SO_4$), potassium sulphate ($K_2SO_4$), megnesium sulphate ($M_gSO_4$), and calcium sulphate ($C_aSO_4$).

In bricks made from clay found near the sea, chlorides are sometimes present, as potassium chloride (KCl) and sodium chloride (NaCl); while other clays furnish compounds, such as potassium carbonate ($K_2CO_3$), sodium carbonate $Na_2CO_3$), sodium nitrate ($NaNO_3$), ferrous sulphate $F_eSO_4$), and aluminium sulphate ($Al_23SO_4$).

With the one exception of calcium sulphate, all the salts given above are soluble in water, most of them exceedingly so, as may be seen by the following table:

| *Salt* | *Solubility in Cold Water* |
|---|---|
| Potassium sulphate ......... | 1 in 12 |
| Potassium chloride .......... | 1 in 3 |
| Potassium carbonate ........ | 1 in 1 |
| Sodium sulphate ............ | 1.18 in 1 |
| Sodium chloride ............ | 1 in 3 |
| Sodium carbonate .......... | 1 in 2 |
| Sodium nitrate ............. | 1 in 1 |
| Calcium sulphate .......... | 1 in 500 |
| Magnesium sulphate ......... | 1 in 3 |
| Ferrous .................... | 1 in 2 |
| Aluminum sulphate ......... | 1 in 2 |

Calcium sulphate, regardless of its relative insolubility, is the most fruitful cause of efflorescence, which is far less readily washed off by rain than that resulting from the more soluble salts.

The chief causes for the existence of efflorescent substances in bricks is due to one or more of the following conditions:

1. Soluble salts contained in the clay used.

2. Soluble salts formed while the clay is in the kiln—by the oxidation of minerals in the clay, or by the action of sulphurous kiln gases in the clay.

3. The use of clay tempering water containing soluble salts.

4. The introduction of soluble salts into the bricks after burning, generally from the mortar employed.

An undesirable variety of surface clay is that containing iron pyrites, or ferric desulphide ($F_eS_2$), as also clay which has been covered with sea water, for all these will exhibit a higher percentage of earthy salts.

Even in cases where the clay is of approved quality, foreign substances of deleterious character are sometimes introduced which result in the formation of salts giving rise to efflorescence. One example of such treatment is the use of ashes with the object of preventing shrinkage, and another is the adoption of sulphurous coal for burning.

It occasionally happens that kiln-burnt bricks are impregnated with soluble salts either in consequence of badly designed plant or inefficient management. Thus, after the dried bricks have been "crowded" into the kiln and the process of heating up has been commenced, if the fires are kept only just high enough to evaporate the moisture in proportion to the chimney draught, the process is unattended with prejudicial conditions.

But if the moisture is evaporated too rapidly for the capacity of the shaft, the surplus vapor in contact with the bricks may absorb sulphur from the gases, resulting in the formation of sulphuric acid, which by combination with the carbonates and other salts will give rise to soluble sulphates, the most general cause of efflorescence. Where certain ingredients of the clay are calculated to give unsatisfactory results, various methods are adopted. The risk of efflorescence can be overcome in clays capable of being vitrified, thereby converting the salts into permanent silicates.

Clays containing earthy salts can be rendered harmless by washing, but in the case of low-priced bricks this method is too costly and therefore impracticable.

Chemical treatment is a more scientific expedient, performed in the case of clays prepared by the wet process by adding to the water used in the wash mill such chemicals as will react upon the soluble sulphates and precipitate harmless compounds, the chemicals most generally employed being barium chloride and carbonate, resulting in the precipitation of barium sulphate ($B_aSO_4$), which is the only soluble to the extent of 1 part in 400,000 parts of water by weight. Even if soluble sodium salts are present they would simply be converted into carbonate or chloride by the corresponding barium compounds, and being very soluble, these salts would be removed by rain quite readily if brought out by efflorescence on the surface of brickwork.

Examination and purification of the water used in brick-making are quite as necessary as treatment of the clay. The operation being simple and very inexpensive, should never be neglected, as good clays are frequently contaminated by saline water.

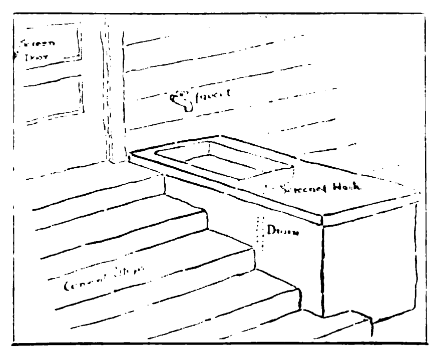
# Wash Basin Outside Kitchen Entrance

## *Novel Feature in California Home Permits One to Wash Up Before Entering House*

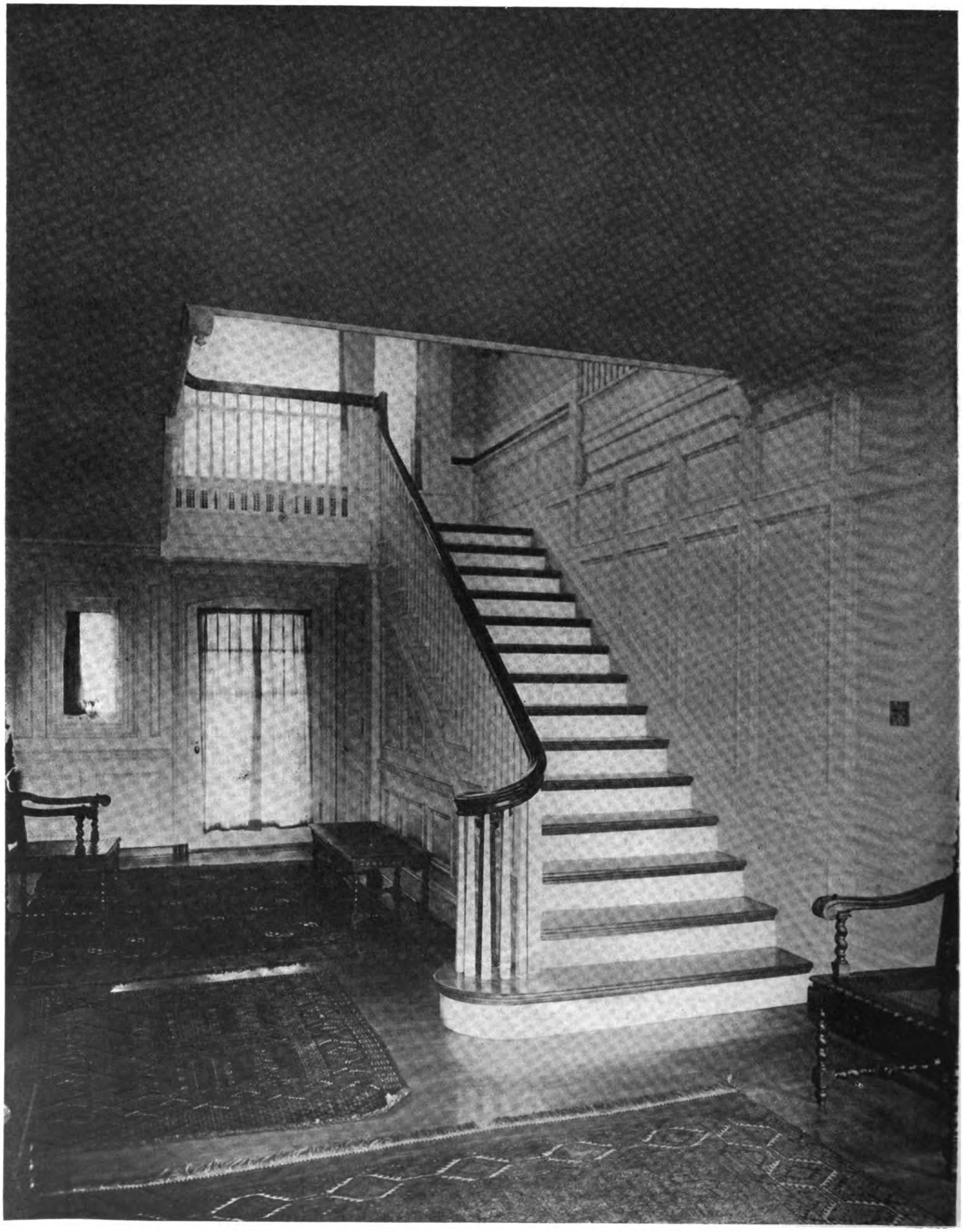
By Persis Bingham

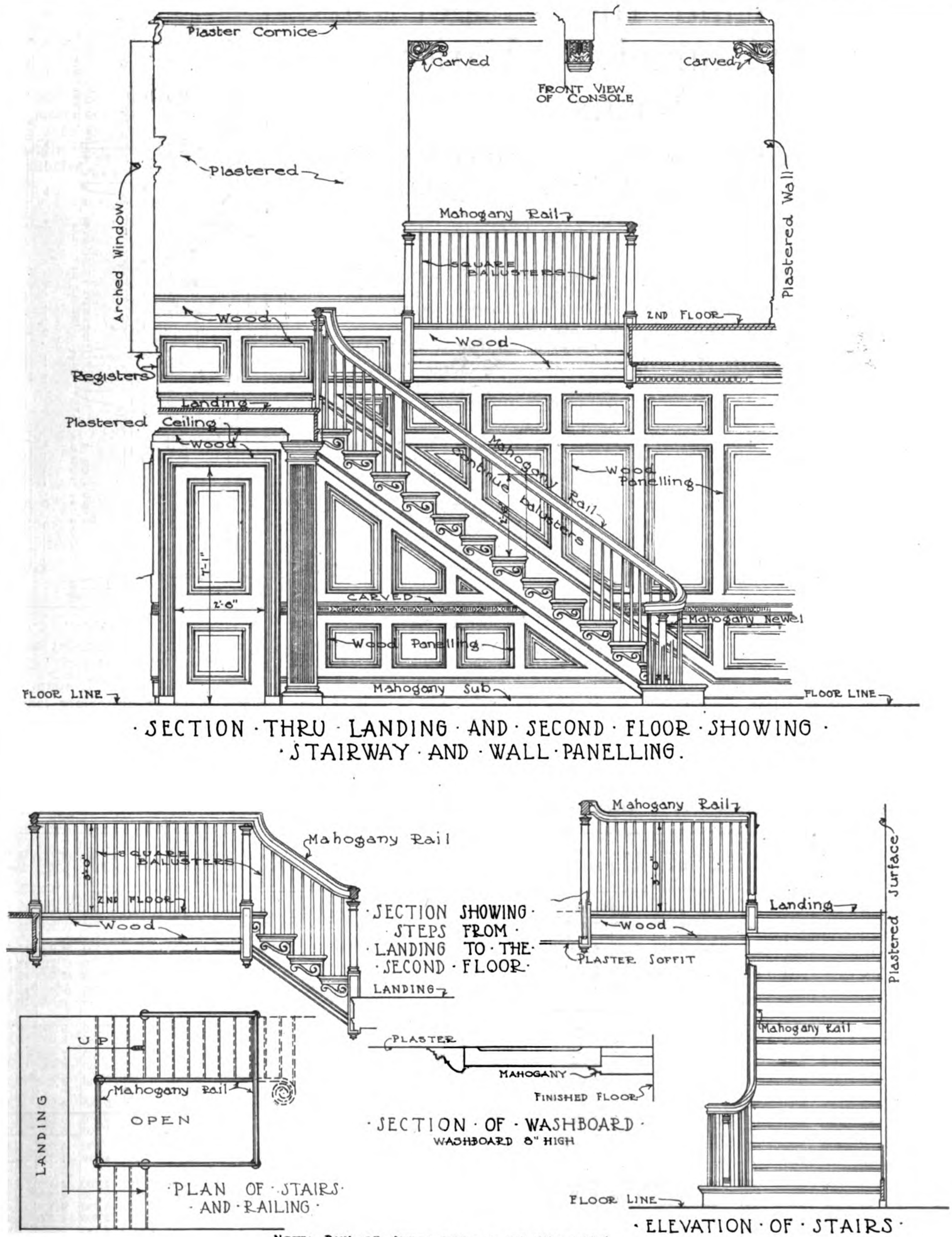
A WASH basin hollowed out of a cement buttress at the rear screen porch door is the practical idea incorporated in a California home. The basin is 8 in. wide, 16 in. long and 6 in. deep, and is used by the housewife for washing vegetables fresh from the garden, preparatory to taking them into the kitchen, and by the men folk for washing hands too grimy with automobile grease to come in contact with all the door knobs on the way to the bath room. A faucet projecting from the wall above the basin furnishes water and a drain running down through the buttress carries waste away to the cess pool.

The buttress in which the basin is made is 12 in. thick, finished with a cap 2 in. deep and projecting 2 in. on all sides. Before the concrete was poured the drain pipe was placed inside the wooden form, 14 in. from the house wall, the top of the drain pipe being 6 in. below the height of the finished cap. An ordinary baking pan, 8 x 16 x 6 in., greased on the outside, was then placed in the form, its short edge 2 in. from the house line and the opposite end resting on the drain pipe. After the initial set of the concrete had taken place the pan was removed, an iron strainer placed over the top of the drain outlet and the inside of the basin troweled smooth.



# *Details of a Colonial Stairway*






NOTE:- RUN OF STEPS TEN AND ONE-HALF INCHES.

## · DETAILS · OF · STAIRWAY ·

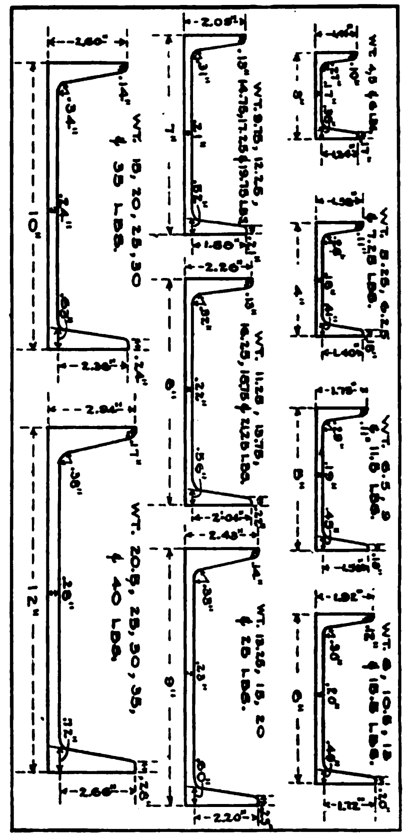
RESIDENCE OF MR. CHAS. LE-B. HOMER — CHESTNUT HILL, PHILADELPHIA, PA.

WALTER T. KARCHER & LIVINGSTON SMITH — ARCHITECTS

# How to Find the Proper Size Steel Channels for Various Spans

## *Set of Handy Tables Showing at a Glance Steel Channels Required for Given Spans*

By George E. Thackary, C.E., and W. A. Giesen, Architect



THE tables of channels give the safe loads in pounds uniformly distributed for spans having a range which will meet almost any structural condition. The safe loads given are based upon an extreme fiber stress of 16,000 lb. per square inch, which is the bending stress usually prescribed for structural steel.

The loads given in the tables, as in the case of the tables of I-beams described in the June issue, include the weight of shape itself, it being necessary to deduct the weight of the channel itself to obtain the net live and dead load it will carry.

For example, suppose we want to find out how much a 9-in. channel, weighing 15 lb. a running foot, will carry on a 10-ft. span.

Glancing under the horizontal column of the size of channel, it will be noted that the 9-in. channel weighing 15 lb. per running foot on a 10-ft. span would call for a deduction of its own weight, 150 lb., from the safe load given in the tables, which would leave 11.900 lb. as the safe, uniformly distributed load the channel would carry, providing it were laterally braced.

Attention is called to the fact that the safe loads given in the tables are for channels laterally braced by means of tie rods or other lateral braces not exceeding twenty times the flange widths apart. By referring to the schedule of flange widths, the number of lateral braces necessary can be readily determined.

Should it be impossible to provide lateral braces, as hereinbefore called for, to obtain full load given in the tables, the reader is referred to the article on "Safe Loads for I-Beams," published in the June issue of BUILDING AGE, which gives the formula of load reduction.

For a concentrated load in the center of span, the values of the tables should be taken at one-half those given.

To find the proper size channel to use for a certain condition, let us assume the following example:

A channel on a 10-ft. span, laterally braced, is to be uniformly loaded with

**SAFE LOADS IN POUNDS UNIFORMLY**

**Safe loads are figured for fibre stress of 16,000 pounds**

| Distance Between Supports in Feet | 3-INCH NO. C5 | | | 4-INCH NO. C9 | | | 5-INCH NO. C13 | | | 6-INCH NO. C17 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 Lbs. | 5 Lbs. | 6 Lbs. | 5.25 Lbs. | 6.25 Lbs. | 7.25 Lbs. | 6.5 Lbs. | 9 Lbs. | 11.5 Lbs. | 8 Lbs. | 10.5 Lbs. | 13 Lbs. | 15.5 Lbs. |
| 4 | 2,910 | 3,290 | 3,680 | 5,060 | 5,570 | 6,030 | 7,910 | 9,460 | 11,100 | 11,550 | 13,440 | 15,400 | 17,360 |
| 5 | 2,330 | 2,630 | 2,040 | 4,050 | 4,450 | 4,870 | 6,330 | 7,570 | 8,880 | 9,240 | 10,750 | 12,320 | 13,890 |
| 6 | 1,940 | 2,190 | 2,450 | 3,370 | 3,710 | 4,060 | 5,270 | 6,310 | 7,400 | 7,700 | 8,960 | 10,270 | 11,570 |
| 7 | 1,660 | 1,880 | 2,100 | 2,890 | 3,180 | 3,480 | 4,520 | 5,410 | 6,340 | 6,600 | 7,680 | 8,800 | 9,920 |
| 8 | 1,450 | 1,640 | 1,840 | 2,530 | 2,780 | 3,050 | 3,960 | 4,730 | 5,550 | 5,780 | 6,720 | 7,700 | 8,680 |
| 9 | 1,290 | 1,460 | 1,630 | 2,250 | 2,470 | 2,510 | 3,520 | 4,210 | 4,930 | 5,130 | 5,970 | 6,840 | 7,720 |
| 10 | 1,160 | 1,310 | 1,470 | 2,020 | 2,230 | 2,440 | 3,160 | 3,790 | 4,410 | 4,620 | 5,380 | 6,160 | 6,940 |
| 11 | 1,060 | 1,190 | 1,340 | 1,840 | 2,020 | 2,210 | 2,880 | 3,440 | 4,010 | 4,200 | 4,890 | 5,600 | 6,310 |
| 12 | 970 | 1,100 | 1,230 | 1,690 | 1,860 | 2,030 | 2,640 | 3,150 | 3,700 | 3,850 | 4,480 | 5,130 | 5,790 |
| 13 | 890 | 1,010 | 1,130 | 1,560 | 1,710 | 1,870 | 2,430 | 2,910 | 3,410 | 3,550 | 4,130 | 4,740 | 5,340 |
| 14 | 830 | 940 | 1,050 | 1,440 | 1,590 | 1,740 | 2,260 | 2,700 | 3,170 | 3,300 | 3,840 | 4,400 | 4,960 |
| 15 | 780 | 880 | 980 | 1,350 | 1,480 | 1,620 | 2,110 | 2,520 | 2,960 | 3,080 | 3,580 | 4,110 | 4,630 |
| 16 | 730 | 820 | 920 | 1,260 | 1,390 | 1,520 | 1,980 | 2,370 | 2,770 | 2,890 | 3,360 | 3,850 | 4,340 |
| 17 | 680 | 770 | 870 | 1,190 | 1,310 | 1,430 | 1,860 | 2,230 | 2,610 | 2,720 | 3,160 | 3,620 | 4,080 |
| 18 | 650 | 730 | 820 | 1,120 | 1,240 | 1,350 | 1,760 | 2,100 | 2,470 | 2,570 | 2,990 | 3,420 | 3,860 |
| 19 | 610 | 690 | 770 | 1,060 | 1,170 | 1,280 | 1,670 | 1,990 | 2,340 | 2,430 | 2,830 | 3,240 | 3,650 |
| 20 | 580 | 660 | 740 | 1,010 | 1,110 | 1,220 | 1,580 | 1,890 | 2,220 | 2,310 | 2,690 | 3,080 | 3,470 |
| 21 | 550 | 630 | 700 | 960 | 1,060 | 1,160 | 1,510 | 1,800 | 2,110 | 2,200 | 2,560 | 2,930 | 3,310 |
| 22 | 530 | 600 | 670 | 920 | 1,010 | 1,110 | 1,410 | 1,720 | 2,020 | 2,100 | 2,440 | 2,800 | 3,160 |
| 23 | 510 | 570 | 640 | 880 | 970 | 1,060 | 1,380 | 1,650 | 1,930 | 2,010 | 2,340 | 2,680 | 3,020 |
| 24 | 480 | 550 | 610 | 840 | 930 | 1,020 | 1,320 | 1,580 | 1,850 | 1,930 | 2,240 | 2,570 | 2,890 |
| 25 | 470 | 530 | 590 | 810 | 890 | 970 | 1,270 | 1,510 | 1,780 | 1,850 | 2,150 | 2,460 | 2,780 |
| 26 | .. | .. | .. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 27 | .. | .. | .. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 28 | .. | .. | .. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 29 | .. | .. | .. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 30 | .. | .. | .. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

| Distance Between Supports in Feet | 7-INCH NO. C21 | | | | | 8-INCH NO. C25 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 9.75 Lbs. | 12.25 Lbs. | 14.75 Lbs. | 17.25 Lbs. | 19.75 Lbs. | 11.25 Lbs. | 13.75 Lbs. | 16.25 Lbs. | 18.75 Lbs. | 21.5 Lbs. |
| 4 | 16,070 | 18,410 | 20,700 | 22,990 | 25,280 | 21,530 | 24,000 | 26,610 | 29,230 | [illegible] |
| 5 | 12,850 | 14,730 | 16,560 | 18,390 | 20,220 | 17,230 | 19,200 | 21,290 | 23,380 | [illegible] |
| 6 | 10,710 | 12,280 | 13,800 | 15,330 | 16,850 | 14,360 | 16,000 | 17,740 | 19,480 | [illegible] |
| 7 | 9,180 | 10,520 | 11,830 | 13,140 | 14,440 | 12,310 | 13,710 | 15,210 | 16,700 | [illegible] |
| 8 | 8,030 | 9,210 | 10,350 | 11,490 | 12,640 | 10,770 | 12,000 | 13,310 | 14,610 | [illegible] |
| 9 | 7,140 | 8,180 | 9,200 | 10,220 | 11,230 | 9,570 | 10,670 | 11,830 | 12,990 | [illegible] |
| 10 | 6,430 | 7,3[illegible]0 | 8,280 | 9,200 | 10,110 | 8,610 | 9,600 | 10,650 | 11,[illegible]90 | [illegible] |
| 11 | 5,840 | 6,700 | 7,530 | 8,360 | 9,190 | 7,830 | 8,730 | 9,680 | 10,630 | [illegible] |
| 12 | 5,360 | 6,140 | 6,900 | 7,660 | 8,430 | 7,180 | 8,000 | 8,870 | 9,740 | [illegible] |
| 13 | 4,940 | 5,670 | 6,370 | 7,070 | 7,780 | 6,630 | 7,380 | 8,190 | 8,990 | [illegible] |
| 14 | 4,590 | 5,260 | 5,910 | 6,570 | 7,220 | 6,150 | 6,860 | 7,600 | 8,350 | [illegible] |
| 15 | 4,280 | 4,910 | 5,520 | 6,130 | 6,740 | 5,740 | 6,400 | 7,100 | 7,790 | [illegible] |
| 16 | 4,020 | 4,600 | 5,180 | 5,750 | 6,320 | 5,380 | 6,000 | 6,650 | 7,310 | [illegible] |
| 17 | 3,780 | 4,330 | 4,870 | 5,410 | 5,950 | 5,070 | 5,650 | 6,260 | 6,880 | [illegible] |
| 18 | 3,570 | 4,090 | 4,600 | 5,110 | 5,620 | 4,790 | 5,330 | 5,910 | 6,490 | [illegible] |
| 19 | 3,380 | 3,880 | 4,360 | 4,840 | 5,320 | 4,530 | 5,050 | 5,600 | 6,150 | [illegible] |
| 20 | 3,210 | 3,680 | 4,140 | 4,600 | 5,060 | 4,310 | 4,800 | 5,320 | 5,850 | [illegible] |
| 21 | 3,060 | 3,510 | 3,940 | 4,380 | 4,810 | 4,100 | 4,570 | 5,070 | 5,570 | [illegible] |
| 22 | 2,920 | 3,350 | 3,760 | 4,180 | 4,600 | 3,920 | 4,360 | 4,840 | 5,310 | [illegible] |
| 23 | 2,790 | 3,200 | 3,600 | 4,000 | 4,400 | 3,750 | 4,170 | 4,630 | 5,080 | [illegible] |
| 24 | 2,680 | 3,070 | 3,450 | 3,830 | 4,210 | 3,590 | 4,000 | 4,410 | 4,870 | [illegible] |
| 25 | 2,570 | 2,950 | 3,310 | 3,680 | 4,040 | 3,450 | 3,840 | 4,260 | 4,680 | [illegible] |
| 26 | ... | ... | ... | ... | ... | ... | ... | ... | ... | [illegible] |
| 27 | ... | ... | ... | ... | ... | ... | ... | ... | ... | [illegible] |
| 28 | ... | ... | ... | ... | ... | ... | ... | ... | ... | [illegible] |
| 29 | ... | ... | ... | ... | ... | ... | ... | ... | ... | [illegible] |
| 30 | ... | ... | ... | ... | ... | ... | ... | ... | ... | [illegible] |

*Published through courtesy of the Cambria Steel Co.

NOTE.—For safe loads below the heavy lines, the deflections will be greater than the allowable limit for plastered cellings, which is 1-360 spa

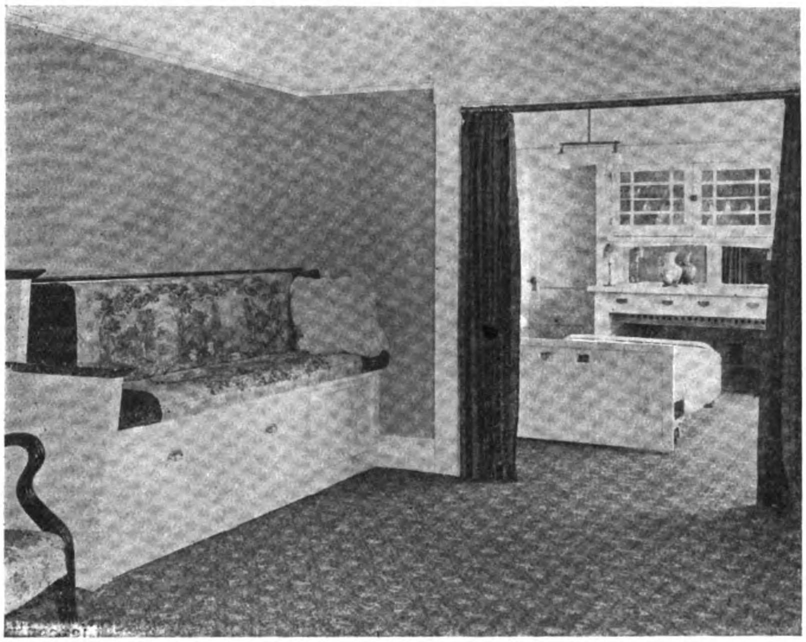
7500 lb. What size channel should be used to support the weight? Referring to the tables, we glance at the figure 10, the span in feet under the heading of "Distance Between Supports in Feet." Looking across the tables horizontally we find the figure 8.610 lb. under an 8-in. channel weighing 11.25 lb. per foot as the most economical section to use, it being safe to carry the load with its own weight deducted. The above example illustrates the fact mentioned in the June article on Beams, in which it was mentioned that at times it is more economical to use a deeper section.

Referring to tables, we find that a 7-in. channel weighing 14.75 lb. per foot would have carried the load given in example, but the 8-in. channel weighing only 11.25 lb. per foot was selected because of it being the lighter section of the two, and therefore the less costly, and that is something very important in structural design, as steel costs money.

# Built-in Beds Cleverly Concealed

By Charles Alma Byers

In both the living room and the dining room here shown is located a disappearing bed, yet the manner in which the beds are concealed from view when not in use is so clever that the rooms to all appearances contain nothing unusual. In the living room, the built-in bed is concealed by a very practical seat, and the one located in the dining room disappears in the bottom part of an equally practical combination of drawers, sideboard shelf and china cupboards. Both beds are practically the full width of the ordinary double kind, although much below the usual height. To enable the complete concealment of the living-room bed, therefore, a portion of it, protruding through the wall, is hidden underneath the somewhat elevated floor of a closet; and, in the case of the one in the dining room, an arrangement of cupboards in the kitchen provides concealing space for the portion that must extend through the dividing wall. A specially designed head-piece of the bed in each instance comprises the outer facing of the feature in which the bed is hidden. Large rollers, instead of the usual casters, enable the beds to be rolled in and out and to any part of the room quickly and easily. The beds are naturally of special design and construction. Rooms equipped in this way, serving a two-fold purpose, are often to be particularly desired in the small, inexpensive home, where extra bed rooms cannot be provided.



For homes where space is limited the built-in bed is very desirable

DISTRIBUTED FOR CHANNELS*

per square inch and include weight of channel.

| 9-INCH NO. C29 | | | | 10-INCH NO. C33 | | | | | 12-INCH NO. C41 | | | | | 15-INCH NO. C53 | | | | | | Distance Between Supports in Feet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.25 Lbs. | 15 Lbs. | 20 Lbs. | 25 Lbs. | 15 Lbs. | 20 Lbs. | 25 Lbs. | 30 Lbs. | 35 Lbs. | 20.5 Lbs. | 25 Lbs. | 30 Lbs. | 35 Lbs. | 40 Lbs. | 33 Lbs. | 35 Lbs. | 40 Lbs. | 45 Lbs. | 50 Lbs. | 55 Lbs. | |
| 28,040 | 30,130 | 36,020 | 41,900 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 4 |
| 22,430 | 24,110 | 28,810 | 33,520 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 |
| 18,690 | 20,090 | 24,010 | 27,930 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 6 |
| 16,020 | 17,220 | 20,580 | 23,940 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 7 |
| 14,020 | 15,070 | 18,010 | 20,950 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 8 |
| 12,460 | 13,390 | 16,010 | 18,620 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 9 |
| 11,220 | 12,050 | 14,410 | 16,760 | 14,270 | 16,790 | 19,410 | 22,020 | 24,640 | 22,780 | 25,600 | 28,740 | 31,870 | 35,010 | 44,450 | 45,500 | 49,420 | 53,350 | 57,270 | 61,190 | 10 |
| 10,200 | 10,960 | 13,100 | 15,240 | 12,970 | 15,270 | 17,640 | 20,020 | 22,400 | 20,700 | 23,270 | 26,120 | 28,980 | 31,830 | 40,410 | 41,370 | 44,930 | 48,500 | 52,060 | 55,630 | 11 |
| 9,350 | 10,040 | 12,010 | 13,970 | 11,890 | 14,000 | 16,170 | 18,350 | 20,530 | 18,980 | 21,330 | 23,950 | 26,560 | 29,180 | 37,010 | 37,920 | 41,190 | 44,460 | 47,720 | 50,990 | 12 |
| 8,630 | 9,270 | 11,080 | 12,890 | 10,980 | 12,920 | 14,930 | 16,940 | 18,950 | 17,520 | 19,690 | 22,110 | 24,520 | 26,930 | 34,190 | 35,000 | 38,020 | 41,010 | 44,050 | 47,070 | 13 |
| 8,010 | 8,610 | 10,290 | 11,970 | 10,190 | 12,000 | 13,860 | 15,730 | 17,600 | 16,270 | 18,290 | 20,530 | 22,770 | 25,010 | 31,750 | 32,500 | 35,300 | 38,100 | 40,910 | 43,710 | 14 |
| 7,480 | 8,040 | 9,600 | 11,170 | 9,510 | 11,200 | 12,940 | 14,680 | 16,430 | 15,180 | 17,070 | 19,160 | 21,250 | 23,340 | 29,630 | 30,340 | 32,950 | 35,560 | 38,180 | 40,790 | 15 |
| 7,010 | 7,530 | 9,000 | 10,470 | 8,920 | 10,500 | 12,130 | 13,760 | 15,400 | 14,230 | 16,000 | 17,960 | 19,920 | 21,880 | 27,780 | 28,440 | 30,890 | 33,340 | 35,790 | 38,240 | 16 |
| 6,600 | 7,090 | 8,470 | 9,860 | 8,390 | 9,880 | 11,420 | 12,950 | 14,490 | 13,400 | 15,060 | 16,900 | 18,750 | 20,600 | 26,150 | 26,770 | 29,070 | 31,380 | 33,690 | 35,990 | 17 |
| 6,230 | 6,700 | 8,000 | 9,310 | 7,930 | 9,330 | 10,780 | 12,240 | 13,690 | 12,650 | 14,220 | 15,970 | 17,710 | 19,450 | 24,700 | 25,280 | 27,460 | 29,640 | 31,820 | 33,990 | 18 |
| 5,900 | 6,340 | 7,580 | 8,820 | 7,510 | 8,840 | 10,220 | 11,590 | 12,970 | 11,990 | 13,470 | 15,120 | 16,780 | 18,430 | 23,400 | 23,950 | 26,010 | 28,080 | 30,140 | 32,210 | 19 |
| 5,610 | 6,030 | 7,200 | 8,380 | 7,130 | 8,400 | 9,700 | 11,010 | 12,230 | 11,390 | 12,800 | 14,370 | 15,940 | 17,510 | 22,230 | 22,750 | 24,710 | 26,670 | 28,630 | 30,590 | 20 |
| 5,340 | 5,740 | 6,860 | 7,980 | 6,790 | 8,000 | 9,240 | 10,490 | 11,730 | 10,850 | 12,190 | 13,680 | 15,180 | 16,670 | 21,170 | 21,670 | 23,540 | 25,400 | 27,270 | 29,140 | 21 |
| 5,100 | 5,480 | 6,550 | 7,620 | 6,490 | 7,630 | 8,820 | 10,010 | 11,200 | 10,350 | 11,640 | 13,060 | 14,490 | 15,910 | 20,210 | 20,680 | 22,470 | 24,250 | 26,030 | 27,810 | 22 |
| 4,880 | 5,240 | 6,260 | 7,290 | 6,200 | 7,300 | 8,440 | 9,580 | 10,710 | 9,900 | 11,130 | 12,490 | 13,860 | 15,220 | 19,330 | 19,780 | 21,490 | 23,190 | 24,900 | 26,600 | 23 |
| 4,670 | 5,020 | 6,000 | 6,980 | 5,940 | 7,000 | 8,090 | 9,180 | 10,270 | 9,490 | 10,670 | 11,970 | 13,280 | 14,590 | 18,520 | 18,960 | 20,590 | 22,230 | 23,860 | 25,500 | 24 |
| 4,490 | 4,820 | 5,760 | 6,700 | 5,710 | 6,720 | 7,760 | 8,810 | 9,860 | 9,110 | 10,240 | 11,490 | 12,750 | 14,000 | 17,780 | 18,200 | 19,770 | 21,340 | 22,910 | 24,480 | 25 |
| .... | .... | .... | .... | 5,490 | 6,460 | 7,460 | 8,470 | 9,480 | 8,760 | 9,850 | 11,050 | 12,260 | 13,470 | 17,100 | 17,500 | 19,010 | 20,520 | 22,030 | 23,530 | 26 |
| .... | .... | .... | .... | 5,280 | 6,220 | 7,190 | 8,160 | 9,130 | 8,440 | 9,480 | 10,640 | 11,810 | 12,970 | 16,460 | 16,850 | 18,310 | 19,760 | 21,210 | 22,660 | 27 |
| .... | .... | .... | .... | 5,100 | 6,000 | 6,930 | 7,870 | 8,800 | 8,130 | 9,140 | 10,260 | 11,380 | 12,500 | 15,880 | 16,250 | 17,650 | 19,050 | 20,450 | 21,850 | 28 |
| .... | .... | .... | .... | 4,920 | 5,790 | 6,690 | 7,590 | 8,500 | 7,850 | 8,830 | 9,910 | 10,990 | 12,070 | 15,330 | 15,690 | 17,040 | 18,400 | 19,750 | 21,100 | 29 |
| .... | .... | .... | .... | 4,760 | 5,600 | 6,470 | 7,340 | 8,210 | 7,590 | 8,530 | 9,580 | 10,6[illegible]0 | 11,670 | 14,820 | 15,170 | 16,470 | 17,7[illegible]0 | 19,0[illegible]0 | 20,400 | 30 |

# Legal Department

### Is an Employer Surety for the Safety of Scaffolds?

A decision lately handed down by the Iowa Supreme Court upholds the liability of defendant employer for injury to a bricklayer, due to collapse of a defective scaffold. The opinion lays down the following rules, which apply in many states other than Iowa, although it seems that in a few of the states these rules are not unqualifiedly recognized:

An employer may avoid liability for accidents due to the defective construction of scaffolds or staging by delegating to his workmen the construction of such appliances. (The employer must, of course, furnish reasonably suitable materials for the purpose.) If the men fail to erect the scaffold or staging in reasonably safe condition for use, the employer will not be liable to them, or their fellow servants, for resulting injury. But where an employer causes a scaffold to be erected by workmen other than those who are to use the same, and thereby undertakes to furnish a ready-made scaffold, he assumes the duty of seeing that it is reasonably safe.

### Interference Under Public Building Contracts

The Mississippi Supreme Court holds that under the statutes of that state an attorney general is not liable in damages, as an individual, for instituting a suit to enjoin performance of a public building contract, although he may have acted in wilful or malicious disregard of the contractor's rights.

In this case (Semmes vs. Collins), it appeared that plaintiff was employed by the state to repair the old capitol at Jackson. Defendant, as attorney general, and at the request of two members of the capitol commission, sued to enjoin Semmes and his associates from doing certain work, claiming that the same was contrary to the plans and specifications applying. This suit resulted in favor of the defendants. Semmes then sued Collins, claiming that the injunction suit had been groundlessly and maliciously prosecuted. But the Supreme Court holds because a statute of the state authorized the attorney general, at the request of a state officer, to prosecute any suit on a contract in which the state is interested, the attorney general was not personally liable, regardless of whether he acted with personal malice or not.

### Comfort Stations in Wisconsin

A law recently enacted in Wisconsin will call for the early construction of public comfort stations in all cities and villages in the state not already suitably supplied. The law, which affects 317 villages and 124 cities, requires provision for "a sufficient number of suitable and adequate public comfort stations for both sexes," under regulation by the state board of health.

Tentative rules adopted by the state board call for the approval of plans by that board, and in some instances, by the state industrial commission. Supervision of construction is to be under the same control. General structural features will be specified by the board of health, covering design, construction, materials, light, ventilation, equipment, floors, walls, ceilings, doors, windows, partitions, painting, etc.

The board also makes this suggestion in a recently issued circular: "Communities desiring to build stations of some size, equipped with a rest room and modern appliances, should arrange to secure the services of an architect or engineer fully familiar with this type of building and equipment."

**If you are bothered by any point of building law, write to our Legal Adviser, A. L. H. Street, LL. B., who is retained for the benefit of subscribers to Building Age, and is at your service.**

### Should New Jersey Contracts Be Filed?

**From A. C. G.**—In your column, "Legal Advice," I read an article of July, 1919, "Who Benefits if Contract is Filed," which states construction contract filed in New Jersey of no advantage to contractor. The article reads as though you speak of the contractor himself filing same. Kindly advise me if the same disadvantage remains where an architect makes filings to cover new work or construction work of any sort.

**Answer**—If you ask concerning filing by an architect of his contract of employment, you are advised that the New Jersey law in question does not provide for such filing.

If you inquire, as we understand, as to the effect of a supervising architect filing a building contract on the part of the owner, we are of the opinion that the filing has the same legal effect as if made by the owner himself. This assumes that the architect files under authority from the owner. An unauthorized filing would probably be held by the courts to be voidable at the instance of a sub-contractor, laborer or materialman, unless it should appear that the owner or contractor ratified the architect's act in filing their agreement.

The answer to which you refer as having been given in the July issue of THE BUILDING AGE was given by the predecessor of the present law editor of this journal, and, in our opinion, should be modified insofar as it states:

"If the contractor places the contract upon record, this would deprive him of any lien he might have upon the premises. In view of this fact, it would seem to be inadvisable to file such a contract."

As we read the statute and its interpretation by the appellate courts of New Jersey, filing of a building contract carries no direct advantage or disadvantage to the contractor. The law is designed merely as a means of enabling the owner to protect himself against liens in favor of subcontractors, laborers and materialmen. It provides:

"Whenever any building shall be erected in whole or in part by contract in writing, *such building and the land* * * * *shall be liable to the contractor alone* for work done or materials furnished in pursuance of such contract; provided such contract, or a duplicate thereof, together with the specifications accompanying the same, or a copy or copies thereof, be filed in the office of the clerk of the county in which such building is situated before such work is done or materials furnished; provided, further, that it shall not be necessary to file the plans for such building * * *."

This provision constitutes section 2 of the New Jersey lien law. Speaking of the whole act, one of the appellate courts of the state has said:

"The normal effect of this legislation is to subject land upon which a building is erected, by authority of the owner, to a lien in favor of any one who furnishes labor or materials therefor. To limit this effect strict compliance with the provisions of the second section of the act is essential. The real contract between the parties must be in writing, and * * * must be filed. The filing of a suppositious contract will not suffice. The argument is without merit that the only purpose of the requirement is to advise that a contract exists."

It was decided by the court that where a contract, as filed, called for a price of $5,100, whereas the real consideration was $4,100, the filing was no protection to the owner against the claim of one who furnished materials to the contractor.

Other decisions of the courts of the state recognize the right of laborers, materialmen and other third parties to enforce lien claims where no contract has been filed.

Speaking more specifically of the effect of section 2, another New Jersey decision says:

"It is clear that the object of the provision in question was to protect the owner who, by filing his contract, was freed from all claims of mechanics or materialmen, and could thus safely make his payments according to contract. Mechanics and materialmen must take notice of such filing and that by it they are deprived of their lien on the building, and must see to it that the contractor pays or secures his indebtedness to them."

It will thus be seen that the only practical effect of filing on the contractor is the tendency of his employees, subcontractors and materialmen to be more insistent upon assurance that they will be paid than they might be under the privilege of filing liens. But filing does not deprive the contractor of his lien.

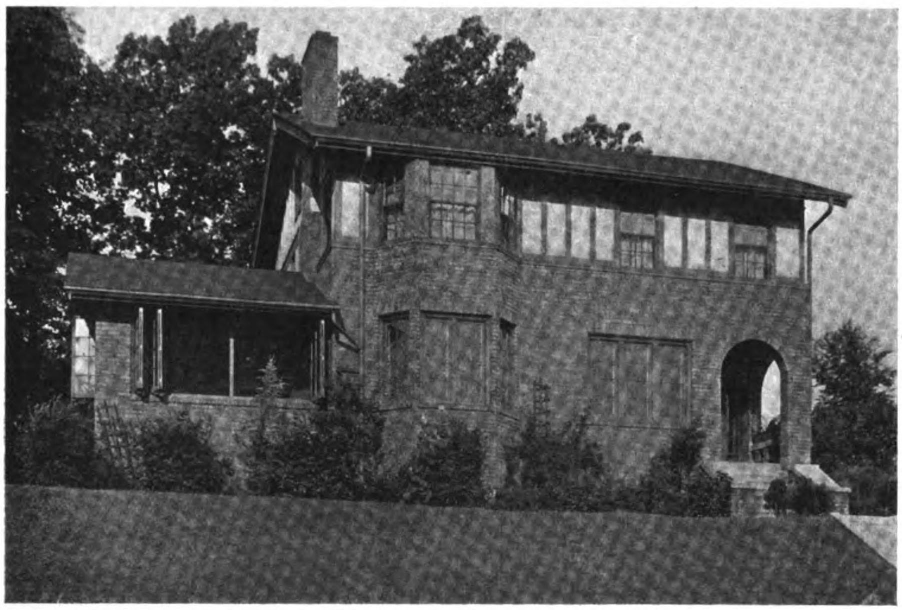
## Can an Alien Hold Property in New York?

**From L. J. B., New York**—I would like to know whether a resident non citizen (probably of the entente class) has a right to purchase a house at the present time. Is he entitled to a full deed if the house is paid for?

**Answer**—Unless he is an enemy alien his right to hold the property is secured to him by the following quoted New York statute:

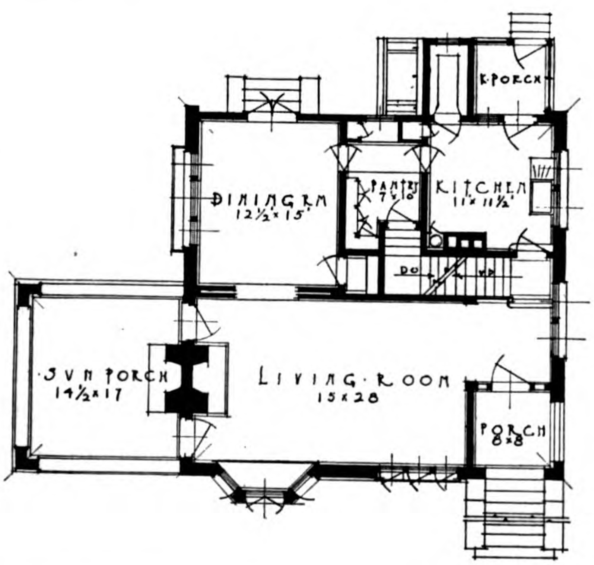
"Alien friends are empowered to take, hold, transmit and dispose of real property within this state in the same manner as native-born citizens * * *."

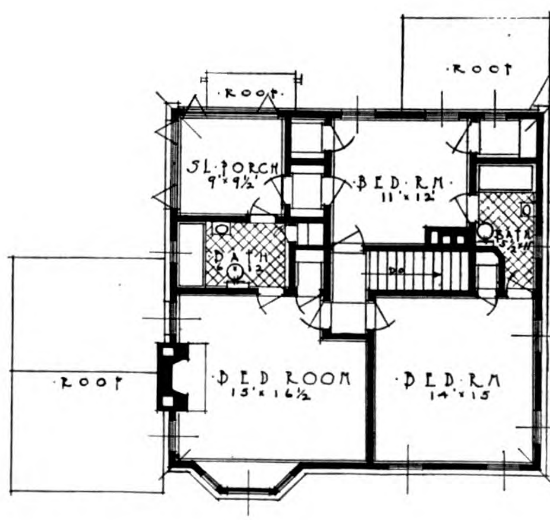
But if he is an alien enemy he is debarred from taking good title, both under this statute and the act of Congress known as the "Trading with the Enemy Act."



## *Six Room House with Two Bathrooms at Birmingham, Ala.*

*Wm. Leslie Welton, Architect*




## Using Barbed Wire for Reinforcing

**From P. M. Col.**—I have a job coming up this fall of a concrete basement and a reinforced concrete floor overhead. This basement is 48 ft. x 180 ft.; there will be a driveway along one side 10 ft. x 180 ft. for teams to drive through; the rest of it, 38 ft. x 180 ft., can be supported with concrete posts and beams. Owing to the high price of steel, I am thinking of concrete beams 10 ft. on centers with posts under beams 10 ft. centers. Beams and posts to be 10 in. x 10 in. Floor to be 3 in. thick, reinforced with barbed wire 6 in. apart both ways. The loading will be 10 peach boxes high and a peach box is 12 in. x 20 in. and weighs about 30 lb., so that the loading will be 180 lb. per sq. ft. of floor.

**Answer.**—The method of reinforcing a floor slab by means of barbed wire spaced 6 in. apart in both directions, as suggested by the correspondent, is original, and a design might be developed which is based on the use of barbed wire, but the writer would not recommend it unless perhaps to use up some surplus stock of barbed wire. Barbed wire is difficult to handle, both as to laying and holding in place, and would most likely cost more than the use of bars or some standard expanded metal product.

The correspondent does not indicate the manner in which he proposes to reinforce the beams and columns.

The detailed design of the above problem will appear in the October number of the BUILDING AGE.

L. GOODMAN, C. E.

## How to Figure Size of Foundation Walls and Footings

**From J. B. R., Texas.**—I would appreciate it if you could furnish me a good simple table or formula for figuring the proper size of concrete foundation walls and footings required to support various thicknesses and heights of walls.

**Answer.**—There are no tables or formulas, so far as I know, for figuring wall footings. The size of the footing depends on two factors, the first being the weight of the superstructure which it must support, and the second being the bearing capacity of the soil. The New York Building Code allows the following loads per square foot on the soil:

Presumptive capacities. In the absence of a satisfactory test of the sustaining power of the soil, different soils, excluding mud, shall be deemed to safely sustain the following loads to the superficial foot, namely:

| | |
|---|---|
| Soft clay | 1 ton |
| Wet sand | 2 tons |
| Firm clay | 2 tons |
| Sand and clay, mixed or in layers | 2 tons |
| Fine and dry sand | 3 tons |
| Hard dry sand | 4 tons |
| Coarse sand | 4 tons |
| Gravel | 6 tons |
| Soft rock | 8 tons |
| Hard pan | 10 tons |
| Medium rock | 15 tons |
| Hard rock | 40 tons |

In case the soil under the footings of any one building is partly rock and partly yielding soil, the bearing capacity of the yielding soil shall be taken at not more than one-half of the capacity otherwise allowed.

In computing the load to be carried, brick work is usually taken as weighing 120 lb. per cubic foot, stone concrete 144 lb. per cubic foot, and stonework at about the same weight. In addition to the weight of the walls the load of any floors supported by the walls must also be added. It is usual to determine the total load which will go on the foundation per linear foot. For example, suppose upon computation it is found that the wall of a six-story building will support a load of 8 tons per linear foot and that the soil is sand and clay mixed, having a bearing capacity of 2 tons per square foot. By dividing the total load of 8 tons by the allowable bearing capacity of the soil, you will find that a footing 4 ft. wide is required. Assuming that the foundation wall is 2 ft. thick, this will necessitate a projection of 1 ft. on each side. Where plain concrete, stone, or stepped-up brick footings are used, they should not be spread out at an angle of 60 deg. as shown in the sketch. E. F. H.

## Repairing Plastered Ceiling

**From J. E. F., New Jersey.**—Would like information as to how to patch an old plastered ceiling; one where the "skim" coat has become loosened. Is it absolutely necessary to put on a new brown coat? The patches are in spots about 15 x 15.

**Answer.**—Remove all the loose portions of the finish or "skim" coat. The brown coat, if in good condition, need not be removed, but should be thoroughly moistened before applying the coat of hard finish, which should be troweled to a smooth and polished surface.

A. B. G.

## Estimating Quantity of Nails Required

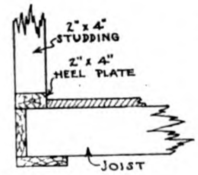
**From A. K., Canada.**—Please publish in your correspondence columns when convenient some information on the number of nails required to secure a given amount of shingles, flooring, etc.

**Answer.**—The table published gives the number of pounds of nails and the proper size to use to secure specified materials either per 1000 or 1000 ft. board measure, and will be found to be very useful in estimating the proper size, quantity, etc.:

| Material | Size of Nail | Lbs. Required |
|---|---|---|
| 1000 shingles | 4 d. | 5 |
| 1000 laths | 3 d. | 7 |
| 1000 sq. ft. beveled siding | 6 d. | 18 |
| 1000 sq. ft. sheathing | 8 d. | 20 |
| 1000 sq. ft. sheathing | 10 d. | 25 |
| 1000 sq. ft. flooring | 8 d. | 30 |
| 1000 sq. ft. flooring | 10 d. | 40 |
| 1000 sq. ft. studding | 10 d. | 15 |
| 1000 sq. ft. studding | 20 d. | 5 |
| 1000 sq. ft. furring, 1 in. x 2 in. | 10 d. | 10 |
| 1000 sq. ft. fin. flooring, ⅞ in. | 10 d. fin. | 20 |
| 1000 sq. ft. fin. flooring, 1⅛ in. | 10 d. fin. | 30 |

W. G.

## Box Sill Used in Colorado




**From P. M. G., Colorado**—I saw an article "Box Sills and Siding" in the June BUILDING AGE, and send you a rough sketch of what we use in Colorado. I think it just as good and much cheaper.

## Obtaining Value of "p" and "k" in Design of Reinforced Concrete Beams and Slabs

**From J. A. W., Montana**—I am much interested in the articles on "Designing Concrete Beams and Slabs," but as my arithmetic is a bit rusty, I fail to solve two problems, namely, I fail to obtain your figure for the value of "$p$" and "$k$." If not asking too much, would you please solve these for me?

**Answer**—The steel ratio for a balanced beam is equal to

$$p = \frac{1}{2} \times \frac{1}{\frac{f_s}{f_c}\left(\frac{f_s}{nf_c}+1\right)}$$

With $f_s = 16{,}000$, $f_c = 650$ and $n = 15$, by substituting these values in the equation we obtain

$$p = \frac{1}{2} \times \frac{1}{\frac{16000}{650}\left(\frac{16000}{15 \times 650}+1\right)}$$

but $\dfrac{16000}{650} = 24.61$

$$\frac{16000}{15 \times 650} = \frac{24.61}{15} = 1.64$$

Therefore $p = \dfrac{1}{2} \times \dfrac{1}{24.61\ (1.64+1)}$

$$24.61 \times 2.64 = 64.97$$

$$\therefore p = \frac{1}{2} \times \frac{1}{64.97} = \frac{1}{129.94}$$

$$\frac{1}{129.94} = .0077 \quad \text{Therefore } p = .0077 = .77\%$$

The equation for "$k$" is as follows:

$$k = \sqrt{2pn + (pn)^2} - pn$$

As $p = .0077$ and $n = 15$ we have

$$k = \sqrt{2 \times .0077 \times 15 + (.0077 \times 15)^2} - .0077 \times 15$$

but $.0077 \times 15 = .1155$

$$2 \times .0077 \times 15 = .2310$$
$$(.0077 \times 15)^2 = .1155 \times .1155 = .0133$$

Therefore

$$k = \sqrt{.2310 + .0133} - .1155 = \sqrt{.2443} - .1155$$

The square root of .2443 is equal to .4942

$$\therefore k = .4942 - .1155 = .3787$$

If the decimals were carried one place further the result would be .378, which is the value always used for the balanced beam.

L. GOODMAN, C. E.

## Can You Help This Lumber Firm Solve Its Business Problem?

**From C. P. Walters & Son, Centreville, Md.**—Recently we have been corresponding with you quite freely concerning various phases of our business, and feeling that we will get expert service of a quality such as is received in your valued publication, we feel free to place all doubtful matters before you for consideration.

What we now ask concerns our future business, and in order to place all facts before you we will give in detail the facts in the case.

The writer took up a course in architecture at Maryland Institute in Baltimore, Md., and in the spring of 1914 became a partner in the firm of C. P. Walters & Son.

For the first year of our partnership our shop work was all done by hand, but feeling that progressiveness called for machinery, we installed in March, 1915, a Crescent Machine Co. Universal woodworker No. 52 with a 5-hp. Westinghouse motor for power. We also have in our equipment a small jig saw with 18-in. lathe attached; also a foot-power mortiser. Our business has been confined principally to house building and repairing, and as the months of December, January, February and March are off months for that kind of work, we have been trying to get something new whereby we could work our force of men full time during those months; also keep our equipment busy.

We might explain at this point that our town is in an agricultural community, and other than two fruit and vegetable canneries operating in summer, we are without any manufacturing industries whatever.

The fact just mentioned has caused the writer to seriously consider the starting of something that would be a nucleus around which something big might grow. So far the problem has not been solved.

Two years ago we advertised in Baltimore and Philadelphia papers for something to manufacture in wood. We received several replies, some of which we will enumerate: A Baltimore man had a patent on a chicken brooder. The writer investigated and was not enthusiastic with the proposition, as the owner wanted only $6,000 for an untried and impractical machine. Another Baltimore inventor had a patented washboard, and as we were about to close a deal the war broke out and negotiations ceased—somebody else got it.

A number of replies made good offers, but quite a lot of them were not suited to our manufacturing facilities. We did however, land one contract which has netted us some profit. It was from a drum head factory in New Jersey. We furnish it about five to 10 barrels of blocks ⅞ in. x ⅞ in. x ¼ in., which works up a lot of our scrap lumber to advantage and clear profit. We hope you can see what we are "driving at." We want to start something that will grow to something big and possibly be the means of putting Centreville on the map.

We have confidence in your ability to help us solve the problem, and we hope to hear from you after you have had time to digest this lengthy letter.

Answer.—After having given the problem brought up in your letter of March 20 considerable attention, we make a few statements which we believe will at least be of interest to you. Of course, as we know nothing of local conditions outside of what you have told us in your letter, it will be impossible to give definite advice, but we can give you some general information which may prove valuable.

What you need is evidently a start in some industry where little capital is required and where your present equipment may be used with as little addition thereto as is possible. You are located near Baltimore, where goods could be disposed of, and we judge that you have fairly good shipping facilities from Centreville.

Perhaps one of the fastest growing industries in America to-day is the toy business. Germany controlled the larger part of this business before the war, and now that she is no longer in the field, Americans are taking hold of the business and developing it rapidly to meet a demand which is at present probably greater than the supply. Many articles can be made of wood, and toys are rapidly salable. The only safety to this business is that it is of a successful nature.

A Western firm a short time ago started to make toy lumber. This toy lumber consisted of toy studs, joists, and other materials entering into building constructed of wood. This company was proving very successful, but internal disagreements caused its failure. The appeal of toy lumber, where a boy can go ahead with a hammer and nails, building something himself, carries more of an appeal than does the metal structural work such as mecano and other similar building toys which have recently proven quite popular. You can probably remember how you felt as a boy when you took hammer and nails and put something together yourself. Something like this should prove rather popular, and it is easily made, as it is all straight stuff. The profit in the toy business is very large, and you would at first not have to do a large business in order to more than make expansion.

The main thing would be, of course, to have ideas which are adapted to wood. Of course it would be necessary to engage a man who understood how to handle wood in small pieces, rather than a carpenter, for the two branches of the business require different skill.

Or you might find it worth while to have toy dolls, toy washing sets for washing dolls' clothes, miniature battle ships, or something similar. The main thing to do is to originate something for which there is a demand already existing yet unfilled. If you can do this, and market the product fairly efficiently, you should be sure of success. Does this help you out?

**From C. P. Walters & Son.**—On March 20 we placed before you a problem relating to our future development as a growing business. You replied at length on April 10, giving some valuable suggestions.

We have recently thought that there must be others in our line who have faced the same problem and solved it, and their experience, if known, would be of inestimable value to us.

We therefore wish you to bring the matter to the attention of your readers through your correspondence department and invite them to impart the result of their investigations to us. This, we believe, will bring us a mass of valuable information and aid us in the solution of this important problem.

# Arrangement of Kitchen and Maid's Room a Feature in This House

## *Two Bathrooms and Sleeping Porch—Simplicity Prevails*

THE Dutch Colonial type of house is one of the most popular architecturally that this country has developed. Doubtless the vogue of this style is due to its being so thoroughly American.

The little house illustrated is a good example of how this type of architecture lends itself to a small design, and how harmony and balance can be effectively secured. The roof has the characteristic gambrel effect, although it is not, strictly speaking, that type. A wide dormer on the second story, which secures maximum space, requires this arrangement if the gambrel effect is desired. The carrying of the main part of the roof down to the cornice over the first story and continuing this as a hood gives a homelike touch to the design that contributes much to its effect.

To the right is an extension providing room for the maid's quarters with a sleeping porch above. This extension is cleverly handled, the main section of the roof being of the gable type and yet the gambrel feeling is carried out by the placing of a hood over the first story, harmonizing with the front of the house.

In the small house the fenestration, or placing of windows, is usually made effective by grouping the windows so that maximum light and ventilation are obtained and yet sufficient wall space is left inside for furnishing the rooms. Furthermore, the well balanced exterior wall surfaces can be effectively handled to contrast with the windows or darker masses.

The house is covered with the familiar wide white clapboards, so generally used with this type of house. The shutters show the Colonial influence and are, of course, painted green. The windows themselves have the small rectangular panes of Colonial times. It will be noted that the windows on the first stories are 4 in. wider than those on the second story, thus giving a proper feeling of balance.

The placing of the chimney at the left gives a sense of balance to that part of the house.

Entrance is had into a small vestibule which has a brick floor 4 in. lower than that of the main floor inside. The tendency of to-day is increasingly towards the use of brick or stone for this vesti-

Fig. 1. Front and side view of the house.

Fig. 2. This built-in feature aids kitchen efficiency.

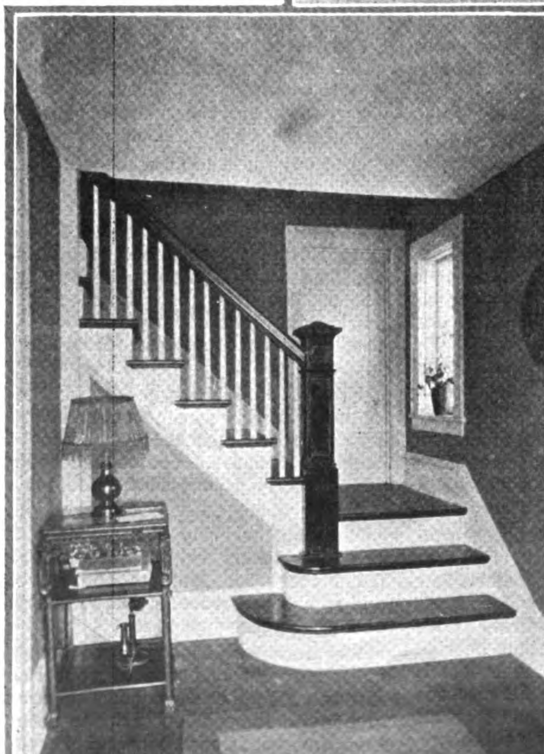


Fig. 3. The stairs are simple and well in keeping with the character of the house.

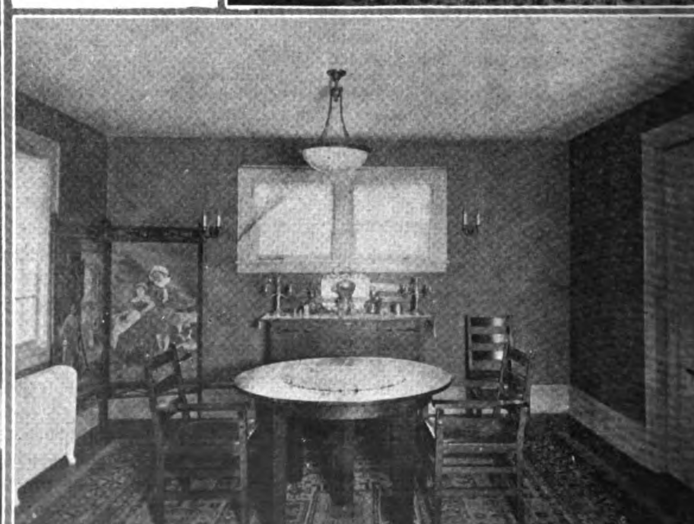


Fig. 4. The dining room. Trim is of the sanitary type, and reduces the labor of housework



*House at Larchmont, New York. Philip Resnyk, Architect*


Plans and elevations. Scale 1/16 in. = 1 ft.

bule entrance, as it is entirely sensible to have a floor that is impervious to any water that may drip down from the garments of visitors who come in during inclement weather. At the right of the vestibule is the so popular closet.

A hall is considered by many to be a necessity in a northern climate, and this feature is well placed in this plan. The stairs are simple in design, as can be seen from one of the illustrations presented, and yet they are effective and in keeping with the character of the house. The living room is semi-separated from the hall by means of a cased opening.

As one enters the living room an attractive vista is presented of the brick fireplace and French windows at either side of it, and also through the dining room.

The principal feature of the plan is the arrangement of the pantry, kitchen and maid's quarters. The maid's quarters are housed in the extension and are entirely separated from the rest of the house. A separate lavatory is provided. The maid can enter either her room or the kitchen from an entry, and the arrangement here is decidedly economical. Small houses generally do not make provision for a maid owing to the present-day difficulty of obtaining competent help, but in a house such as this, this feature is often desired. Many families would turn this room into a den.

The main feature of the kitchen is a built-in cabinet which is effectively arranged to serve the housewife's convenience, as shown in one of the illustrations. A gas range is provided so that there is no necessity for a second chimney. The sink is placed underneath a window with a drain board on either side. Communication between the kitchen and dining room is establishe through a pantry, the doors of which ar staggered so that one cannot look fron the dining room into the kitchen. Th pantry is provided with ample dresse space and contains the entrance to th cellar.

The stairs, it will be noted, are of th combination type and are easily reache from the kitchen.

The second floor contains two bath rooms, being the result of an increasin tendency to provide more bathrooms eve in the smaller house. One of the bath rooms serves the master's bedroom an the other serves the other two chambers

This house was built at Larchmont N. Y., for J. Barnum, in accordance wit plans and specifications prepared b Philip Resnyk, architect, 131 West 39t Street, New York City.

# Why Some Contractors' Profits Appear to Shrink

## *How to Keep Such Accurate Track of Costs That Reliable Bids Can Confidently Be Quoted*

By G. E. Holloway

THE contractor's business is to build or construct. For this service he is entitled to a return which will reimburse him for all the expense incurred in rendering such service and a reasonable profit. It is incumbent upon the contractor himself to see that the price at which he undertakes to do the work is sufficient to cover all expenses and yield the desired profit.

In submitting a quotation, the contractor must guard himself against two opposite tendencies: that of making the price so high that a competitor may secure the work at materially less and still realize a good profit, and that of competing below the safety line. In order to be amply protected against both these tendencies, it is essential that the contractor know to the smallest detail all elements of expense entering, either directly or indirectly, into the cost of his work.

It is not at all uncommon to find a builder who insists that he allowed a fair margin for profit in all his estimates and that his work was executed substantially as planned and yet he finds himself unable to produce any evidence of a material gain. He naturally is interested in knowing what caused the apparent shrinkage of net profits. An analysis of these cases always proves interesting because it brings out forcefully the earning power of a cost system and the expense of guesswork.

One of these cases is graphically illustrated in figures 1 and 2.

In Fig. 1 is shown how the contractor originally built the price quoted by him. He omitted the overhead expense as a regular step, relying upon the margin to carry this burden as well as the contingencies of price increase of material, labor difficulty and penalties. He was almost stunned when informed that his overhead alone was nearly large enough to absorb the margin allowed by him, leaving only a meager amount for contingencies and profit. Under normal conditions, he could hardly have secured better than an even break.

Fig. 2 shows the price as it would have been built had he kept a systematic record of costs. In such a case he would have had a margin clearly in excess of the total cost under normal conditions and a fair residue in spite of the slightly increased cost.

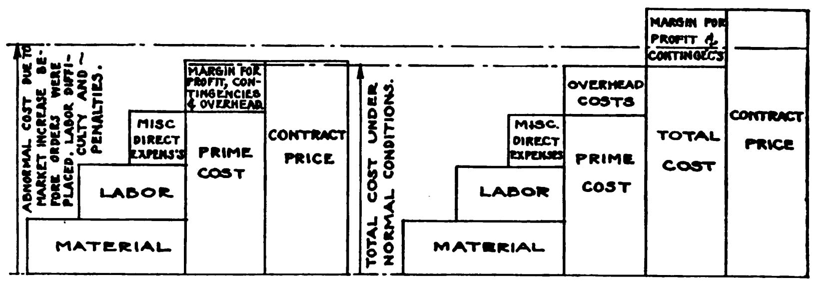



FIG. 1. FIG. 2.

It is important that due attention be given to the handling of both the miscellaneous direct charges and the overhead. Any expense that can be clearly identified with a certain job should be charged to it directly, but any expense for which all the jobs in progress were partially responsible, or benefited, should be included in the overhead distribution.

Among the miscellaneous direct charges should be classified such items as interest when money is borrowed solely to carry out a particular contract, legal expenses when incurred as a result of a particular contract, the cost of estimating and submitting quotations for the contracts accepted, etc. The legal expenses may include the drawing up of contracts, counsel fees, or the bringing or defending an action in respect to a contract. The estimating costs, including the salary for the actual time consumed in making inspection, securing quotations, submitting plans, etc., should be borne by the job itself, if secured, except when these duties were performed by some one in addition to other regular work. For instance, when the bookkeeper does such work, it is hardly necessary to divide his salary.

When the contractor undertakes to place a bid on an important job, he should open an account, such as "Bid No. 106", and charge to it all the expenses to which he is subjected as a result of the job contemplated. If the contract is secured, then this account should be credited for the total cost and the amount charged as a miscellaneous expense to "Job No. ——." If the contract goes to some one else, then the amount is charged to "Estimating Costs" and distributed with the overhead costs.

Herewith are shown forms which illustrate how easily the overhead expense may be accurately determined and distributed. In the overhead should be included every expense applying to the period under consideration, whether actually incurred, accrued, or prepaid, that is an expense necessarily or beneficially due to the business. It should not, however, be burdened with such items as a loss by fire not covered by insurance, income tax, dividends, interest on money borrowed to carry Liberty bonds or other securities, or other analogous non-operating expense.

Form No. 1 is the schedule of prepaid and accruing charges. These items should be distributed over all the months of operations, regardless of when paid. At the beginning of the year the new tax rate was not known, an estimate being used until the rate was known on July 16. The charge was then adjusted for the remaining six months so that the slight shortage in the estimate was taken care of in the latter charges of $17.66.

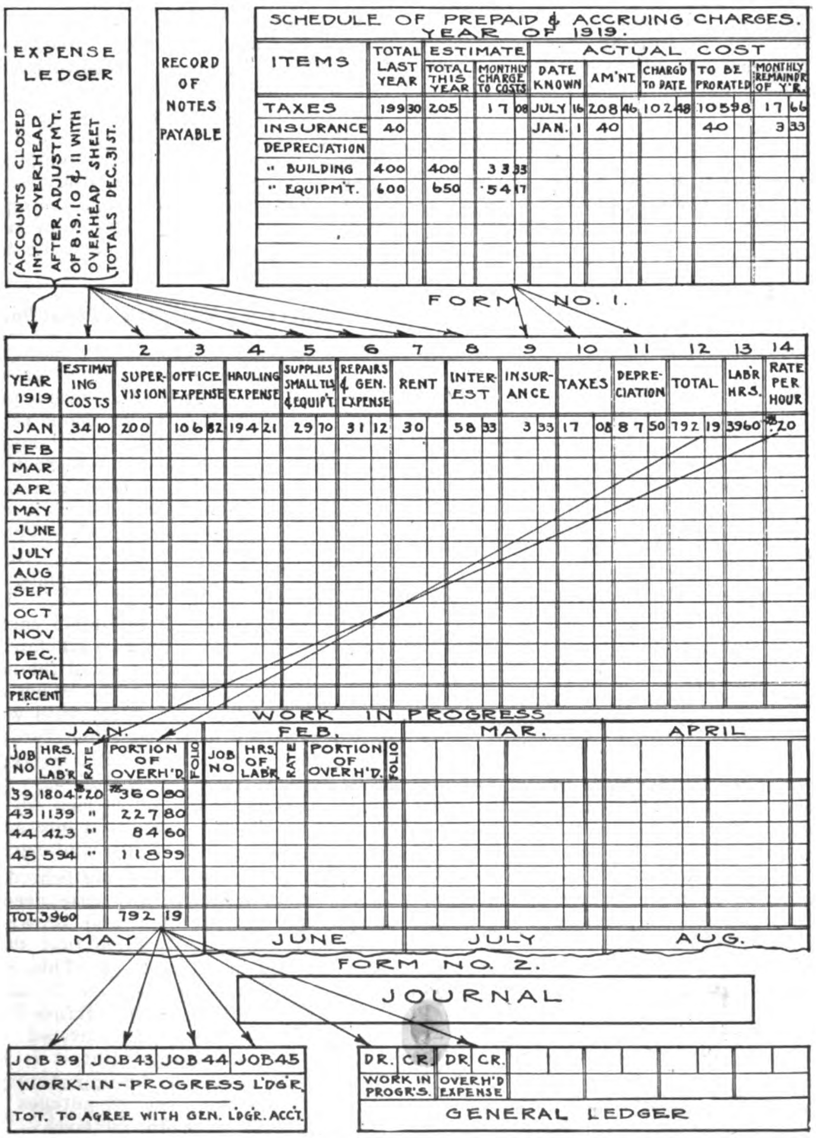
The insurance was prepaid so that the actual cost to be distributed was known at the beginning of the period.

The depreciation on buildings (such as shop, etc., if owned) was based on the calculation that they still had a life of 25 years. This charge, if continued, would provide a reserve, equal to their present value, at the expiration of that time and offset the loss occasioned through their retirement, making replacement possible without the investment of additional capital. The useful life of equipment is much shorter than that of buildings due to obsolescence as well as wear and tear. This makes a larger rate of depreciation necessary. A salvage value may, however, be allowed.

Any other items of importance, not wholly chargeable to the month in which incurred, may be distributed on this form over any number of months to which they apply. Should the period be less than the remaining portion of the year, it may be entered in red ink as a reminder and a notation below, such as "Beginning 7/31 and Ending 10/31".

Form No. 2. On this form is contained a summary of all overhead charges and the distribution to the various jobs on the basis of cost per unit of direct labor hours. The cost of labor or the cost of labor and material could have been used instead of the number of hours as a basis of distribution, but for contractors the number of hours generally is desirable. The source of the information required for this form is sufficiently indicated with the exception of the total direct labor hours and the number of hours worked by all the men on each job. This information is obtainable from the payroll or the accounts in the work-in-progress ledger. If the payroll is on a weekly basis then it will be necessary to consult the time cards of the workmen in order to secure the hours worked on the odd days at the beginning and the end of the month, when they are included in a payroll with days of a preceding or subsequent month. This might be simplified by posting all the workmen's time, between the last payroll and the end of the month, to the job accounts and the remaining days' work posted after the close of the week in the regular way. The job accounts would then have the information desired immediately available.

Items in columns 1-7 inclusive are taken from the expense ledger and are the exact amounts shown in these accounts for each month, item 1 being the expense of estimating on work not obtained; item 2 is the salary of the construction superintendent, or foreman, or other person in charge of all the work in progress during the month; item 3 includes the salary of the bookkeeper and supplies purchased; item 4 includes salary of driver and upkeep of truck; item 5 includes such tools, supplies and equipment as are quickly consumed or worn out in the ordinary operation of the business, or require replacement, as form lumber in concrete work. There may be supplies purchased each month which are usable in subsequent months, but unless they are quite large this need not be taken into account, as the supplies purchased and charged to costs in the preceding month and consumed in the present month will automatically equalize the charge. However, if there is a large purchase of such material it should be placed in a separate account and distributed monthly by the use of form No. 1. Item 6 includes repairs to buildings and equipment and other miscellaneous expense. If there is a general repairing of buildings or equipment, as is sometimes done in slack periods, the cost may be spread over a number of months by the use of form No. 1. Item 7 is for rent of office or other facilities. Item 8 is that part, applying to the present month, of the sum paid or accrued as interest on money borrowed to carry on the general business. Interest on money obtained to carry out a specific contract should be charged directly to that job and not to this account. Interest on money used for other than business purposes should be kept in a separate account. A separate calculation should be made each month for this charge, due to its fluctuating nature. Items 9, 10 and 11 are explained in connection with form No. 1. Item 12 is the total business expense for the month, not chargeable to specific work but by virtue of which all the work was facilitated. Item 13 is the total number of hours of all workmen employed on various jobs during the month. Item 14 shows the amount chargeable for each hour's work to meet the total overhead expenses.




In column 15 is made the January distribution of item 12 among the various jobs in progress during the month according to the hours of labor charged to each and the rate in column 14. Any small difference caused by not using a long decimal in the rate can be adjusted on the last job, as was done in this case by adding the odd 19 cents to job 45.

The amount shown for each job should then be posted directly to the respective cost sheets in the work-in-progress ledger. The total is then entered through the journal to the debit of "work-in-progress" account and to the credit of "overhead expense" in the general ledger.

At the close of the year, the totals in columns 1-7 inclusive should agree with the respective accounts as they appear in the expense ledger. These accounts are then closed out and charged to "overhead expense" account. The total of column 8 will seldom, if ever, agree with the ledger figures, due to the fact that some interest may be prepaid or some interest accrued but unpaid. A debit or credit should be entered into the account to make it balance with the amount shown on the overhead sheet. The account is then closed and charged into "overhead expense" account. The amount used to adjust the account is then brought down on the opposite side as an inventory. If a debit when brought down, it represents prepaid interest which will be included in the costs for the following year to which it applies. For example:

| Debit | | Credit | |
|---|---|---|---|
| Aug. 8, Int. to Feb. 8 next... | $300 | Dec. 31 (adjustment) ........ | $50 |
| | | Dec. 31, To overhead ......... | 250 |
| | $300 | | $300 |
| Jan. 1, Prepaid. | $50 | | |

If the balance when brought down is a credit, it represents interest accrued and unpaid. When the interest is paid and the amount, portions of which belong to the costs of both years, is charged into the interest account, it will be offset by the credit from the previous year, so that the balance will represent the expense due to the present year only. For example:

| Debit | | Credit | |
|---|---|---|---|
| Sept. 15, Int. to date .......... | $400 | Dec. 31, To overhead ......... | $600 |
| Dec. 31 (adjustment) ........ | 200 | | $600 |
| | $600 | Jan 1, Accrued.. | $200 |

The insurance and taxes are handled in the same manner as interest.

The total of column 11 is debited to "depreciation" account and credited to "reserve for depreciation." The depreciation account should be closed into "overhead expense" account, which will then balance off with all the expense for the year included in the cost of various work done.

Forms 1 and 2 are designed to accommodate all the calculations required in determining and distributing the overhead costs for a period of one year. In actual use extra columns should be provided to accommodate any new accounts opened after the beginning of the year. The accounts, of course, should conform to the individual business.

The extra work occasioned by the use of these forms is of no importance when compared with the benefits. For the average contractor it would require only a few minutes monthly to make it up and certainly not more than five or six hours for the entire year. The valuable secrets revealed are too many to enumerate here. However, from among them a few can be mentioned as follows: The contractor can see at a glance any increase in his overhead and whether it is in proportion to his increased activities. Even the items that caused the increase will stand out visibly as larger than those above it in the same column. He knows the exact amount to charge to each job and, most important of all, he knows when making estimates on work what the reasonable allowance for overhead should be.

# Country House Details

## *Construction of Double Hung Window in a Brick Wall*

### By A. Benton Greenberg, Architect

HEREWITH is presented a double hung window suitable for a brick or stone wall. A cursory examination will show that there is practically no difference between the details of a box frame window in a brick wall and those of a box frame window in a frame wall, which was illustrated and discussed in the September issue of the BUILDING AGE. A comparison of the two plates will make quite evident that the changes which occur in some of the details of the window illustrated on the opposite page are due not to any alterations in the design or construction of the several members of the frame, but to modifications necessary to fit the frame to its brick surroundings.

Take the head of the window, for instance. Except for the introduction of the staff bead to conceal the joint of and form a neat finish between the woodwork and the brickwork, the details of the wood frame in both plates are identical. But how vastly different is the construction of the lintel. Instead of a simple double stud over the top of the opening to support the weight above the window, we have an elaborate construction of a brick relieving arch on top of a timber lintel on the interior, and a gauged brick arch on the exterior of the wall.

#### *How to Lay Up the Relieving Arch*

The main weight of the wall is carried by this relieving or discharging arch, so called because it relieves the head of the window from the superimposed weight by discharging or transmitting it to the walls or abutments on either side. It is ordinarily made up of two rows of rough brick, laid in concentric rings of headers and built over a wood lintel in either one of the following ways: First, a wood lintel made up of two or three 2-in. planks, the upper edges of which are shaped to conform to the soffit of the relieving arch, all as ...ly explained in the July issue of this ...zine; and secondly, a wood lintel ... up of 2-in. planks, the upper and lower edges of which are parallel, with a relieving arch above and a brick core built in between the upper edge of the lintel and the under surface of the arch, as illustrated in the accompanying plate. In either case, care should be taken to see that the bearing of the lintel on the wall on each side of the opening is at least 4 in. The purpose of the lintel is to provide a nailing surface for the interior wood finish, while the object of the relieving arch is to prevent the wall from collapsing should the lintel be destroyed by fire.

#### *Making the Wall Impervious to Dampness*

Another detail of the section through the head that might profitably be dwelt upon is the plastering on the interior of the wall. If it is applied directly to the brick wall, the latter must be thoroughly coated with a waterproofing paint to make the wall impervious to moisture. We shall speak more of this later on. The method illustrated in the plate shows furring pieces of wood, ⅞ x 2 in., set vertically and securely attached to the inside wall. When the laths are nailed to these furring pieces and the plaster is applied, a space is formed between the plaster and the brickwork which makes an excellent deterrent of dampness.

For the sizes of the several members composing the wood frame, the reader is again referred to the plates which appeared in the last two issues of the BUILDING AGE. The only features requiring special comment are the reveal, that is the distance which the frame is set back of the face of the wall, which is seldom made less than 4 in., although it may be varied to suit the taste of the designer; the staff bead, which is generally worked out of 1⅜ in. stuff and may assume almost any shape as long as it covers the junction of the wood frame with the brickwork; and the yoke, which is from 1½ in. to 1⅞ in. in thickness, being somewhat thicker than the yokes found in windows for frame walls.

In the section through the jamb we see the construction of the complete weight box, with the space between the back lining and the brick wall calked with oakum or a scratch coat of mortar, so as to make it wind-proof. Note also how the jamb is tongued into the box casing, to provide for contraction and expansion, and how the interior trim is nailed to the jamb casing and the ground. The interior treatment is subject to innumerable modifications, and any one of the finishes shown on other window and door details of this series may be adopted.

It is desirable that the woodwork about the window and in the exposed parts of the frame be of the same finish as that of the rest of the room in which the window is set. How this is accomplished may be readily seen by a study of the application of the covering piece of "veneer" over the box casing, and in the corresponding section through the head of the window.

#### *Finishing the Wall with a Panel Back*

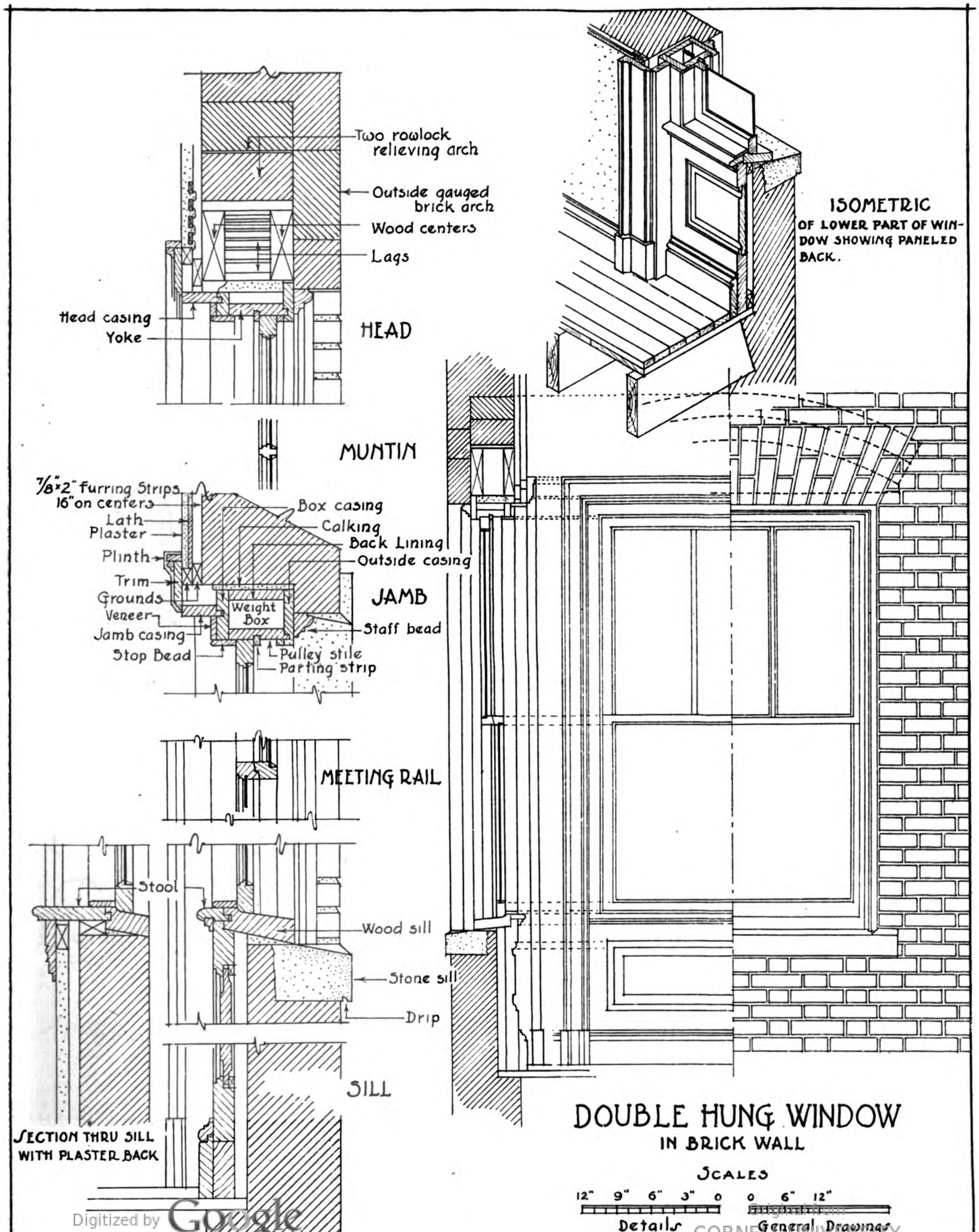
The section through the sill shows two ways of finishing the interior: one with a plaster back and the other with a panel back, which is not so common as the former. In thick walls particularly the portion of the wall between the floor and the sill is sometimes made thinner so as to form a recess. This recess is then treated as shown in the section through the sill at the bottom, or better still, in the isometric at the top of the plate, and is designated as a "panel back." In a window thus finished, the jamb casings and the architrave are carried down to the floor and otherwise treated the same as a door trim; while the space between the floor and the sill is fitted with wooden panels, set loose, to allow for contraction and expansion. Plastering behind the panel back should never be omitted, but should be carried all the way down to the floor as a protection against the spread of fire and vermin.

Observe that the plastering behind the panel back, which in any case need be but two coats—scratch and brown—is constructed differently from that shown in either the jamb or head. This, however, would not be the case in actual practice. Either the entire surface would be painted or the whole covered with vertical furring strips. But it is here shown thus to give us an opportunity to discuss more fully the advantages and disadvantages of both methods. If a waterproofing mixture is used, the surface of the wall should be covered with two coats of that paint, applying evenly throughout and covering every crack and crevice. If applied properly, painting proves an effective method of retarding moisture. But if careless workmen perform the work and every opening, however insignificant, is not coated, painting is next to worthless. Then again there is the further danger arising from subsequent puncturing of the walls for heating pipes, plumbing stacks, fire escapes, etc., and the possibility of the negligence of the respective contractors to repair said damages. On the whole, furring strips are recommended. The facility with which they are set in place.

the air-space they form for the absorption of all moisture and the nailing surface they present for the application of interior trim are only a few of the reasons for our preference.

If a cheaper and simpler finish is desired on the inside of the sill, the plaster back may be used. Note that the construction of the stool and apron is the same whether the panel or the plaster back is employed.

The stone sill across the bottom on the exterior of the window has a thickness equal to two courses of face brickwork and a projection of 1 in. beyond the wall line. It extends 2 in. under the wood sill and is 2 in. longer at each end than the opening. The upper surface is cut with a wash and lugs, while the under side of the projecting portion of the sill is cut with a drip to prevent the rain water from marring the surface of the wall and from disintegrating the mortar of the brickwork.



# Planning the Efficient Kitchen

## *Height of Shelves—Arrangement of Fixtures*

By E. H. Klaber, Architect

IN these days when women are experiencing great difficulty in obtaining domestic help, more and more of them find themselves obliged to do their own work. Where a maid is employed in a small house the kitchen is not only a workroom but a sitting room as well. It must consequently be larger than is necessary for the woman who does her own work. In the latter case, the more compact the kitchen the better it is. In fact, these women are demanding a small laboratory in which to prepare their meals, rather than the large kitchen of our grandmothers. They find a small kitchen is easier to keep clean and above all, if conveniently arranged, they can save themselves many steps. This woman's ideal is a kitchen in which all operations can be performed practically without moving from one spot.

To show the possibilities of a conveniently arranged kitchen the accompanying design was prepared. The position of the kitchen is one which is typical of many American homes. The kitchen is 9 x 12 ft. In the entrance is the refrigerator with shelving above for vegetables for immediate use. On one side of the kitchen is the work table which is the center of operations. The food is prepared here and immediately below it are drawers and lockers with the necessary utensils. Dry groceries and spices are within easy reach. The sink is right at hand for securing water or washing, and once washed the utensils can be replaced without unnecessary steps. Under one of the drain boards, hinged so that the lip can be readily cleaned, is a garbage receptacle which opens both inside and outdoors, facilitating the disposal of garbage without carrying it across the room.

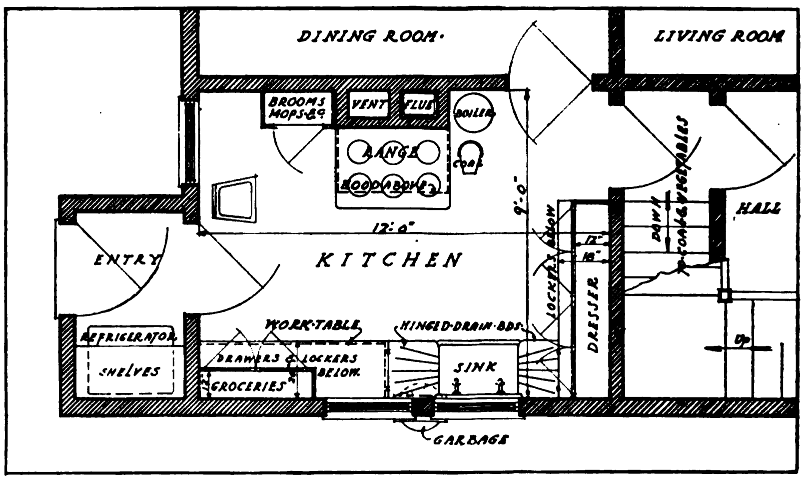
Although the range is on the opposite side of the kitchen it is actually within easy reach, and hot pots and pans and pans of water can be set down quickly.

On the other side of the sink is found a dresser for glassware and dishes. These can be taken down from the shelves for serving and put back after washing, avoiding the stacking up and carrying that is usually necessary.

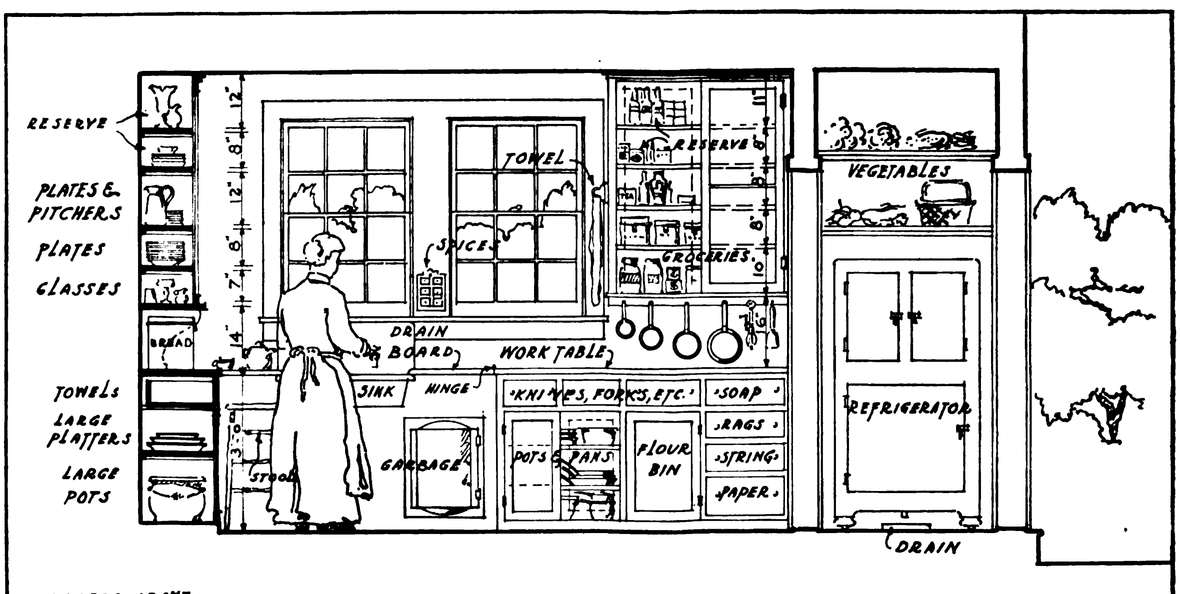
Special attention has been given to the question of heights, a feature which is too often neglected. In most dressers the shelves are too high and too deep, and some of the dishes have to be placed behind others in an inconvenient way, whereas several inches may be going to waste above all of them. It is much better to have the spaces between shelves smaller, and only a single row of dishes. It will be noted that the shelf heights vary to accommodate different kinds of articles and by spacing the lower shelves more closely it is possible to have more of them accessible without climbing than is the case in the ordinary kitchen.

Both the work table and the sink are high to eliminate stooping, and a high stool is provided which can be slipped under the drain board when not in use.

In any kitchen it is advisable to have some space for accessories such as brooms and mops. A locker is provided




Plan of a well designed kitchen. Note the sink with hinged drainboards and dresser at the right




Elevation of one side of kitchen showing how conveniently the work closets are located for these and extra drawers for soap, string, paper, etc.

The dresser for dishes has been kept nearest the dining room, whereas foods and supplies are near the entrance so that they can be readily put away when delivered.

This design is based on the supposition that no eating is done in the kitchen. With slight modification, however, an alcove could be arranged containing a bench and small table where the housekeeper might take her luncheon, or if the family is small, Sunday night supper might be served. Where a maid is employed such an alcove is a highly desirable feature, unless a special maid's dining room can be furnished.

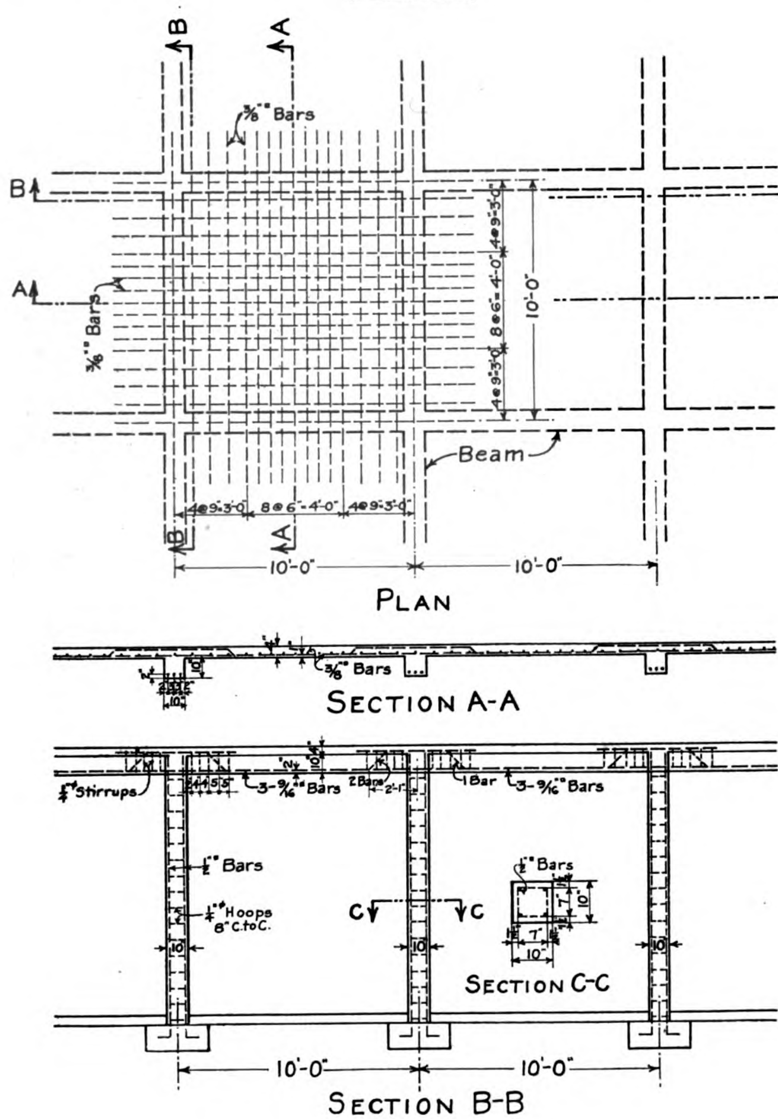



Fig. 8

# Design of Reinforced Concrete Beams and Slabs—III

## *Application of Principles in Preceding Articles to a Subscriber's Problem*

By L. Goodman, C.E.

THE problem submitted by a correspondent has a number of points of general interest and will be answered in detail.

The case in hand is a building 48 ft. x 180 ft. having a floor which has to carry a live load of 180 pounds per square foot. The correspondent proposes to use a slab reinforcement running in both directions and proposes to support the slab on 10 in. by 10 in. columns and beams spaced 10 ft. apart in both directions.

### *Floor Slab*

Square floor slabs reinforced in two directions are designed by using one-half the live and dead load in calculating the moments to be resisted in each direction. Thus if we have a 4 in. slab weighing 50 pounds per sq. ft., the total load becomes 180 + 50 = 230 pounds and half this load equals 115 pounds per square foot.

The bending moment for a strip 12 in. wide

$$M = \frac{Wl}{12} = \frac{115 \times 10 \times 10}{12} \times 12 = 11500 \text{ in. lbs.}$$

The effective depth becomes

$$d = \sqrt{\frac{M}{Kb}} = \sqrt{\frac{11500}{107.4 \times 12}} = 3 \text{ in.}$$

We will use a 4 in. floor slab, as it is not advisable to use a floor slab less than this thickness. Placing the center of the steel one inch above the bottom, the actual $d$ becomes 3 inches.

The steel area required for a 12 inch strip

$$A_s = \frac{M}{f_s jd} = \frac{11500}{16000 \times .874 \times 3} = .274 \text{ sq. in.}$$

With ⅜-in. square bars we have

$$Spacing = \frac{12 \times .1406}{.274} = 6 \text{ in.}$$

As the bending moment is less at the edges of the slab than at the center, the spacing for the outer quarter of each panel will be increased to 9 in. as shown on the drawing.

### *T-Beams*

When the floor slab and beams are poured at one time and the slab and beam are tied together by means of stirrups a part of the floor slab may be considered acting with the beam to resist the bending stresses.

A T-beam is thus formed as shown in Fig. 7; the horizontal portions overhanging the beam are called the flanges and the vertical or beam portion is called the stem or web.

There are two limiting conditions which control the width $b$, of the beam:

($a$) It shall not exceed one-fourth of the span length of the beam.

($b$) Its overhanging width on either side of the web shall not exceed six times the thickness of the slab.

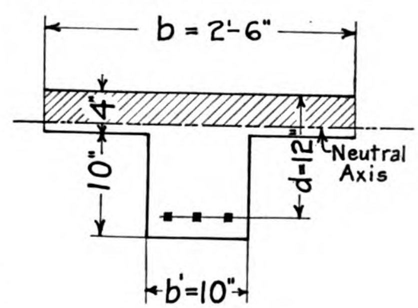



Fig. 7

In the case under discussion the first condition is the smaller and therefore controls so that the dimensions of the T-beam are as shown in Fig. 7.

The next point to be considered is the location of the neutral axis. There are two cases possible: Case I is when the neutral axis falls in the flange, and Case II where the neutral axis falls in the stem.

As the value of $k$ for a T-beam is less than for a rectangular beam, it can be seen by inspection that in our example the neutral axis will fall under Case I—that is the neutral axis is in the flange. When the T-beam falls under Case I the formulæ of Part I, for a rectangular beam, are used. Should the neutral axis fall in the stem the regular T-beam formulæ given in the standard text books would be used for finding the constants.

When the panels are square the floor load will not be distributed uniformly along the floor beam, but may be assumed to vary as the ordinates of a triangle having its apex in the middle of the beam.

If $w$ is the load per square foot on the slab the bending moment in the beam, considering it simply supported, would be

$$M = \frac{wl^3}{24}$$

As our beam is common to two panels this must be multiplied by 2, and as the beam is continuous we may take eight-twelfths of this value. The bending moment of the beam due to the floor slab therefore beccmes

$$M = 2 \times \frac{wl^3}{24} \times \frac{8}{12}$$

$$= 2 \times \frac{230 \times 1000}{24} \times \frac{8}{12} \times 12$$

$$= 153{,}300 \text{ in. lbs.}$$

To this must be added the bending moment due to the weight of the stem which is equal to

$$M = \frac{wl^2}{12} = \frac{100 \times 100}{12} \times 12 = 10{,}000 \text{ in. lbs.}$$

The total bending moment is therefore equal to 163,300 inch pounds.

We now have a beam 30 in. wide and 12 in. deep and the problem is to find the steel required to resist the bending moment. It is very evident that the beam is exceedingly strong with respect to the compressive stresses in the concrete and that it would be a waste of steel to use the percentage (.77 per cent) used for a balanced beam.

Assuming $j = .9$ we obtain the steel from the formula

$$A_s = \frac{M}{f_s jd} = \frac{163300}{16000 \times .9 \times 12} = .945 \text{ sq. in.}$$

With 3-9/16 in. sq. bars the actual $A_s = 3 \times .316 = .948$ sq. in.

$$\textit{Actual } p = \frac{A_s}{bd} = \frac{.948}{30 \times 12} = .0026$$

$$\therefore k = \sqrt{2pn + (pn)^2} - pn =$$

$$\sqrt{2 \times .0026 \times 15 + (.0026 \times 15)^2} - .0026 \times 15 = .243$$

$$j = 1 - 1/3k = 1 - \frac{.243}{3} = .919$$

$$\textit{Revised } A_s = \frac{163300}{16000 \times .919 \times 12} = .927 \text{ sq. in.}$$

The 3-9/16 in. square bar or 3-⅝ in. round bars will answer.

As the beam is continuous it will have a negative bending moment over the support equal in amount to the positive bending moment at the center of beam. This negative bending moment causes tension at the upper surface over the support and, as concrete is negligible as regards tensile stresses, the flanges of the T-beam do not assist in taking care of the stresses, so that we have the condition of a rectangular beam. The bars are bent up to provide tensile reinforcement. As shown on the drawing (Fig. 8), two bars are bent up in one span and one bar in the adjacent span providing three bars over each support.

$$p = \frac{.948}{10 \times 12} = .0079$$

As a simple beam $k = .383$ and $j = .872$

$$f_s = \frac{M}{A_s jd} = \frac{163300}{.948 \times .872 \times 12}$$

$$= 16500 \text{ lbs. per sq. in.}$$

$$f_c = \frac{M}{\frac{1}{2}kj\ (bd^2)}$$

$$= \frac{163300}{\frac{1}{2} \times .383 \times .872 \times 10 \times 144}$$

$$= 680 \text{ lbs. per sq. in.}$$

In this instance the stresses do not exceed the allowable to any great degree and by running the bars, which are not bent up, straight through to the quarter point of the adjacent span, we provide three bars in the bottom of the beam, thus producing a double reinforced beam. The bars in the compression surface in this instance would reduce the stresses of both the concrete and the steel sufficiently to bring them within the allowable working values.

### *Stirrups*

It has been found from actual tests that as regards their resistance to shear the T-beams are no stronger than rectangular beams having the same width as the stem. In other words the flanges of T-beams are disregarded in designing for shearing stresses, and provision is made for the shearing stresses the same as for a rectangular beam.

As a matter of fact, when a beam fails, due to excessive shearing stresses, the failure is actually due to diagonal tensile stresses. At any point in a beam the horizontal and vertical shearing stresses are equal and these produce diagonal tensile stresses. This diagonal tension causes cracks which are inclined to the horizontal, the angle being flatter at the ends of the beam than at the center.

To prevent failure due to these cracks, the bars are either bent up, generally at an angle of 45 degrees, or else vertical stirrups are used. In our case we are bending up the bars, as shown, to provide negative reinforcement over the support, but will take care of the shearing stresses by means of vertical stirrups. It should be borne in mind that it is the diagonal tension that we are providing for and that the vertical or horizontal shear is simply used as a measure of the diagonal tension, since the latter is rather a complicated analysis and seldom used in practice.

The total shear at the ends of the beam is equal to one-half the total live and dead load on the beam, therefore:

$$V = \tfrac{1}{2} \times \frac{10 \times 10 \times 230}{4} \times 2 + \frac{10 \times 100}{2}$$

$$= 6250 \text{ lbs.}$$

and the unit shear

$$v = \frac{V}{bjd} = \frac{6250}{10 \times .874 \times 12}$$

$$= 60 \text{ lbs. per sq. in.}$$

According to the Joint Committee, when the shear exceeds 40 pounds per square inch, two-thirds of the shear must be taken care of by means of stirrups, while the remaining third is taken care of by the concrete. (In no case is the unit shear to exceed 120 lbs. per square inch.)

Having chosen the size of stirrups to be used the theoretical spacing at any point can be obtained from the equation:

$$s = \frac{3}{2}\ \frac{a_s\ f_s\ jd}{V}$$

In which $V$ is the total shear at the section under consideration, $a_s$ is the area of the legs of the stirrup.

Thus if we use ¼-in. round bars for stirrups with the U-shaped stirrup the area of the two legs is .098 sq. in. and

$$S = \frac{3}{2}\ \frac{.098 \times 16000 \times .874 \times 12}{6250}$$

$$= 4 \text{ inches}$$

2/3 of the total horizontal shear from the end of the beam to a point 20 inches from the end of the beam, (at which point the shear is 40 pounds per square inch and no stirrups are required)

$$= \frac{2/3\ v\ b + 2/3\ v^1 b^1}{2} \times 20$$

$$= \frac{2/3 \times 60 \times 10 + 2/3 \times 40 \times 10}{2} \times 20 = 6660 \text{ lbs.}$$

And the value of one stirrup is $2 \times .049 \times 16000 = 1570$ lbs. Therefore the total number of stirrups required is $6660 \div 1570 = 4$.

The maximum spacing allowed for vertical stirrups is half the depth of the beam.

It is good practice to put in one or two stirrups beyond the point at which no stirrups are required and some designers put stirrups throughout the beam.

### *Columns*

Columns are generally reinforced by means of longitudinal bars extending the full length of the column or by means of bands, hoops or spirals. Usually a combination of the two systems is employed; the longitudinal bars are held

TABLE 5—COLUMNS

| Size, Inches | Effect. Size | Reinf. p | Steel $A_s$ | Total Load, Pounds |
|---|---|---|---|---|
| 10x10 | 7x 7 | 0.01 | 0.49 | 25,100 |
| | | 0.02 | 0.98 | 28,200 |
| | | 0.03 | 1.47 | 31,300 |
| | | 0.04 | 1.96 | 34,400 |
| 12x12 | 9x 9 | 0.01 | 0.81 | 41,600 |
| | | 0.02 | 1.62 | 46,700 |
| | | 0.03 | 2.43 | 51,800 |
| | | 0.04 | 3.24 | 56,900 |
| 14x14 | 11x11 | 0.01 | 1.21 | 62,100 |
| | | 0.02 | 2.42 | 69,700 |
| | | 0.03 | 3.63 | 77,300 |
| | | 0.04 | 4.84 | 84,900 |
| 16x16 | 13x13 | 0.01 | 1.69 | 86,700 |
| | | 0.02 | 3.38 | 97,300 |
| | | 0.03 | 5.07 | 108,000 |
| | | 0.04 | 6.76 | 118,600 |
| 18x18 | 14x14 | 0.01 | 1.96 | 100,500 |
| | | 0.02 | 3.92 | 112,900 |
| | | 0.03 | 5.88 | 125,200 |
| | | 0.04 | 7.84 | 137,600 |
| 20x20 | 16x16 | 0.01 | 2.56 | 131,300 |
| | | 0.02 | 5.12 | 147,500 |
| | | 0.03 | 7.68 | 163,600 |
| | | 0.04 | 10.24 | 179,700 |
| 22x22 | 18x18 | 0.01 | 3.24 | 166,200 |
| | | 0.02 | 6.48 | 186,600 |
| | | 0.03 | 9.72 | 207,000 |
| | | 0.04 | 12.96 | 227,400 |
| 24x24 | 20x20 | 0.01 | 4.00 | 205,200 |
| | | 0.02 | 8.00 | 230,400 |
| | | 0.03 | 12.00 | 255,600 |
| | | 0.04 | 16.00 | 280,800 |

in place by bands or the bands or spiral bars are held in place by longitudinal bars.

Columns with longitudinal reinforcement such as we propose to use should have not less than 1 per cent and not more than 4 per cent of reinforcement. In this type of column the steel aids by carrying a part of the load directly; the stresses in the concrete and steel being proportional to their moduli of elasticity, so that $f_s = nf_c$. The total load which a column of given dimensions will carry is equal to

$$P = f_c A_c + f_s A_s$$

and this reduces to the equation:

$$P = f_c A [1 + (n\text{-}1) p]$$

The allowable axial compression on the concrete is 450 pounds per square inch.

The columns shown in Fig. 8 are 10 in. x 10 in. and have an effective area $A$ = 7 in. x 7 in. = 49 sq. in. The longitudinal reinforcement consists of 4-½ in. square bars so that $p = 4 \times .25 \div 49 = .02$.

Therefore the load which the column can carry is equal to:

$$P = 450 \times 49 [1 + (15\text{-}1) \times .02]$$
$$= 28200 \text{ pounds}$$

The actual total load on the column is equal to the live load of 10 x 10 x 180 or 18,000 pounds plus the weight of slab; 10 x 10 x 50 = 5000 pounds, weight of two beams or 2 x 10 x 100 = 2000 pounds and the weight of the column itself 12 x 100 = 1200 pounds, giving a total load of 26,200 pounds and the column is safe as shown.

It should be noted that the effective area was used in designing the columns as the concrete outside of the steel reinforcement is used for fire protection purposes. If there is no danger of fire the gross area could be used.

The longitudinal bars should have lateral ties of not less than ¼ inch diameter spaced not more than 12 in. apart nor further apart than 16 times the diameter of the vertical bars. In the present example rectangular bands or hoops made of ¼ inch round bars were used and spaced 8 inches apart.

As an aid in designing columns Table 5 gives the carrying capacity of different sizes of columns having different percentages of reinforcement.

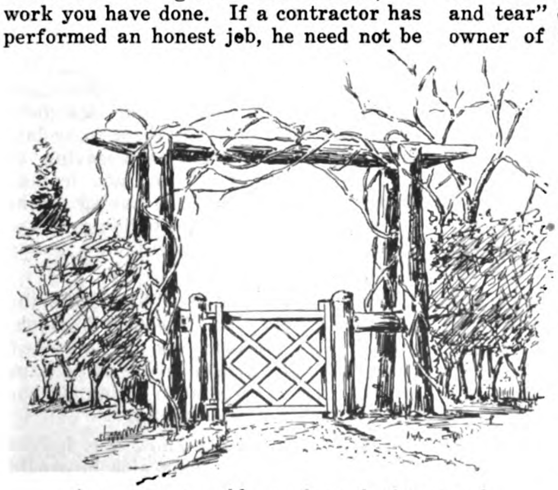
*(The End)*

# Making Old Customers Bring New

## *People You've Done Work for Excellent Prospects—Get the Upkeep Jobs*

By Paul D. Otter

GETTING new business is very greatly due to looking after old business, the work you have done. If a contractor has performed an honest job, he need not be diffident, some years after, calling attention to the ravages of time, the "wear and tear" on property, and acquaint the owner of the value of that "stitch in time."



A rustic gate adds much to the beauty of the country home

Next to a "run-down-at-the-heel" man there is nothing so bad as a run down property.

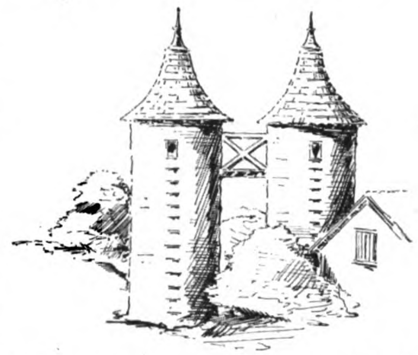
Porch rails, missing balusters, decayed steps and floor nosing are the first symptoms, and yet in many communities a tiresome search must be made by the owner for a man to do this, or to build a garage on the end of the lot.

The same slogan holds good for the contractor to employ as the merchant uses:

"Once a customer always a customer."

Who then is looking after such possibilities in the small towns, the suburbs? Is the contractor fully awake to the personal touch in such matters?

Doing one first class job, making capital out of it—yes, photographing it—



Silos can be picturesquely treated in the Gothic style

taking time off to exploit his ability to a good prospect.

There is no limit to what a man might do in first making his home attractive within and without, as an exposition of what he might do to making the new home and its surroundings, of the banker up the street, the merchant's home in the next block, or putting up the band stand in the town park. All these are simple suggestions as stimulus to an ambitious man in studying the possibilities in his particular community. He must not "hide his light under a bushel" by just doing and not following up. He should be alive to civic interests in his community as well as interested, or informed, about the social life. Individual interests should hold his attention mightily, for if he is enterprising, the engagement of a prominent young couple should mean much to him, for the home is being thought out long before the wedding day. Are you going to build it?

The furniture man who follows local history and domestic combinations diligently aims to make himself and business known to a prospective couple by sending them furniture booklets, everlastingly following up—until he has the little baby, months later, landed in a baby carriage from the line he handles.

Should not the carpenter, or would-be contractor have just as pertinent an interest? More so. The nest first and later, through the file system, well laid plans to follow up building that garage, pergola, or added sleeping porch, or the breakfast room, for all these follow in the wake of prosperity, and people must have them, not all at once with most of us, but we demand them sooner or later.

You are accustomed to look at pictures, right here in this BUILDING AGE, of a house "just finished." Sure, it is a house just finished; next month it will be a home in the beginning. It takes on human interest.

"Watch it grow."

Should a man take possession of this house who simply has no other idea than it be a place to hang up his hat over night and shelter his family when he is away, his imagination no doubt will stop with a couple of pounds of grass seed scattered around the lot every spring.

Ross Crane, who is now doing so much in the interest of art in and about the home, shows his audience a great enlarged photograph of this same "finished house" you and I are so familiar with when we look over building papers. It was built for a college professor. Several months went by, when a shrubbery man presented a proposition to have the grounds look finished. What a contrast in the second photograph, shown three years after. Vines on the walls and over added spandrels and trellises, a luxuriant growth of shrubs and trees transformed the place from A HOUSE to A HOME.

What is the idea? Didn't the contractor with the help of his carpenters build the house, clear up the shavings, take away all their tools, and even their scaffolding—what more could you ask?

Don't lose interest in that property; it's a growing proposition.

Realize this is quite the age of concrete. Get into that business, more or less; or co-operate with a concrete man so that you can work together. Exterior features will be wanted from the garage which combines wood and cement to flower and plant holders, bird baths, post bases, arbors and trellises. All these the new home owner will add as time passes just as new furniture and features are added within.

When the big operations are completed, or interfered with by weather or other causes, have neatly written typewritten letters or printed cards go out in the mail to former patrons and new "prospects," suggesting various accessories to the newly finished home. Enumerate the things a woman wants to make a badly planned house more satisfactory in conveniences, in built-in or hinged devices, from the wainscot drop shelf for the pantry to making the useless attic pay for itself in wall board room additions or children's play room.

ADVERTISE! The church advertises. The banks advertise. The banks have done more to popularize practical psychology than any other medium. They suggest thrift and hold your money for you after you have acquired the habit.

Making yourself well and favorably known, particularly in small towns or cities, helps wonderfully in securing information on prospective work.

Friendly relations with leading business men creates a chain which extends many links beyond one's conception in business value. A townsman buys a car from your friend, a selling agent; call up the new automobile owner and ask privilege of figuring on garage, should he entertain the thought of building. You have started something, even though it remain a suggestion.

Friendly access to information pertaining to building permits granted prospective builders should be cultivated. This can, with a little tact and judgment, be done without being a prier, prober, or a nuisance, much less a giver of bribes.

Riding about in a car over many sections of this broad land is conducive to cogitations covering many subjects. What impresses one greatly is the marked unattractiveness of some towns and villages. Homes unadorned by trees, shrubs, vines and varied outlying buildings; all so many places simply to exist. Off in another direction civic pride announces on overhung arch: "Welcome to Greeneville," a mile out of town. As you enter, broad streets greet your eyes, park strip, varied architectural treatment in buildings and homes indicating that the builder's skill is recognized.

Out again on another long trip, one draws the conclusion that every farmer must have bought a K. D. silo, so much do they look like barrel staves held together by wire hoops.

Unsubstantial and out of plumb. How about over Wisconsin way? Why, every farmer vies with his neighbor in giving architectural variety and sky line to the scene in the building of barn and silo.

It would seem as though there was an absence of the intelligent builder's personality in one community and a pronounced appreciation of it in the other, for farmers, like their sheep, in architectural matters will follow the leader. What kind of leader are you?

Another roadside proposition which must flourish and attack the enterprising carpenter and builder to its new and growing possibilities, is the roadside market. Beginning with a farmer's display of vegetables and produce tilted up in baskets along a well traveled automobile thoroughfare, the project has thrived to such proportions that more satisfactory stands or booths are being used. The requirements are bringing about the adoption of a simple booth suggested by the gas filling service stations with a curved entrance and exit to thoroughfare. The success of such a project is confined more to highways between prominent towns and cities. Taking figures from the latest prominent farm paper (*The Farm Journal*), a New Jersey roadside market sold more than $8,000 worth of farm produce.

Another man's sales ran as high as $300 in one day, and his total sales in 1917 amounted to $14,000. A farm specializing in peaches, tomatoes and sweet corn netted him for a six weeks' season more than $2,000.

High prices, and usually stale produce found in the city make this project interesting to the automobile owner who likes to combine business with pleasure.

Here are building possibilities. And so it goes. It will be found on close observation that where custom or changing order of things excludes the carpenter, electric man or mechanic in one direction, it opens up in so many other directions new demands from the new order of things. The automobile and the moving picture interest are notable examples.

Developing new business is then largely a question of how much do we aim to fit in with present tendencies and inclinations—recognizing them not as trifling, or a passing fad of the wealthy, but that they may bring a rich return by your attention to them.

# How to Build and Fireproof with Hollow Tile—XVIII

## *Cost of Laying—Number of Tile That Can Be Laid in a Day*

### By J. J. Cosgrove

KNOWING your branch of building thoroughly; having carefully interpreted the plans and specifications; being assured of what the architects will stand for, and having provided yourself with pencil and paper, you are ready to commence taking off quantities, and computing the cost of an undertaking.

As we are interested in this article only in the cost of doing work with hollow tile, we will narrow the inquiry to cover that important branch of the building industry.

Let us suppose that bids are called for on a group of buildings one or two stories in height, the bearing walls of which are to be of hollow tile. Nothing is said in the specifications as to how the hollow tile blocks shall be laid.

There is where a knowledge of building without a knowledge of what the architect has in mind, or in other words what he will stand for, might prove a dangerous thing. For instance, every bidder knows that the way to lay hollow tile blocks of standard make is with the cells verticle. That is the blocks stand on end. But remember, the specifications have not called for them to be laid that way. Now, there is a saving of time laying hollow tile on side instead of on end, and, while the saving might not be great in a single building, it becomes a matter of moment on a group of buildings.

The question then is: "What does the architect want?" or "What will he accept?" Can the blocks be laid on side? If so, that will mean a saving of perhaps ten per cent on the labor laying up the bearing walls of the buildings.

If a builder did not know that hollow tile can safely be laid on side he would overlook the chance of cutting his cost by doing so. But even though the builder knows they can safely be laid on side, he must likewise know that the architect will permit it, before he can take the difference from his costs.

There is a limit, of course, beyond which it is not safe to lay ordinary hollow tile on side, and the thickness of the walls varies with the height of course, being made thicker as the height increases. Five stories is the greatest permissible height bearing walls of buildings can be carried with hollow tile laid on side; and they can be used then only in case the buildings are to be used for residences, hotels, apartment houses, or for like structures where similar light loads will be carried. The hollow tile blocks should be set on end for warehouses which carry extra heavy loads, factories, loft buildings, dance halls, theatres, or buildings of any kind having heavy live loads.

In the case of public buildings, factories, etc., the walls would, of course, be proportioned in thickness to the loads carried, the architect or engineer having carefully worked out the thickness from the data at his disposal.

### *Make Sure Your Method of Laying Will Be Permitted*

The point is, the estimator should never figure to lay the hollow tile blocks on side for buildings intended to carry heavy live loads. If he does, he will find himself in for a loss instead of a profit, for he will not be permitted to lay them in that position.

Lest it might be overlooked, it might be well to state here that if a wall is less than 8 in. in thickness that fact alone determines the way the tile are to be laid. Walls from 2 in. up to 8 in., and bearing wall of 6 in. can be laid with tile on end; but bearing walls of less than 8 in. are never laid with hollow tile on side.

Having determined just how the tile are to be laid, in a building, the next move is to find out just how many blocks of the various kinds will be required so you can figure what they will cost laid up in the wall.

In this connection it will be well to remember that there are special hollow tile blocks for almost every purpose. For instance there are column blocks; water-table blocks; corner blocks; window blocks; window and door caps; slabs for joists to rest upon, and blocks of every size and shape needed.

### *Calculating the Breakage*

The number of the various blocks that will be needed must be taken off in detail, and a sufficient allowance made to cover breakage in transit and while being delivered to and handled on the job. This allowance for breakage is a matter of more or less importance according to where the work is to be done. If the building is but a very short distance from a well stocked yard of masons' and builders' materials, the allowance can be very small, for any shortage can be made good from the yard of the local dealer without loss of time and at slight cost. If, on the other hand, the operation is a large one and at considerable distance from suitable markets, a considerable saving can be affected by purchasing in carload lots and having shipped direct to the job. Storage, freight, handling and interest on the purchase money can then be saved, and the cost of the material will be less. To offset this, though, a larger allowance must be made for breakage. It would not do to be caught short a few blocks of hollow tile and be tied up for a couple of weeks waiting for a supply, for that would prove costly in many ways. Men would have to be kept there to lay the blocks when the material arrived, and as they would be under pay the wages alone would more than offset the cost of an extra allowance of blocks.

When fitting tile blocks in place they are sometimes broken; inspectors and architects sometimes condemn a small percentage of the blocks; handling brittle material like hollow tile is sure to account for a few, and in that way the several small items mount upward until they total many.

It is hard to say just what percentage of tile to order over and above what are actually needed for a building operation There are many things which enter into the problem to run up or keep down the percentage. For instance, on a large operation such as a scattered group of buildings the breakage would be greater than for one or two buildings, for there would be not only a greater amount of handling, but while stored on the premises the blocks would be damaged more or less by the storing or moving of other building materials.

A well organized and well handled job, on the other hand, would show a smaller percentage of breakage than would obtain in a poorly organized and weakly handled job. Viewing the matter in a broad light, it might be safe to say that a fair average would be about five per cent. On a well handled job the loss would be less. On some extravagant jobs I have seen it much greater. Accepting that as a base therefor, each estimator must figure out for himself just what loss he is going to have on his work.

### *Getting the Tile at the Lowest Cost*

Knowing the exact amount of hollow tile that will be required on an operation, the next thing is to find out just what it will cost delivered on the cars, or barges as the case might be, at the site of the operation, or at the nearest yard or siding.

This is not so simple a matter to find out as it might seem, for it involves four items: cost of materials at the factory; length of haul; freight rate, and weight of material. To show the relation of all these factors, let me say that it might be cheaper to buy at a more distant factory than at the nearest one, the price of the material in all cases being the same.

The reason is not one we need long seek. While the hollow tile blocks turned out by any one manufacturer are standardized as to size and quality, still there is a difference in the weight of the blocks turned out at their various plants; while again, there might be a better freight rate from a more distant yard than from the near one. It is well, therefore, to stipulate shipment from a yard which will cost the least in freight to get it to the site of the operation.

Select in advance where the hollow tile blocks will be piled which will be convenient to all the buildings to be erected and will avoid handling. If there is to be a group of buildings, it will be better to pile them in several places, and locate each pile far enough away from the buildings which are to be erected so they will not be in the way of other contractors. It seems to be a fact that each contractor must take care of his own material, for other contractors will heap material on it, or handle it like the "Tank" corps "We Treat Them Rough" if it happens to be in their way.

The first question which arises in the mind of an estimator when called upon to estimate the cost of a building of hollow tile is, how many hollow tile blocks can a bricklayer lay in a day, and how does it compare with the amount he could lay up with brick. That is, how many brick would be the equivalent of the hollow tile wall laid up by a bricklayer in a day.

### *Estimating the Labor Required*

In estimating the amount of work that *will* be laid up in a day, one must not confuse it with the number of tile that *can* be laid up in a day. There is a vast difference between the two, as a little thought will show. One man exceptionally speedy and otherwise well equipped for the purpose, might lay up from 450 to 500 hollow tile a day, just to see how many he could lay. It is not likely he could or would keep up that pace for any great length of time, so what that man might do would be in the nature of a sport or contest to establish a record, rather than work, and is best forgotten.

What the estimator must grasp if he wishes to succeed as a contractor is not the number an exceptionally good or swift workman can lay, but how many in the natural course of events will be laid on an average day, day in and day out as long as the work lasts, by workmen as they are picked up in practice.

The percentage of work actually performed will be found to be far less than the amount turned out even by a fair workman under fair conditions.

The accompanying table will give a good idea of what to expect in the way of results when you come to compute your final costs. The table is compiled to show the equivalent of brick that would have to be laid up to build the same amount of wall.

### *Difference in Labor Between Brick and Hollow Tile Walls*

The difference to the workman between laying up a wall of hollow tile and laying up an equal wall of brick, is the difference between weight and speed. Bricklayers who have become expert at laying hollow tile in bearing walls for buildings seem to go home less tired after a day's work than they would be if they had done as big a day's work laying brick. The reason seems to be that they do not have to stoop so many times. The wear and tear on a brick-in. To lay the equivalent of 1800 bricks using 12 x 12 x 12 hollow tile blocks would necessitate stooping to pick up the material only 80 times. If building an eight inch wall, only about 120 times.

It will be seen by the table that about 20 per cent more hollow tile can be laid with cells horizontal than when the blocks are set on end, and this, like all the values given in the table is a safe, fair, average.

TABLE SHOWING NUMBER OF HOLLOW-TILE LAID IN AN EIGHT-HOUR DAY BY A MASON IN BUILDINGS OF DIFFERENT KINDS, USING TILE OF VARIOUS THICKNESSES

| Size of Tile | How Laid | No. of Masons | No. of Helpers | In Residence, Work, Average Number of Openings | Stores, Factories or Buildings of Few Openings | No. of Brick Required to Lay Equivalent Wall | |
|---|---|---|---|---|---|---|---|
| | | | | | | Residences | Stores |
| WALLS: | | | | | | | |
| 8x12x12 | Horizontal | 1 | 1 | 110–145 | 165–200 | 1650–2175 | 2475–3000 |
| | Vertical | 1 | 1 | 100–130 | 150–180 | 1500–1950 | 2250–2700 |
| 12x12x12 | Horizontal | 1 | 1 | 100–135 | 145–165 | 2300–3100 | 3335–3795 |
| | Vertical | 1 | 1 | 90–120 | 130–150 | 2070–2760 | 3000–3450 |
| PARTITIONS: | | | | | | | |
| 3x12x12 | Vert. or hor. | 1 | 1 | 240–250 | 250–300 | 1440–1500 | 1500–1800 |
| 4x12x12 | Vert. or hor. | 1 | 1 | ........ | 260 | ........ | 1950 |
| 5x12x12 | Vert. or hor. | 1 | 1 | ........ | 240 | ........ | 1920 |
| 6x12x12 | Vert. or hor. | 1 | 1 | ........ | 200 | ........ | 2200 |
| 8x12x12 | Vert. or hor. | 1 | 1 | ........ | 150 | ........ | 2250 |
| 10x12x12 | Vert. or hor. | 1 | 1 | ........ | 130 | ........ | 2470 |
| 12x12x12 | Vert. or hor. | 1 | 1 | ........ | 120 | ........ | 2760 |
| ARCHES: | | | | | | | |
| 8x12x12 | .......... | 1 | 1½ | ........ | 440 | ........ | 6600 |
| 10x12x12 | .......... | 1 | 1½ | ........ | 360 | ........ | 6840 |
| 12x12x12 | .......... | 1 | 1½ | ........ | 320 | ........ | 7360 |

layer comes in his stooping and back muscles. It is not so much the amount of weight he picks up and lays in the wall each day as it is the number of times he has to bend down to pick up the material with which he is working. It is not as hard on him, therefore, to lay 300 hollow tile blocks a day as it is to lay 1500 to 1800 brick in the same length of time.

In laying 1800 brick the workman has to stoop 1800 times inside of eight hours. More than that, as a matter of fact, because of the bats he picks up and the mortar he must have to lay the bricks

It will be noticed that the first three items in the table show quantities that can be laid in residence work with the average number of openings; also in stores, factories, warehouses or other buildings of comparatively few openings.

From this data an estimator ought to be able to determine with a fair degree of accuracy just the length of time it would require to lay up a wall of any number of openings or breaks.

*(To be continued)*

# A Good Saw-buck Speeds Up Work

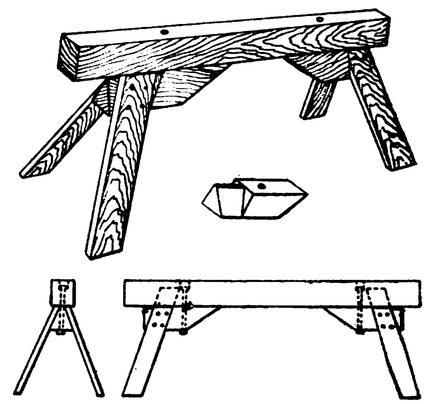
## By Henry Simon

THE saw-buck as commonly made has the great drawback that the nails holding the legs to the body are located close to the upper edges, where there is constant danger of their coming into contact with the saw. Further, nails holding the cross-cleats to the legs are a constant menace to the saw when working parallel to the body. Even if these nails are well set into the wood, this danger is hardly lessened, because they are still near the surface, and the constant racking of the saw-buck causes them to work loose, with results known to all carpenters.

This is a particularly unfortunate condition in interior finishing, where the carpenter often works with a single saw-horse and therefore the saw is in constant close proximity to these nail-studded parts. A little carelessness, and a 12-point saw, just filed to suit the most fastidious, must be set and filed again.

The saw-buck here illustrated obviates this ever-present danger, besides having additional advantages. The body is provided near each end with a single wedge-shaped mortise entering it from the under side and accommodating the upper ends of a pair of legs, the legs there being mitered and nailed together. A heavy block, of the same stuff as the body, and cut down to fit between the legs under the mortise, is forced against them from below by a ½-in. bolt having its head countersunk deep into the body.

The mortises are made a trifle full at their upper, or smaller ends, and the blocks are so shaped as to make a very tight fit between the legs, so that when the bolts are drawn up, the saw-buck is firmly held together. The nails holding the legs to the blocks are therefore only auxiliary holding means, and for this and the further reason that not being near the ends of the legs, they can be extra long and heavy, there is no danger of their ever working out;



Construction of a type of saw-buck that is an efficient aid to the contractor

and unless they worked out altogether, there is no possibility of ever striking them with the saw.

It takes longer to make this kind of saw-buck than the ordinary type, but one saw-filing avoided will pay for the extra work.

# The Strike Situation Today and Since January First

There are 2000 strike situations in this country to-day, meaning 2000 strikes either going on or imminent, according to the American Federation of Labor. And it was hoped that President Wilson's plea would have a quieting effect on labor unrest!

Strikes during July and August were twice as many as during the corresponding months of last year. The average number going on each day since the first of the year has been: January 105, February 110, March 102, April 134, May 219, June 245, July 364, and August 308. About 34 per cent of all strikes now going on involve shorter hours.

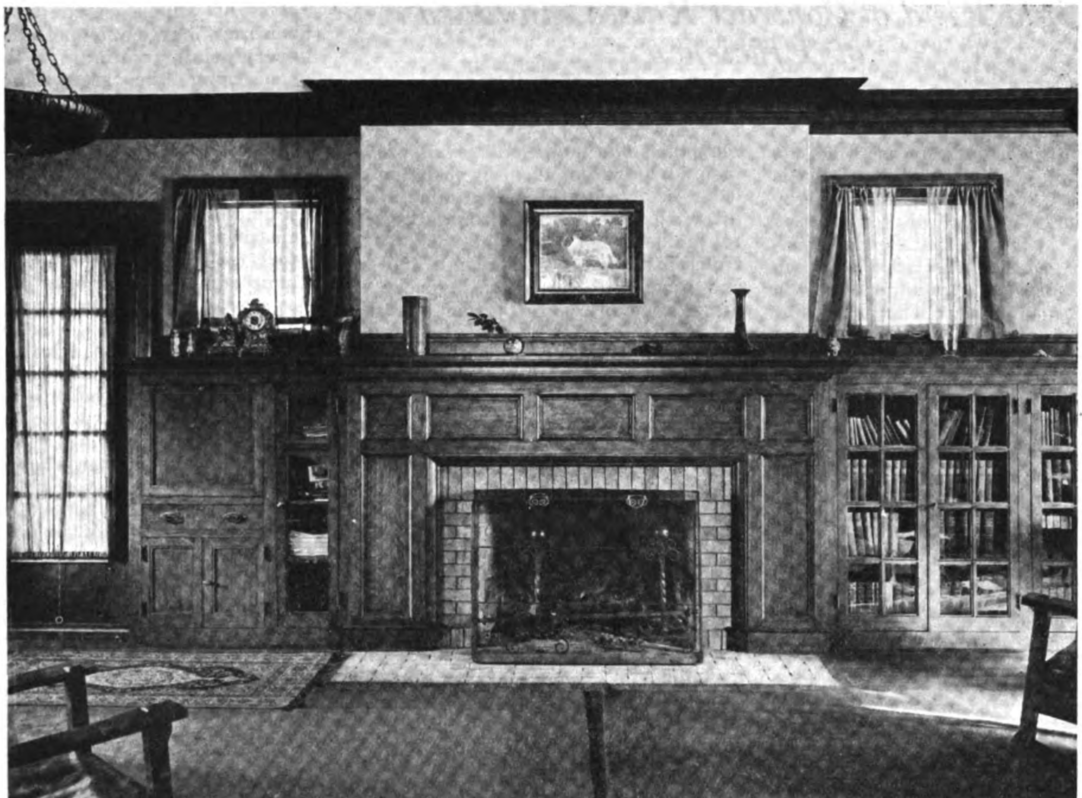
An inquiry conducted by the New York *Tribune* shows that there has been a very pronounced and progressive decline in actual quantity of goods produced, and that shorter hours and higher wages have not been compensated for by increased efficiency. In view of the talk concerning the statement that shorter hours mean a greater output, the survey showed that among firms granting shorter hours, 7.9 per cent suffered decreased production, 19.9 per cent saw no change, and in only 3.2 per cent had production increased. There is an increasing demand from labor for a less than a 48-hour week.

Employers of labor declare that this decrease in the average number of hours causes greater production losses than even the great losses caused by strikes.

The Federal Reserve Board in its

*(Concluded on page 346)*

# *Two Striking Interiors*



# Drawing the Ideal Contract

## *Partnership of Owner and Contractor Essential—Right Kind of Contract Raises Standard of Efficiency*

By J. A. L. Waddell, D.E., LL.D.

IS it not obvious that any one who lets a contract on the "cost-plus" basis places himself absolutely at the mercy of the contractor and the contractor's employees? It is true that the specifications often contain restrictions which tend to lessen the contractor's power to take advantage of the client; but their enforcement would be very troublesome and would generally involve litigation with its attendant delay and expense.

Even if the contractor has every possible desire to expedite the work in the interest of the client, he cannot prevent his men from taking life easily and "soldiering" on the job. When they feel that their indolence or negligence will cost "the boss" nothing, but, on the contrary, will probably add to his profits, they cannot be induced to labor with the same amount of energy which they would employ if they knew that upon their efforts depends his success or failure.

Most people will acknowledge that the percentage of truly-conscientious contractors is not as large as one hundred, * * * but how much smaller is that of truly-conscientious workmen! I do not deny that there are workmen who always give a *quid pro quo* and who are upright and honorable in all their dealings; but, alas! they are sadly in the minority. Their number is so small that they are unable to induce their co-laborers to exert themselves any more than they are compelled to, unless, perchance, they are paid by the job instead of by the day or hour.

By the way, when it is practicable, such a scheme of paying the workmen is an improvement on that of time-compensation, because it provides a great incentive to effort; but, at the same time, it also serves as a strong temptation to scamp the work. With close supervision. however, and a strict enforcement of the clause in the specifications relating to the taking out and replacing of defectively built work, the employees soon learn, through the fines and penalties enforced by the contractor, that scamping does not pay, and that the old adage of honesty being the best policy is just as applicable now as it was when first enunciated.

### *Unsatisfactory Contract Forms*

So much from the client's point of view, and now let us discuss the question from that of the contractor. In the days of hard times when contractors are willing to take work at low figures, and even below cost, in order to keep their force together, the public in general, especially as represented by companies and municipalities, is prone to take advantage of them by insisting that work be let by the lump sum, and by throwing upon the unfortunate "successful bidder" not only the risk of loss from rising prices of materials and labor and from unforeseen contingencies, but also, in many cases, from excess of quantities above those given in the specifications. This is accomplished by inserting in the latter a most unjust clause compelling each bidder to verify for himself both the quantities stated and the character of the conditions described. The bidders, hungry for work, accept this clause without comment, but with the mental reservation that, in case of hard luck, they will, by some means or other, obtain extra compensation, even if they have to carry the controversy into the courts.

In nineteen cases out of twenty it is unjust to bidders to ask them to name a lump-sum compensation for doing work, unless provision be made for a variation in the quantities of materials upon which they tender. If provision be arranged for such variation, the method of letting is no longer that of the "lump sum," but reduces to a modification of that of "unit prices."

The latter method is certainly the more logical, and yet it is far from being entirely fair to the contractor; because, while it provides against loss through excess in quantities of materials, it leaves him open to the possibility of still greater loss through changing prices, onerous unanticipated conditions and disastrous happenings beyond his control.

The client is the proper party to assume the principal risks inherent to the work, provided that the adverse happenings be really unavoidable by the contractor, and that the latter take every reasonable precaution against disaster or loss.

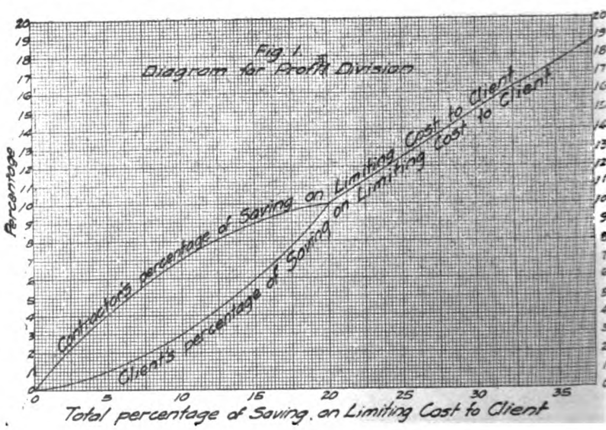
### *Principles of Satisfactory Forms*

From the preceding it is evident that the "cost-plus," the "lump-sum," and the "unit-price" methods of letting contracts are not only faulty but also unjust to one or other of the two parties to the agreement; consequently, the question arises: "Is there not some method which will be just and fair to both?" That question, I claim, can truly be answered in the affirmative; and I shall now proceed to explain such a method in complete detail.

Let the specification, which should invariably be drafted by an engineer who is acknowledged to be an expert in the class of work covered in the proposed contract, be complete and thorough in every detail, recording all that is known concerning the governing conditions; pointing out all features concerning which there is any uncertainty; tabulating as accurately as possible the estimated quantities of all the materials that will probably enter the construction; providing a justly-drawn clause for unclassified work and the payment therefor; calling for each bidder to name a lump sum so much above his estimate of total cost that there is practically no danger of the actual cost exceeding it, which sum (after modification as hereinafter indicated) shall be the greatest that the client can be called upon to pay for the completed work; naming such properly-balanced unit prices for all the materials that, when they are applied to the quantities thereof given in the specifications, the sum of the several ensuing estimates of cost shall exactly equal the limit of cost set in the contract, which unit prices are to be adopted when computing the final payment for the entire work; providing a surety-company bond for the faithful performance of the work and guaranteeing the client against having to pay more than the limiting sum agreed upon (as finally modified); and adopting the following method of profit-sharing between the contractor and the client.

### *Method of Profit-Sharing Contract*

An accurate estimate of cost of every detail of the work from start to finish is to be kept by the contractor and verified by an accountant in the employ of the client, so that the total profit on the job may be ascertained by deducting this total cost from the maximum figure named in the contractor's tender and afterwards embodied in the contract (modified, however, as hereinafter described). This profit is to be shared between the contractor and the client as indicated in the profit diagram. It should be clearly understood that every direct and indirect expense to which the contractor is put in doing the work, after



the contract is signed, is to be included in the cost—all over-head expenses of every kind, plant deterioration, traveling expenses, supervision, and salaries, excepting only that the contractor himself is not entitled to any salary. In the case of a firm being the contractor, the head of that firm should receive no salary; but if any of the juniors devote their time exclusively to the job, it would be legitimate to allow them reasonable salaries, equivalent to what would have to be paid to regular assistants. All such matters, however, should be stipulated in the contract.

In order to determine, after the entire job is finished, the amount due the contractor, the actual quantities of materials recorded are to be multiplied by the unit prices named in the contract, and to the sum of these is to be added the value of all unclassified work (usually denominated "extras"); then from the sum is to be subtracted the lump sum named by the bidder and incorporated in the contract. The ratio which this difference (either a positive or a negative quantity) bears to the said lump sum named by the contractor in bidding is to be figured and adopted in the employment of the diagram of "corrective ratios" for the said difference.

### *Application of Corrective Ratio*

There are two reasons for applying this corrective ratio. *First:* in the case where the actual quantities of materials exceed the estimated ones of the specifications, it would be hardly fair to the client to apply to the excess those unit prices which produce his tentative limiting expenditure. *Second:* in the case where the actual quantities of materials are less than the estimated ones, it would be unjust to the contractor to use the high unit prices on the diminution quantities, not only because of the great difference between these and the unit actual-costs, but also for the reason that the total overhead charges would be about the same for the estimated total quantities as for the diminished amounts.

In the corrective-ratio diagram it will be noticed, that, after the ratio of value difference (due to increase and diminution of quantities of materials) reaches 0.2, the "corrective ratio" remains constant at 0.8, which corresponds approximately to actual cost conditions. The object of this is to provide that the contractor shall not be too much benefited by an abnormal increase in quantities, nor, on the other hand, shall he obtain too much advantage because of an abnormal diminution thereof.

To utilize the corrective-ratio diagram, look on the line of abscissae for the ratio of cost-difference, pass vertically upward to the curve (or right line, as the case may be), then horizontally to the extreme left vertical, which will indicate the corrective ratio required. Next multiply the previously computed difference by this corrective ratio and add the result to or subtract it from the limit stipulated in the contract. The result will be the corrected limit, from which must be subtracted the total cost so as to determine the amount of profit to be divided between the contractor and the client, as per the profit diagram.

### *Illustration*

In order to show *the modus operandi* of this method of profit-sharing, let us assume the following case, in which the estimated quantities are exceeded.

Lump sum limit tendered . $1,700,000

Value of total work done per unit-price list and clause re unclassified work ................ $1,855,000

Total cost of work ...... $1,575,500

Difference = $1,855,000 — $1,700,000 = $155,000.

Ratio of Difference = $150,000 ÷ $1,700,000 = 0.091.

From Fig. 2 we find the "Corrective Ratio" to be 0.833; then the Corrected Difference = $155,000 × 0.933 = $129,115.

Corrected Limit = $1,700,000 + $129,115 = $1,829,115.

Profit = $1,829,115 — $1,575,500 = $253,615.

Percentage of total profit = $25,361,500 ÷ $1,575,500 = 16.1

From Fig. 1, we find the division of this profit to be as follows:

Contractor ................ 9.4%
Client .................... 6.7%

Total payment to Contractor = 109.4 × $1,575,500 = $1,723,597

Now let us investigate a case in which there is a diminution in the estimated quantities of materials.

Lump-sum limit tendered $1,700,000

Value of total work done per unit-price list and clause re unclassified work .................. $1,615,000

Total cost of work ....... $1,310,000

Difference = $1,700,000 — $1,615,000 = $85,000.

Ratio of Difference = $85,000 ÷ $1,700,000 = 0.05.

From Fig. 2 we find the "Corrective Ratio" to be 0.87, then the Corrected Difference = $85,000 × 0.87 = $73,950.

Corrected Limit = $1,700,000 — $73,950 = $1,626,050.

Profit = $1,626,050 — $1,310,000 = $316,050.

Percentage of total profit = $31,605,000 ÷ $1,310,000 = 24.1.

From Fig. 1 we find the division of profit to be as follows:

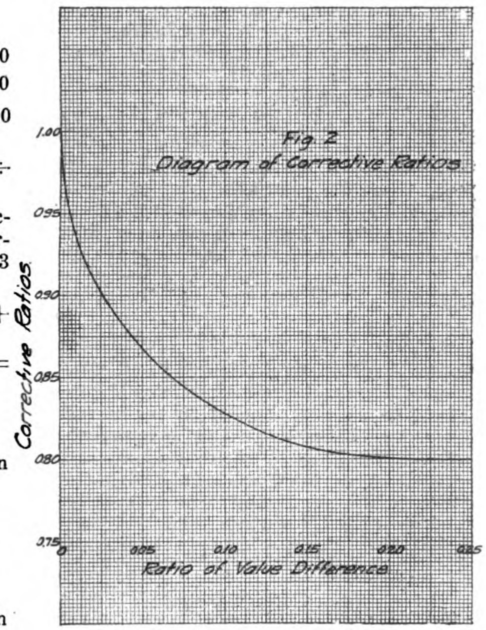
Contractor ................ 12.05%
Client .................... 12.05%

Total payment to Contractor = 1.1205 × $1,310,000 = $1,467,855.

The advantages of this method of contract-letting are as follows: *First:* While it is true that the client at the outset does not know exactly what the work is going to cost him, he is positive that it will *not* cost him more than a certain amount, provided that his engineer's estimate of quantities of materials is about right, as, generally speaking, it certainly ought to be.

*Second:* The client has the satisfaction of feeling that, even if, in his opinion, the limit bid by the contractor is excessive, and that the profit on the job, in consequence, will be too large, the said profit will be shared between them on a fifty-fifty basis.

*Third:* All the advantages of competitive bidding are retained by this method of tendering, because all that a bidder has to do is to name a limiting lump-sum with certain unit prices, and to make sure that the latter, when properly applied to the quantities of materials given in the specifications, will produce a total value equal to the said limiting lump-sum. All bids will be upon exactly the same basis, no modification of the stipulated method of tendering being permitted, hence the selection of the bidder will be governed solely by the lowest lump-sum named, provided, of course, that the one tendering it possesses the necessary experience, capital, plant, and general reputation for doing good and satisfactory work.




*Fourth:* The contractor, if he was not too keen in bidding, knows that there is almost no chance whatsoever of his losing money on the job, and that the harder and the more intelligently he works the greater will be his profit.

*Fifth:* The division of total profit given in the profit diagram is eminently equitable, in that, when the amount is small, nearly all of it goes to the contractor, and, as it augments, a continually-increasing proportion of it goes to the client, up to the point where the total profit amounts to 20 per cent., after which the partition is on a fifty-fifty basis. This point was selected as being the one above which a contract is generally deemed by contractors to be good, slightly below which it is only fair, and much below which it is bad; for it corresponds to a net profit of 10 per cent. That is as small a margin as is generally deemed safe for any bidder to tender upon, and yet it constitutes a satisfactory profit on a finished job. As for limiting the client's share of the profit to one-half—that is reasonable and just, because he would have no moral right to receive more than his partner, the contractor. If the client's share were allowed to increase beyond the point of equal division, it is conceivable that, with a very large prospective total profit, the contractor could save money for himself by making the work more expensive.

*Sixth*: The contractor will feel during the progress of the construction that the client is a partner on the job, and that, therefore, he and his engineers will not be likely to be unnecessarily severe in their requirements, also that they will permit the adoption of all legitimate expense-saving expedients, and will not demand too many frills on the finishing.

*Seventh*: Owing to the justice and equity involved by this method of contract-letting and profit-sharing, all concerned in the execution of the work will labor whole-heartedly and good-naturedly, avoiding petty squabbles and disagreements of all kinds; and the result will be earnest, honest effort, a satisfactory piece of construction, and the general contentment of both parties to the agreement.

### Adoption of Method

If this proposed method of contract-letting and profit-sharing be received with favor by engineers, architects, contractors and builders in general, it could easily be adopted as a standard for the country by calling a small convention with a single representative from each of the leading technical and railroad societies, contracting organizations, and bankers' associations, to discuss the advisability of adopting it (or else some modification of it) and to report the decision of the meeting to the said bodies for their approval. If any large group of clients, such as the railroad companies, were to adopt the method as standard and use it, very soon everybody having construction contracts to let would follow their example, thus making it the universal standard of contract-letting for our country—nor would it be long before other American countries would follow our lead, thus greatly simplifying our business relations.—*Contracting*.

## Where Is the Government in "Build Now"?

Since the signing of the armistice, one of the most important activities of the government has been the "Build Now" movement. Strange to say, in spite of government propaganda, the government itself has been singularly lax in its own attitude toward this movement.

Just as an instance: it is ten years since plans were approved for new buildings for the Departments of State, Justice, Labor and Commerce. To-day, official Washington is much hampered by lack of proper accommodations.

It seems strange that with all the active government propaganda in favor of the "Build Now" movement, federal and municipal authorities are not themselves undertaking construction work.

## Law Authorizing Licensing of Builders in Wisconsin

A LETTER concerning this important subject, received from Wm. D. Harper, Inspector of Buildings, Milwaukee, Wis., reads as follows:

I am pleased to send you copy of bill passed July 15, 1919, relating to the licensing of contractors, which reads as follows:—Sec. 1, of Chapter 435, Laws of 1913, is amended to read: Section 1. The Common Council of any city or the Village Board of any village, however incorporated, is hereby authorized and empowered by ordinance to license and regulate any person, firm or corporation employed or regularly engaged as a contractor or sub-contractor, for profit or gain, in the installing, erecting, constructing or altering of any electrical work or wiring in any building or part of building, or in the erecting, constructing, altering, remodeling or repairing of any building, part of building or structure in any such city or village, and to fix a fee for such license at a sum not less than one dollar nor more than twenty dollars per annum. Section 2. This act shall take effect and be in force from and after its passage and publication.

You will observe that this act does not compel the licensing of building contractors, but that its purpose is to legalize the action of any Village Board or the Common Council of any city, who, by ordinance, may determine to so license and regulate such contractors.

The general opinion among contractors in our city is in favor of licenses, and it is the intention to have an ordinance drafted and presented to the Common Council as early as possible providing for such licenses. You will also notice that the scope of this act is wide, and may be construed to cover and apply to all trades in building construction.

## The Strike Situation Today and Since January First

(*Concluded from page* 342)

latest report states that a decreasing efficiency of labor is noted. Among bankers canvassed by the *Tribune*, a loss of 20 per cent and up in productiveness was stated; 75 per cent of the state labor commissioners confirmed this, but put the loss from 10 per cent up.

In New York, a State Labor Board of nine has been decided on. The object of this Board will be to settle industrial disputes before matters reach the stage where production suffers. Certainly increased production is the only solution if the cost of living is to be reduced while wages remain at their present level.

## How to Finish Common Woods

(*Continued from page* 316)

of varnish, which may be rubbed or left in the gloss.

Considerable elm is full of sappy spots, which will show up lighter than the rest in the finish if not stained first; this is done after the filling and sandpapering, by taking a piece of soft cotton rag, a cup of water stain of either burnt umber or Vandyke brown, and applying this to the sap.

*Maple*.—The first coat is thin, white shellac varnish, and this to be followed by such number of coats of the same kind of shellac as the degree of excellence in finishing may require. Final coating, pale copal varnish. The color of this wood varies, ranging from light gray to near white. Staining is rarely done on maple, but a very pretty effect may be had by staining with copper as water. Oil should never be used on the bare maple wood, as it will darken the wood greatly in time. Shellac preserves the color at first, but time will change it to a rich golden hue. Avoid getting too much varnish on, the less the better; just enough to give a solid finish. Three or four coats of white shellac and one coat of white or pale copal is enough. The finish should be in gloss, as the dead finish does not bring out the beauty of the wood properly. The wood worker should have maple perfectly smooth for the finishing. Varnish should have ample time for drying; never rush maple finishing, if you wish the best effects. Dark varnish dries quicker than light, hence it is well that pale varnish must be used. Damar varnish is white, but will not do, too soft. What is called white or pale copal is right, and one coat of this for the finish will do. If you do apply more than one coat, let each coat stand four days before applying the next coat, and for a rubbing coat, such as should be just before the final coat, let it stand five days. If a dead finish is desired, rub down with pulverized rottenstone and water. Use a soft felt rubber.

*Mahogany*.—Coarse of grain, rather spongy wood, mahogany is rather bothersome to finish right. Requires paste filler, the filling must be done skillfully, filling wood level full, then shellac, orange shellac made thin. Rub this smooth with fine sandpaper, then another shellacing, another sandpapering, and finally two or three coats of varnish. Like elm, this wood has a fuzz, and it runs in opposite or two directions, making it difficult for the wood worker to get it smooth. Shellac these spongy places, after water staining the wood, not before. Then apply the paste filler, let this stand 24 hours, then sandpaper smooth with fine paper; 48 hours is better than 24. Make filler match color of the stain that is to be used. As a general thing it is best not to stain mahogany too dark, unless the wood is an inferior sort, when the stain does better dark in hiding defects and making the surface uniform.

(*To be concluded*)

# THE EDITOR'S PAGE

## What Kind of Contract Will Bring Lowest Cost to Owners?

"The cost-plus form of contract brings a lower cost to the owner," was the assertion made by J. P. H. Perry, vice-president of the Turner Construction Co., at a recent meeting of the American Society of Civil Engineers. In proof of this assertion Mr. Perry read data kept by his company showing that in most cases the average unit cost was lower under the cost-plus form of contract than under the lump sum contract. His explanation was that under the cost-plus form, both the contractor's and owner's interests are the same and that if the contractor can use a quicker and cheaper method, he is enabled to put it through. Under the lump sum contract, the owner is suspicious of every change suggested by the contractor, and the interests of the two are no longer the same. When changes by the owner are made, they come under the head of "extras," and cost more than when a more flexible form of contract is used.

This, of course, is true to a certain extent, yet experienced architects and engineers seem generally not to favor this form of contract. An investor naturally desires to know how much his building is going to cost him in order to be sure that the income will be commensurate with the investment.

It logically follows that a limit sum to be expended must be assured the investor if he is to look with favor upon any form of the cost-plus contract, either a cost-plus-a-fixed fee, or cost-plus-percentage. This has been done successfully in more than one case, notably by Gramatan Homes, a suburban New York firm of architects and builders specializing in country home work, which refuses to take a contract on any other basis.

Not only on large work is a saving possible by means of the cost-plus form of contract, but on small work also. In Newark, N. J., an owner who called for bids on a $20,000 house decided later to build on a cost-plus basis. In spite of the fact that materials and equipment were purchased from the most expensive firms in town, the completed cost of the building to the owner was less than the lowest contract price before quoted. This is unusual, yet such experiences as this and that of the Turner Construction Co. show that there is sound reason for believing that a cost-plus contract is fairer to both contractor and owner.

Certainly the lump sum contract is unfair to the contractor under the present rapidly changing material prices and wage scales. In self protection, he must either add a considerable amount to take care of contingencies that may arise or must have an agreement that will make some allowance for advancing wages and material prices. In fact, some contractors to-day will refuse to take a job except on a cost-plus basis, as they consider it too great a risk.

Of course much depends on the contractor's integrity. It is certainly unfair to insinuate that a contractor will run up his costs as high as possible on a percentage basis, for he is no more of a crook than the average business man, who has learned that he must be honest if his business is to succeed.

Undoubtedly there is a tendency for a contractor to put his fastest men on a lump sum job. But is there any reputable contractor so dishonest as to deliberately put all his "cripples" on the percentage job in order to run up the cost to the owner and encourage his men to loaf? Not if he expects to remain in business. Any capable architect would soon see that the work was being purposely slowed up, and that particular contractor would either have to speed up or he would be quietly boycotted by architects careful of their clients' interests.

The contractor is as honest as are his fellow business men, for it is to his best interests to be so. The crook does not stay in business, for he will be shunned as soon as his undependability is discovered. He must play fair with the public, his customers, whatever may be his manipulating or hard shrewdness. The contractor is no exception to this rule.

An excellent further discussion of this subject will be found on page 344.

## Contractors Suffer from Labor's Broken Contracts

Contractors are not the least sufferers from the many strikes to-day. Whereas a manufacturer can generally pass on to the consumer any added cost due to higher wages, the contractor is frequently bound by contracts that force him to continue operations with an increased cost that may wipe out all his profits and even cause an actual loss.

The situation would not be so bad were it not for the fact that Labor's contracts seem to be breakable at the will of Labor. Only too frequent in the trade is the breaking by Labor of contracts arrived at after fair and solemn agreement.

This lack of regard for the sanctity of a contract casts much disfavor on Labor, and causes its agreements to be distrusted. Labor is the loser, for a stigma always attaches to those who are undependable.

# Building Activity During August

The estimated value of permits granted during August, 1919, in 168 cities totals $169,858,941, a gain of 274 per cent over the August, 1918, total of $45,431,709.

Again the activity is widespread, 155 cities reporting increases as against 13 reporting losses. Southern cities report the largest gain, 445 per cent, with 37 out of 38 cities reporting increases. Eastern cities follow with 338 per cent, 55 out of 60 reporting gains. Middle state cities show a gain of 214 per cent, 41 out of 47 reporting increases; and western cities show 94 per cent gain, 22 out of 23 reporting increases.

It is significant that the volume of construction for which permits were granted during August, 1919, is 27 millions greater than for July, 1919, when 174 cities reported, showing that the industry is in the main in a fairly healthy condition.

Strikes have acted as a strong deterrent to construction during the past month, and many buildings have been held up. The labor situation, even more than the higher level of material prices, has been a disturbing influence in the trade, especially in cities where the unions have broken their contracts, as did the Painters' Union in New York. Breaches of faith such as this cause builders to hesitate to accept contracts on the usual lump sum basis, preferring the cost-plus-percentage or cost-plus-a-fixed-fee as being safer.

Costs have increased very appreciably since the first of the year, due to increases in wages and materials. There has been much talk of profiteering by material manufacturers and dealers, but so far no proof has been advanced of any concerted effort to advance prices. A commission appointed by the State of Illinois recently investigated material prices in that state; it found satisfactory evidence that prevailing prices were justifiable under present economic conditions. The present high prices will remain either until there is a decided lowering in the general scale of labor, or until more economical methods of construction are evolved.

CITIES IN EASTERN STATES

| | August, 1919 | | | | August, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Albany, N. Y. | 30 | $257,625 | 192 | $74,830 | 15 | $12,275 | 107 | $30,317 |
| *Allentown, Pa. | 28 | 218,300 | 20 | 8,365 | 10 | 35,600 | 2 | 1,500 |
| *Altoona, Pa. | 30 | 104,204 | 68 | 22,005 | 1 | 1,000 | 47 | 12,457 |
| *Atlantic City, N. J. | 28 | 435,661 | 38 | 27,135 | ... | ... | 34 | 11,380 |
| *Auburn, N. Y. | 18 | 30,725 | ... | ... | 5 | 28,900 | ... | ... |
| *Binghamton, N. Y. | 207 | 59,586 | ... | ... | 102 | 49,834 | ... | ... |
| *Bayonne, N. J. | 57 | 241,010 | ... | ... | 15 | 85,448 | ... | ... |
| *Boston, Mass. | 96 | 2,335,175 | 491 | 720,088 | 43 | 307,805 | 336 | 452,962 |
| *Bridgeport, Conn. | 150 | 628,341 | ... | ... | 5 | 28,900 | ... | ... |
| *Brockton, Mass. | 35 | 45,885 | ... | ... | 26 | 44,505 | ... | ... |
| Buffalo, N. Y. | 672 | 1,503 | 115 | 148 | 455 | 874,000 | ... | ... |
| Camden, N. J. | 111 | 722,780 | ... | ... | 53 | 2,734,634 | ... | ... |
| *Chelsea, Mass. | 18 | 122,125 | ... | ... | 16 | 69,700 | ... | ... |
| *Easton, Pa. | 12 | 74,258 | 11 | 8,588 | 3 | 7,875 | 5 | 745 |
| *East Orange, N. J. | 77 | 420,256 | ... | ... | 29 | 56,798 | ... | ... |
| *Elizabeth, N. J. | 99 | 402,512 | ... | ... | 31 | 50,565 | ... | ... |
| Erie, Pa. | 84 | 204,665 | 51 | 64,153 | 60 | 323,750 | 32 | 25,204 |
| *Fall River, Mass. | 25 | 89,990 | 30 | 45,520 | 18 | 21,625 | 11 | 35,425 |
| Fitchburg, Mass. | 21 | 52,910 | 12 | 3,490 | 9 | 7,535 | 10 | 114,770 |
| *Harrisburg, Pa. | 49 | 186,915 | ... | ... | 14 | 15,075 | ... | ... |
| *Hartford, Conn. | 119 | 438,617 | ... | ... | 98 | 177,870 | ... | ... |
| *Haverhill, Mass. | 24 | 39,075 | ... | ... | 3 | 1,700 | ... | ... |
| *Hoboken, N. J. | 3 | 17,500 | 15 | 11,794 | 3 | 2,400 | 8 | 2,850 |
| *Holyoke, Mass. | 44 | 298,150 | ... | ... | 9 | 25,850 | ... | ... |
| *Lawrence, Mass. | 24 | 127,200 | 19 | 44,225 | 19 | 38,770 | 20 | 75,950 |
| *Lowell, Mass. | 56 | 158,065 | 43 | 59,675 | 23 | 34,280 | 34 | 27,525 |
| *Manchester, N. H. | 54 | 105,660 | 52 | 22,765 | 21 | 7,015 | 31 | 20,180 |
| *Medford, Mass. | 38 | 71,255 | ... | ... | 25 | 28,870 | ... | ... |
| *Newark, N. J. | 263 | 1,425,503 | ... | ... | 164 | 357,240 | ... | ... |
| *New Bedford, Mass. | 71 | 1,071,500 | ... | ... | 37 | 113,825 | ... | ... |
| *New Haven, Conn. | 159 | 625,977 | ... | ... | 91 | 180,420 | ... | ... |
| New York: | | | | | | | | |
| *Manhattan | 40 | 20,425,600 | 310 | 5,767,675 | 16 | 424,000 | 226 | 1,129,437 |
| *Bronx | 166 | 2,702,300 | 267 | 399,630 | 11 | 73,050 | 125 | 427,187 |
| *Brooklyn | 683 | 9,466,070 | 659 | 1,274,699 | 182 | 1,521,035 | 627 | 468,747 |
| *Queens | 1284 | 5,458,033 | ... | ... | 438 | 893,660 | ... | ... |
| *Richmond | 135 | 675,464 | ... | ... | 58 | 160,749 | ... | ... |
| *Niagara Falls, N. Y. | 72 | 283,490 | 21 | 28,364 | 41 | 220,020 | 11 | 11,550 |
| *Nutley, N. J. | 20 | 59,665 | 11 | 1,749 | 5 | 10,000 | 8 | 385 |
| *Passaic, N. J. | 20 | 207,925 | 12 | 5,375 | 10 | 113,150 | .17 | 10,400 |
| *Paterson, N. J. | 179 | 727,346 | ... | ... | 89 | 123,373 | ... | ... |
| *Philadelphia, Pa. | 1509 | 6,019,560 | ... | ... | 516 | 1,931,390 | ... | ... |
| *Pittsburgh, Pa. | 488 | 2,227,086 | 112 | 175,162 | 249 | 825,456 | 73 | 84,827 |
| *Portland, Me. | 39 | 298,870 | 35 | 40,525 | 13 | 34,000 | 22 | 20,810 |
| *Quincy, Mass. | 83 | 191,325 | ... | ... | 76 | 93,133 | ... | ... |
| *Reading, Pa. | 54 | 146,550 | 159 | 121,600 | 27 | 33,300 | 111 | 16,450 |
| *Rochester, N. Y. | 270 | 981,238 | 150 | 223,119 | 71 | 240,040 | 81 | 70,056 |
| *Salem, Mass. | 35 | 34,095 | ... | ... | 46 | 19,604 | ... | ... |
| *Schenectady, N. Y. | 74 | 281,020 | 18 | 4,180 | 28 | 69,965 | 21 | 17,831 |
| *Scranton, Pa. | 44 | 197,823 | ... | ... | 9 | 9,925 | ... | ... |
| *Somerville, Mass. | 32 | 231,380 | ... | ... | 19 | 20,000 | ... | ... |
| *Springfield, Mass. | 170 | 676,556 | ... | ... | 65 | 99,035 | ... | ... |
| *Syracuse, N. Y. | 115 | 494,460 | 74 | 96,720 | 56 | 322,410 | 83 | 51,979 |
| *Trenton, N. J. | 94 | 360,506 | ... | ... | 36 | 63,555 | ... | ... |
| *Troy, N. Y. | 3 | 182,000 | 37 | 25,060 | 28 | 20,030 | ... | ... |
| *Utica, N. Y. | 29 | 263,050 | 7 | 14,300 | 19 | 72,275 | 9 | 17,465 |
| *West Hoboken, N. J. | 28 | 10,669 | ... | ... | 7 | 9,800 | ... | ... |
| Wilkes-Barre, Pa. | 70 | 47,980 | ... | ... | 42 | 217,298 | ... | ... |
| *Worcester, Mass. | 176 | 818,757 | 92 | 420,565 | 67 | 285,645 | 56 | 118,715 |
| *York, Pa. | 16 | 52,228 | 41 | 17,738 | 4 | 2,890 | 30 | 8,075 |
| *Yonkers, N. Y. | 49 | 168,000 | ... | ... | 18 | 108,000 | ... | ... |
| | 8679 | $64,701,974 | 3162 | $9,729,242 | 3649 | $13,740,852 | 2177 | $3,265,179 |

CITIES IN WESTERN STATES

| | August, 1919 | | | | August, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Berkeley, Cal. | 26 | $106,915 | 71 | $32,895 | 8 | $19,150 | 40 | $12,557 |
| *Boise, Idaho | 6 | 88,200 | 12 | 15,485 | ... | ... | 25 | 6,086 |
| *Butte, Mont. | 72 | 67,000 | 52 | 17,600 | 81 | 52,300 | ... | ... |
| *Col. Spgs., Col. | 11 | 4,145 | 13 | 7,636 | 7 | 3,925 | 5 | 1,850 |
| *Denver, Col. | 158 | 631,750 | 120 | 59,150 | 80 | 181,850 | 80 | 41,450 |
| *Eureka, Cal. | 5 | 3,500 | 5 | 2,500 | 4 | 2,060 | 3 | 800 |
| *Fresno, Cal. | 73 | 224,920 | 43 | 32,227 | 32 | 56,001 | 48 | 59,602 |
| *Long Beach, Cal. | 224 | 392,482 | ... | ... | 223 | 243,599 | ... | ... |
| *Los Angeles, Cal. | 732 | 2,068,484 | 342 | 333,960 | 341 | 600,266 | 228 | 163,313 |
| *Missoula, Mont. | 9 | 107,300 | ... | ... | ... | ... | ... | ... |
| *Oakland, Cal. | 298 | 871,282 | 123 | 50,099 | 194 | 871,756 | 82 | 29,721 |
| *Pasadena, Cal. | 30 | 102,336 | 79 | 40,044 | 12 | 17,579 | 37 | 16,951 |
| *Portland, Ore. | 835 | 780,320 | ... | ... | 416 | 728,970 | ... | ... |
| *Pueblo, Col. | 53 | 84,700 | ... | ... | 39 | 27,069 | ... | ... |
| *Salt Lake City, Utah | 83 | 409,875 | 26 | 63,650 | 25 | 161,725 | 27 | 41,575 |
| *Sacramento, Cal. | 112 | 211,337 | ... | ... | 62 | 28,557 | ... | ... |
| San Diego, Cal. | 125 | 131,160 | ... | ... | 125 | 524,018 | ... | ... |
| *San Francisco, Cal. | 111 | 2,245,608 | 436 | 320,251 | 61 | 663,262 | 263 | 205,266 |
| *San Jose, Cal. | 41 | 156,571 | ... | ... | 18 | 10,200 | ... | ... |
| *Seattle, Wash. | 1356 | 1,858,205 | ... | ... | 1331 | 1,009,015 | ... | ... |
| *Spokane, Wash. | 87 | 91,325 | 62 | 102,800 | 40 | 17,497 | 17 | 51,174 |
| *Stockton, Cal. | 64 | 189,787 | ... | ... | 69 | 76,098 | ... | ... |
| *Tacoma, Wash. | 499 | 257,719 | 289 | 118,719 | 283 | 243,755 | 122 | 41,775 |
| | 5010 | $11,034,921 | 1673 | $1,197,016 | 3451 | $5,538,652 | 977 | $672,120 |

*Indicates increase.

CITIES IN MIDDLE STATES

| | August, 1919 | | | | August, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Akron, Ohio | 617 | $2,058,233 | ... | ... | 187 | $284,925 | ... | ... |
| *Canton, Ohio | 171 | 576,838 | ... | ... | 76 | 145,655 | ... | ... |
| *Cedar Rapids, Iowa | 38 | 140,000 | 12 | $18,000 | 16 | 50,000 | 6 | $22,000 |
| *Chicago, Ill. | 288 | 4,960,400 | ... | ... | 247 | 4,635,900 | ... | ... |
| *Cincinnati, Ohio | 1253 | 1,208,485 | ... | ... | 936 | 323,410 | ... | ... |
| *Cleveland, Ohio | 1243 | 7,495,975 | ... | ... | 835 | 2,300,960 | ... | ... |
| *Columbus, Ohio | 223 | 648,115 | 101 | 115,715 | 68 | 247,450 | 57 | 57,575 |
| Davenport, Iowa | 115 | 170,848 | ... | ... | 76 | 209,178 | ... | ... |
| *Dayton, Ohio | 193 | 1,087,422 | 71 | 45,570 | 100 | 414,491 | 28 | 18,915 |
| *Decatur, Ill. | 59 | 183,650 | 28 | 20,525 | 14 | 40,725 | 6 | 2,000 |
| Des Moines, Iowa | 145 | 863,210 | ... | ... | 31 | 874,529 | ... | ... |
| *Detroit, Mich. | 1923 | 8,767,135 | 552 | 1,112,230 | 668 | 1,002,898 | ... | ... |
| *Dubuque, Iowa | 18 | 134,615 | ... | ... | 2 | 1,220 | ... | ... |
| *Duluth, Minn. | 247 | 899,301 | ... | ... | 117 | 179,416 | ... | ... |
| *East St. Louis, Ill. | 52 | 131,740 | ... | ... | 20 | 63,585 | ... | ... |
| *Evansville, Ind. | 104 | 93,869 | ... | ... | 63 | 32,911 | ... | ... |
| *Ft. Wayne, Ind. | 46 | 272,765 | 14 | 21,255 | 16 | 29,400 | 8 | 2,500 |
| *Grand Rapids, Mich. | 176 | 458,805 | ... | ... | 98 | 192,535 | ... | ... |
| *Hamilton, Ohio | 30 | 128,748 | 26 | 23,761 | 58 | 87,600 | 18 | 7,672 |
| *Indianapolis, Ind. | 376 | 2,450,491 | 33 | 151,006 | 196 | 845,422 | 235 | 85,972 |
| *Jackson, Mich. | 64 | 133,910 | 15 | 18,775 | 22 | 31,542 | 23 | 20,145 |
| Joplin, Mo. | 12 | 27,500 | 8 | 4,675 | 14 | 30,275 | 6 | 4,350 |
| *Kansas City, Mo. | 395 | 1,122,225 | ... | ... | 158 | 276,950 | ... | ... |
| *Lansing, Mich. | 139 | 275,895 | 28 | 10,700 | 26 | 12,555 | 14 | 5,680 |
| *Lincoln, Neb. | 52 | 461,700 | ... | ... | 17 | 26,650 | ... | ... |
| *Milwaukee, Wis. | 397 | 1,144,898 | ... | ... | 232 | 348,300 | ... | ... |
| *Minneapolis, Minn. | 739 | 2,152,265 | ... | ... | 284 | 319,815 | ... | ... |
| *Omaha, Neb. | 160 | 783,110 | ... | ... | 88 | 311,440 | ... | ... |
| *Peoria, Ill. | 48 | 161,275 | 46 | 43,050 | 29 | 68,035 | 58 | 22,450 |
| *Quincy, Ill. | 5 | 165,200 | ... | ... | ... | ... | ... | ... |
| *Richmond, Ind. | 15 | 86,696 | 9 | 4,875 | 2 | 550 | 16 | 7,112 |
| *Saginaw, Mich. | 233 | 283,312 | ... | ... | 63 | 108,553 | ... | ... |
| *St. Louis, Mo. | 410 | 2,585,060 | 409 | 767,868 | 157 | 408,650 | 268 | 263,250 |
| St. Joseph, Mo. | 49 | 58,910 | ... | ... | 28 | 94,480 | ... | ... |
| *St. Paul, Minn. | 293 | 997,040 | ... | ... | 107 | 343,418 | ... | ... |
| *Sioux City, Iowa | 109 | 2,013,415 | ... | ... | 48 | 119,250 | ... | ... |
| South Bend, Ind. | 100 | 45,055 | ... | ... | 174 | 155,783 | ... | ... |
| Superior, Wis. | 112 | 74,735 | ... | ... | 88 | 336,415 | ... | ... |
| *Springfield, Ill. | 25 | 91,425 | 36 | 27,275 | 8 | 14,100 | 25 | 14,250 |
| *Springfield, Ohio | 155 | 384,930 | ... | ... | 16 | 24,650 | ... | ... |
| *Springfield, Mo. | 22 | 48,150 | 13 | 13,075 | 4 | 875 | 11 | 2,800 |
| *Terre Haute, Ind. | 46 | 46,490 | 29 | 9,715 | 45 | 35,715 | 18 | 6,280 |
| *Toledo, Ohio | 404 | 1,041,498 | ... | ... | 159 | 296,648 | ... | ... |
| *Topeka, Kan. | 27 | 181,123 | 14 | 34,320 | 16 | 12,976 | 4 | 2,000 |
| *Wichita, Kan. | 112 | 316,705 | ... | ... | 114 | 194,120 | ... | ... |
| *Youngstown, Ohio. | 244 | 1,603,496 | 40 | 75,975 | 129 | 319,020 | 19 | 13,922 |
| *Zanesville, Ohio | 7 | 8,596 | 2 | 2,300 | 1 | 2,500 | 1 | 500 |
| | 11,691 | $49,025,259 | 1786 | $2,520,665 | 5844 | $15,855,475 | 831 | $559,375 |

CITIES IN SOUTHERN STATES

| | August, 1919 | | | | August, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Atlanta, Ga. | 67 | $742,300 | 170 | $150,204 | 19 | $93,850 | 146 | $72,656 |
| *Augusta, Ga. | 38 | 134,305 | 167 | 52,741 | 6 | 19,110 | 107 | 13,872 |
| *Baltimore, Md. | 493 | 2,061,800 | 1030 | 514,605 | 121 | 439,238 | 249 | 113,500 |
| *Birmingham, Ala. | 126 | 428,178 | 253 | 72,108 | 43 | 37,960 | 181 | 32,264 |
| Charleston, S. C. | 18 | 43,450 | 10 | 4,365 | 8 | 72,500 | 12 | 8,910 |
| *Chattanooga, Tenn. | 157 | 93,206 | ... | ... | 132 | 24,295 | ... | ... |
| *Covington, Ky. | 16 | 37,800 | 12 | 54,100 | 5 | 7,550 | 4 | 6,550 |
| *Dallas, Tex. | 115 | 2,347,500 | 59 | 189,900 | 29 | 82,258 | 20 | 58,830 |
| *El Paso Tex. | 73 | 72,866 | ... | ... | 67 | 39,135 | ... | ... |
| *Fort Smith, Ark. | 15 | 66,975 | 10 | 7,675 | 2 | 5,050 | 10 | 7,146 |
| *Fort Worth, Tex. | 210 | 3,414,190 | ... | ... | 83 | 206,480 | ... | ... |
| *Galveston, Tex. | 485 | 58,375 | ... | ... | 376 | 16,036 | ... | ... |
| *Jacksonville, Fla. | 31 | 166,070 | 28 | 91,095 | 14 | 132,550 | 20 | 33,325 |
| *Houston, Tex. | 134 | 683,738 | 271 | 60,952 | 70 | 252,930 | 151 | 25,566 |
| *Huntington, W. Va. | 83 | 387,255 | ... | ... | 32 | 34,130 | ... | ... |
| *Knoxville, Tenn. | 17 | 487,117 | 82 | 86,610 | ... | ... | 64 | 24,865 |
| *Lexington, Ky. | 30 | 650,000 | 31 | 46,505 | 12 | 15,000 | ... | ... |
| *Little Rock, Ark. | 96 | 520,056 | ... | ... | 61 | 64,145 | ... | ... |
| *Louisville, Ky. | 63 | 353,300 | 124 | 77,230 | 24 | 104,185 | 61 | 33,465 |
| *Memphis, Tenn. | 158 | 1,297,125 | ... | ... | 55 | 107,440 | ... | ... |
| *Miami, Fla. | 77 | 261,000 | ... | ... | 53 | 133,700 | ... | ... |
| *Muskogee, Okla. | 11 | 20,083 | ... | ... | 1 | 400 | ... | ... |
| *Nashville, Tenn. | 60 | 203,260 | 255 | 74,777 | 34 | 18,350 | 289 | 28,559 |
| *New Orleans, La. | 41 | 245,450 | 48 | 131,592 | 36 | 134,990 | 26 | 70,483 |
| *Norfolk, Va. | 94 | 880,463 | 14 | 28,395 | 52 | 256,975 | 5 | 13,950 |
| *Oklahoma City, Okla. | 132 | 682,335 | ... | ... | 56 | 109,280 | ... | ... |
| *Pensacola, Fla. | 8 | 495,550 | 120 | 67,702 | 4 | 3,900 | 126 | 13,606 |
| *Pine Bluff, Ark. | 6 | 11,600 | 6 | 19,400 | ... | ... | ... | ... |
| *Richmond, Va. | 106 | 1,798,071 | 80 | 76,384 | 26 | 94,488 | 74 | 90,734 |
| *Roanoke, Va. | 68 | 64,570 | ... | ... | 22 | 20,230 | ... | ... |
| *San Antonio, Tex. | 240 | 408,502 | ... | ... | 215 | 216,720 | ... | ... |
| *Savannah, Ga. | 51 | 235,200 | 11 | 8,250 | 18 | 24,950 | 2 | 1,850 |
| *Shreveport, La. | 137 | 318,980 | ... | ... | 63 | 34,450 | ... | ... |
| *Tampa, Fla. | 21 | 41,405 | 76 | 22,810 | 13 | 17,930 | 41 | 8,195 |
| *Tulsa, Okla. | 144 | 837,725 | 48 | 34,160 | 44 | 183,881 | 32 | 23,920 |
| *Washington, D. C. | 344 | 2,962,750 | 426 | 316,277 | 108 | 600,820 | 304 | 350,750 |
| *Wheeling, W. Va. | 27 | 5,395,200 | 20 | 7,815 | 8 | 308,200 | 10 | 1,400 |
| *Wilmington, Del. | 131 | 996,462 | ... | ... | 61 | 892,554 | ... | ... |
| | 4123 | $29,404,212 | 3351 | $2,195,652 | 1973 | $4,755,660 | 1934 | $1,044,396 |

# What Is a Fair House Rent?

## Contractors and Architects Should Be Able to Advise Clients—Data Showing How to Calculate a Fair Rent

By Leslie H. Allen*

LANDLORDS all over the country are in trouble with their tenants, because they find it necessary to raise rents. Ordinarily it is a mere question of supply and demand, and many a landlord has boosted his figures about as much as he thought the "traffic would bear". But when we examine the real facts in the situation, what do we find? While there have been many cases of apparent extortion, the fact remains that rents have increased, on the average, not over 20 per cent, in a period which has seen food, clothing and other items of expense go up from 75 to 150 per cent. Because other things have increased in price is no reason for advancing rents. But how is the building owner situated with respect to operating costs on his property?

As a typical case, let us consider a two-family house built in 1900, which has five rooms downstairs and seven rooms upstairs. It cost the owner $6,500 of which $1,000 was land and $5.500 was house complete. He invested $3,000 cash and placed the other $3,500 on a mortgage. His assessment on the property was $5,000. What rent should he obtain from the two "halves" of the house? The fact that he actually rented these two portions at $25 and $30 respectively, or a total of $55, has no direct bearing on the answer to the above question, for it furnishes no evidence that the owner properly analyzed his costs or made adequate allowance for the future.

### *Analysis of Actual Cost to Owner*

Let us examine the owner's costs and what ought to be his earnings, both in the light of prices and conditions as they existed in the first fifteen years of this century, what they are to-day and what promises to be to-morrow's scale.

His mortgage at 6 per cent (the prevailing rate in 1900 to 1915) would cost him $210 per year. His taxes at $20 per thousand per year would cost him $100. If we allow $25 for insurance and water, this makes standing fixed charges of $335 per year, which have been practically maintained year after year, with only slight upward changes during the past few months. His minor repairs, which may be estimated at about $20 a year under the old conditions are now at least $35 for identically the same amount of work. While the growing decay of the house would normally make repairs much more necessary to-day than ten or fifteen years ago, this figure of $35 will be used in the comparison. There is no janitor, and each tenant provides his own heat.

*Aberthaw Construction Co.

Any building owner who rents his property must pay from that rental his mortgage, interest, insurance and water rates and the minor repairs necessary from time to time. Ordinarily those are the only items considered in arriving at a proper rental figure; but the owner, who is something of a financier—using the word in the most commendatory sense—looks farther ahead than this. He knows that the outside of his house requires painting every three years; that the inside requires painting and papering every ten years. He knows that in twenty years, more or less, he will have to put in new furnaces, put on a new roof and thoroughly overhaul his entire system of plumbing. It is these items of infrequent occurrence, but of large aggregate amount, which the ordinary small house owner or landlord fails to appraise or appreciate until they strike him a knock-out blow by their sudden necessity.

### *Increase in Up-keep Costs*

The cost of painting the outside of the house, which would have been about $150 in the earlier years, would be around $320 to-day. The cost of papering and painting the inside has likewise advanced from about $300 to $500. The installation of two new furnaces, one for each tenant, would have cost about $200 ten or twelve years ago; to-day they cannot be put in for less than $300. If new roofing had been required before prices went up it would have cost about $220; to-day the figure would be nearer $360. New plumbing, insofar as renovation would be necessary at the end of twenty years, would to-day cost no less than $600, in place of the $400 before the war.

### *Allowing for Infrequent Repairs Essential*

These items, occurring at infrequent intervals, would not show in the owner's balance sheet normally until they had to be met. The farsighted owner, however, would make provision in advance, count up his cost, measure his host and provide in his rent each year's pro rata share for each of these several items, which he knows are coming on as relentlessly as death and taxes. Under the earlier schedule of prices, as well as under the new, his yearly carrying charge for these items will be about as follows:

| | 1910 | 1920 |
|---|---|---|
| Painting outside of house | $50.00 | $107.00 |
| Painting and papering inside | 30.00 | 50.00 |
| New heating plant | 10.00 | 15.00 |
| New roofing | 11.00 | 18.00 |
| Renovating plumbing | 20.00 | 30.00 |
| Minor repairs, annual | 20.00 | 35.00 |
| | $141.00 | $255.00 |

During the period of low prices, now well behind us, the owner would have required $476 per year to cover his interest, taxes, insurance, water and the pro rata share of the renovations covered in the above table. In addition to this, he should have had enough income from the house to pay him a satisfactory percentage upon his investment of $3,000 cash. What should this percentage of return be?

### *Can Money Be Invested to Better Advantage Than in Real Estate?*

He could have invested his money in the early years of this century in any one of a number of thoroughly good stocks which would have paid upward of 6 per cent, and would have incurred no business risk—no risk of vacancies, no risk of dissolving in smoke and no risk of sudden damage from any one of a dozen sources which might affect the house. If it be assumed that insurance would take care of his fire risk, let us remember that while it might reimburse him for the actual cost of his building, it would not pay him his rental during the six months' period of rebuilding, all of which would be a total loss. To cover all of these items, it would only be fair for the owner to obtain perhaps 10 per cent upon the actual cash investment of $3,000. Adding to this $300 to his average annual outlay, we find that the rent of the two parts of the building under the old condition of prices should have brought some $776, or approximately $65 per month. This might be split into $30 and $35 respectively for the two parts of the house, or $5 more for each part than was actually charged in the case under consideration.

As the owner has not received what we shall have to recognize as an adequate rental during the earlier years of the life of his building, he has not been able to accumulate a fund for depreciation as the building gradually wears out. This being the case, his rebuilding or renovating program must necessarily come from capital rather than from previous earnings, and this definitely adds to his actual investment in the property—an addition which should share equitably in the annual earnings. Unless such a property has earned enough to provide in advance for contingencies, it is not on a healthy or thoroughly stable basis, and cannot be expected to act as a stimulant to the investment of money in such enterprises.

With the present high prices for every element entering into repairs and upkeep, the condition has changed considerably. In place of $141 for renewals, we find that such renewals as will have to be made from now on should be provided for at the rate of $255 per year. This makes his total fixed charges, so to speak, $590 per year. Adding his normal 10 per cent return on his investment, we have a total of $890 per year or $74 per month. This might be apportioned at $34 and $40 for the two parts of the building, and even then does not cover the failure of past rentals to provide for the present high prices of roofing, plumbing and heating renewals. But the owner has carried the building more than fifteen years at a rate altogether too low to permit him to make the necessary renewals under present prices, and still come out whole on his investment. If, therefore, he were to raise the rent to say $80, or $36 and $44 for the two parts of the house, which is not quite 50 per cent above the old rental figures, he would be obtaining for his property no more than it should bring him.

It will be noted that his $55 per month, or $660 per year, leaves him only $70 per year as return on his investment, when present prices are considered. This is only 2⅓ per cent. Will any one argue that that is a fair return on money invested in an enterprise of ordinary business hazard?

There appears no indication that costs of operating and maintaining buildings will diminish. The cost of labor is continually rising, and it may well be that next year will see the upkeep figures decidedly higher than they are to-day, with a correspondingly greater deficit to be made up, due to insufficient rents in the past years.

It may perhaps be unreasonable to expect tenants to look at the matter from this point of view. They have been accustomed to apportioning their outgo on the basis of a certain amount for rent and certain other amounts for other purposes. An increase of 40 or 50 per cent in one of the major items of expenditure will inevitably call forth strenuous protests. (We have been accustomed to consider rent as absorbing from one-fifth to one-fourth of wages and of small salaries.) Pure fairness, however, Mr. Allen maintains, requires that both sides of the question be examined and that a rental be fixed which will be fair alike to the owner and to the tenant. The average tenant would reject with scorn any suggestion that he pay a portion of the proper rent and receive the balance as a charity gift. Yet that is exactly the situation, when he pays less than the property ought in all fairness to bring, however strong his disinclination to pay more than he has been paying in the past.

Because rents are now too low on buildings, and because of the tenants' opposition to permitting them to reach a logical figure, building for renting purposes holds no attraction for investors. The cost of construction is so much higher to-day than it was at the time our example was erected that a fair rental on a new building would be much higher than on the old. This is precisely a fact which tenants do not desire to recognize; but just as long as money has to be spent in the upkeep of a building and to pay for taxes and insurance on the building, and interest on money borrowed for its erection, just so long will it be necessary to fix a rental high enough to cover all of these items, and leave a fair profit for the man who provides the housing accommodation.

# Material Conditions

## *Prices Have Reached Their Peak—Strikes Hamper the Trade*

"Prices of lumber have about reached their peak"—that is the feeling of dealers. They are very firm and no recession is looked for, during the rest of this year. Trade in both wholesale and retail branches of the lumber industry is good but before wholesalers will quote on a bill of goods, they still have to wire the mill to find out if the price has jumped since they last received a quotation. Yards in the larger cities are not as busy as yards in the suburban sections where the benefits of considerable home buildings are being felt. City yards have to be content with a considerable volume of alteration jobs.

In regard to the strike in the retail yards of the Brooklyn and East New York sections, workers "blushingly" demanded $0.75 an hour, eight-hour day, and time and a half for overtime. They now receive from $20 to $28 a week, for a ten-hour day. This is a typical condition, not only in the yards but in the contracting field.

Shortage of stocks of lumber both in retail yards and at manufacturing points still is the rule.

To-day finds all branches of the lumber industry trying to solve higher prices. Each is trying to look into the future and do "its little bit" to bring prices down. It is generally felt that the manufacturers who are guaranteeing their prices to last for 30-day periods have gone a long way to solve the immediate problem—stabilization.

However, of all the theories propounded by modern Socrates, probably the one that sounds the most logical is increase your production. This would solve to some extent high labor costs. With the supply overshadowing the demand, prices would be lowered.

There is a feeling throughout the trade that if high prices continue, the building trade will not receive many of the benefits of a prosperous 1920. Stock of desirable items is very scarce and it is reported in the New York section that many houses are complete except they are shy of flooring and inside trim. The shortage of these items is so acute that if nothing else tends to halt building here this will.

Pacific Coast mills are the nearest to normal production. Other mills seem only to be able to reach 50 to 65 per cent of their normal production.

Although the structural steel market is said to be fairly active, the average of the new bookings is thought to be somewhat lower than in July and August. It is generally anticipated, however, that a large number of important structural projects will be released for estimates and placed under contract during the next month or so, and these projects will do much toward increasing interest in the fabricated steel market. Fabricated steel prices are firm and unchanged.

There has been a decided improvement in the cast iron pipe market over the conditions that maintained just a few weeks ago. Although not many important contracts have been placed, there have been a number of tonnage sales of fair size, and prices are being well maintained.

There has been no material change in the linseed oil situation. Oil is still scarce and the demand is firm and increasing. Prices are strong at the levels established a few weeks ago, and there is no possibility of a recession in selling price at wholesale until the crushers are able to deliver oil from the new seed crop that is now coming through. The only change anticipated in the market after the new supply becomes available is that oil will be more easily obtainable than at present, but prices are extremely likely to remain at their current high levels for some months. Although the fall is rapidly approaching, there is no slackening in the demand for linseed oil, and according to the reports of new building operations planned, the demand will continue strong throughout the winter months.

A. C. S.

# Ice Used to Make Large Cavities in Concrete

Up to the present it has only been possible to make small cavities in concrete, but under a new German patent much larger ones can be made. Pieces of ice, corresponding to the measurements of the cavity required, are embedded in the concrete mass, and small channels are introduced to allow of the rapid drawing-off of the melted ice. In this way not only small concrete constructions, such as pillars, stairs, and beams, can be supplied with a hollow space, but large fixed blocks can be supplied with several chambers, such as are required for walls of houses or ships. The process is of particular advantage in reinforcing concrete with iron. The iron parts are not built in during the stamping, but are attached to the ice blocks before the work is begun, which increases its strength. The continual moistening which is required when working on concrete or cement is unnecessary in the new process, as the loss by evaporation is made good by the melted ice, which ensures a complete hardening of the concrete mass. The process can also be applied to artificial stone.—*Iron Monger.*

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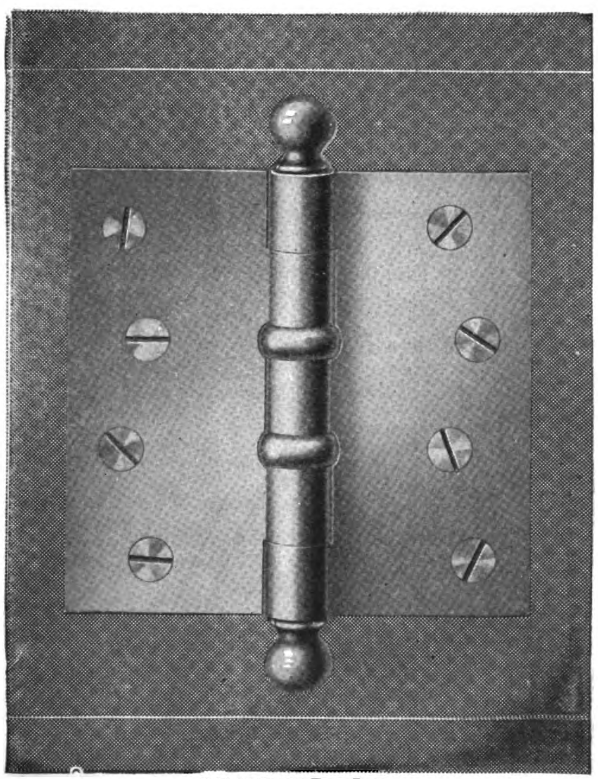

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Formerly Carpentry and Building, Founded 1879

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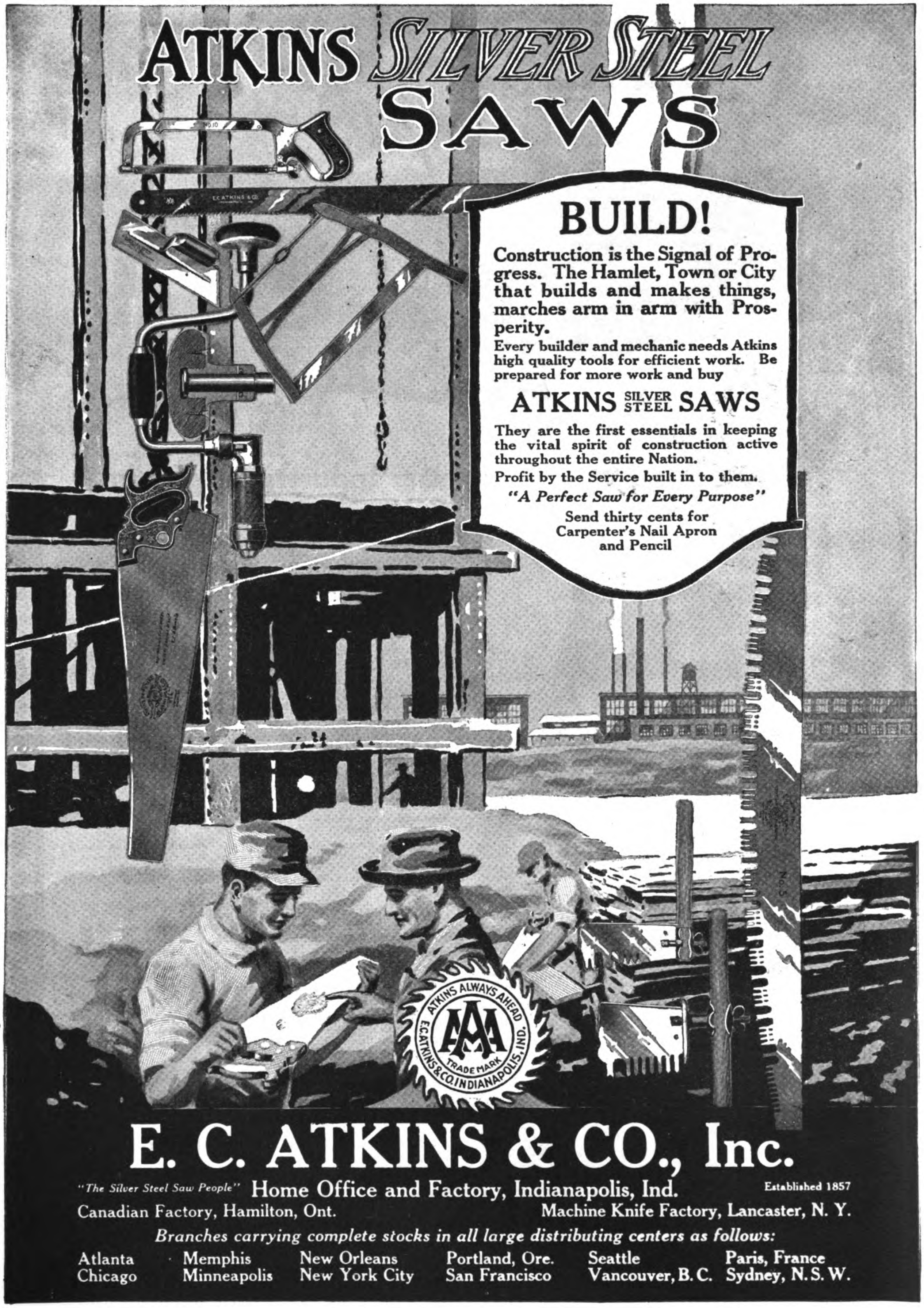
## Contents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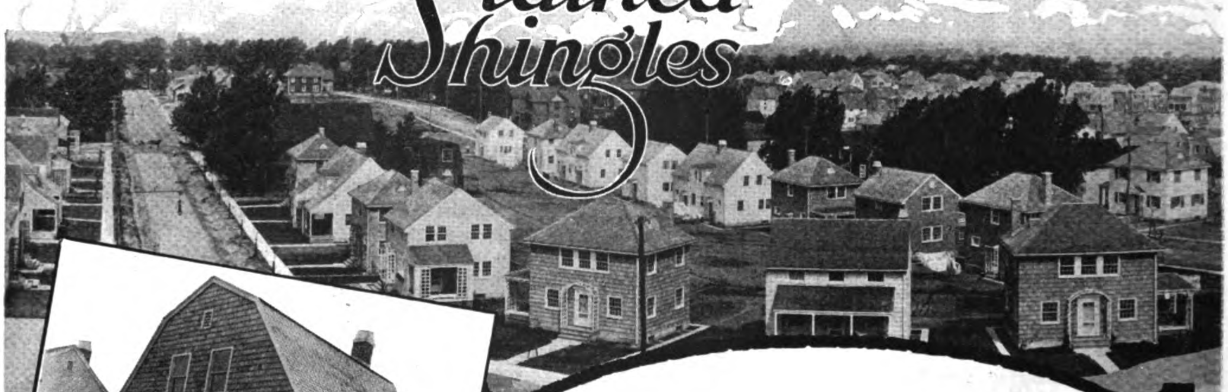

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Industrial housing is on a new plane. Various types of houses are now built—not only economically, not only durably—but ARTISTICALLY as well.

The following extracts from the description by the Architects of the Watertown Housing Project prove that, after months of intensive work by the Committee of Design and the Ordnance Department in planning the erection of three hundred houses within scheduled time, "Creo-Dipt" Stained Shingles were considered the best choice for side walls, as well as roofs, for their ECONOMY, DURABILITY, RAPIDITY IN LAYING, VARIETY IN TREATMENT AND BEAUTY.

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"The fact that winter weather would be reached before the work was well advanced led to the decision to build the houses entirely of frame construction, using 16-inch and 24-inch 'Creo-Dipt' Shingles for exterior walls and 16-inch 'Creo-Dipt' Stained Shingles for roofs."

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*At this Stage—*

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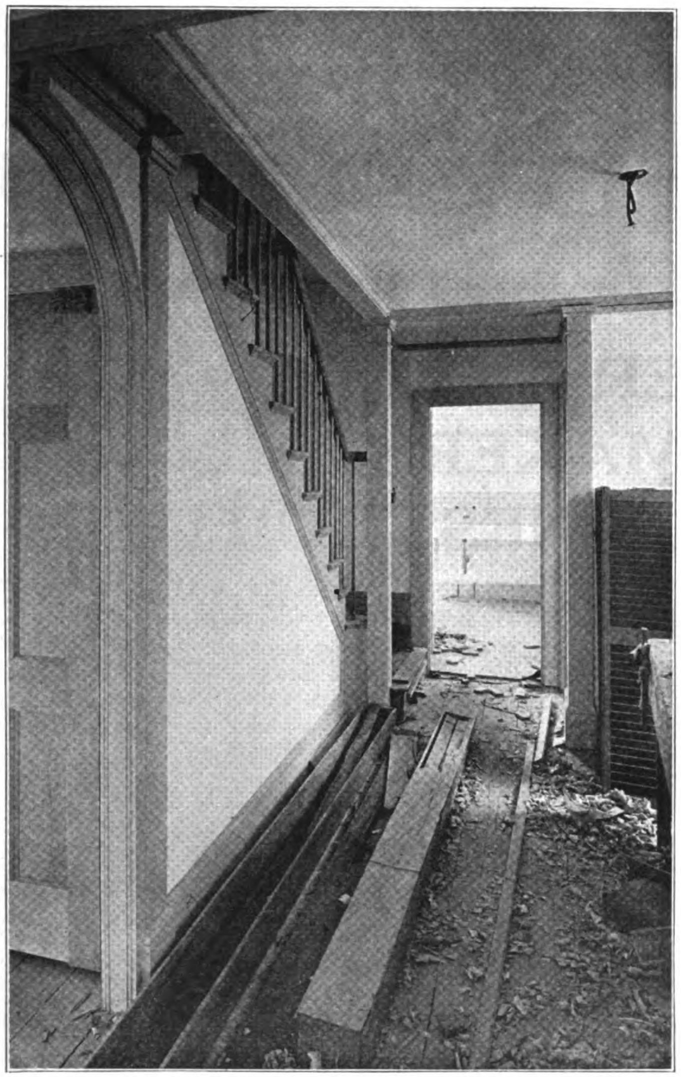

Used for white enamel throughout in this home at West Newton, Massachusetts

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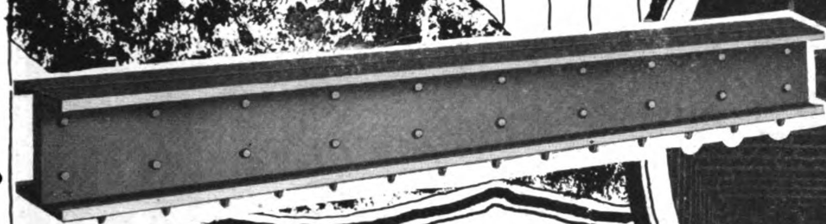

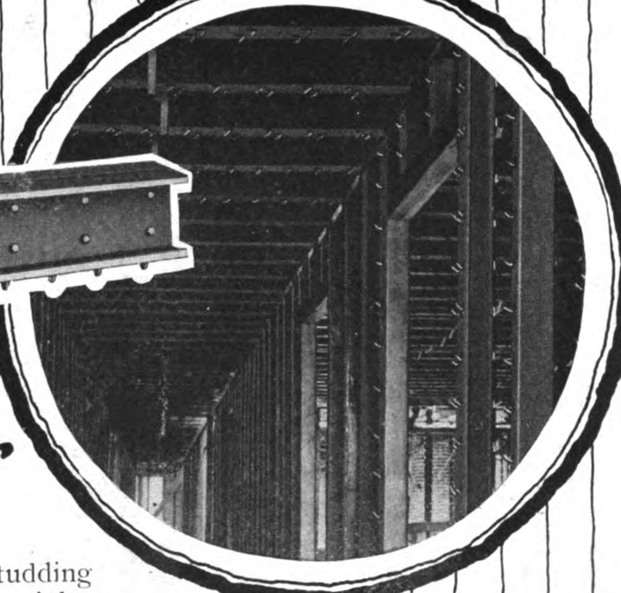

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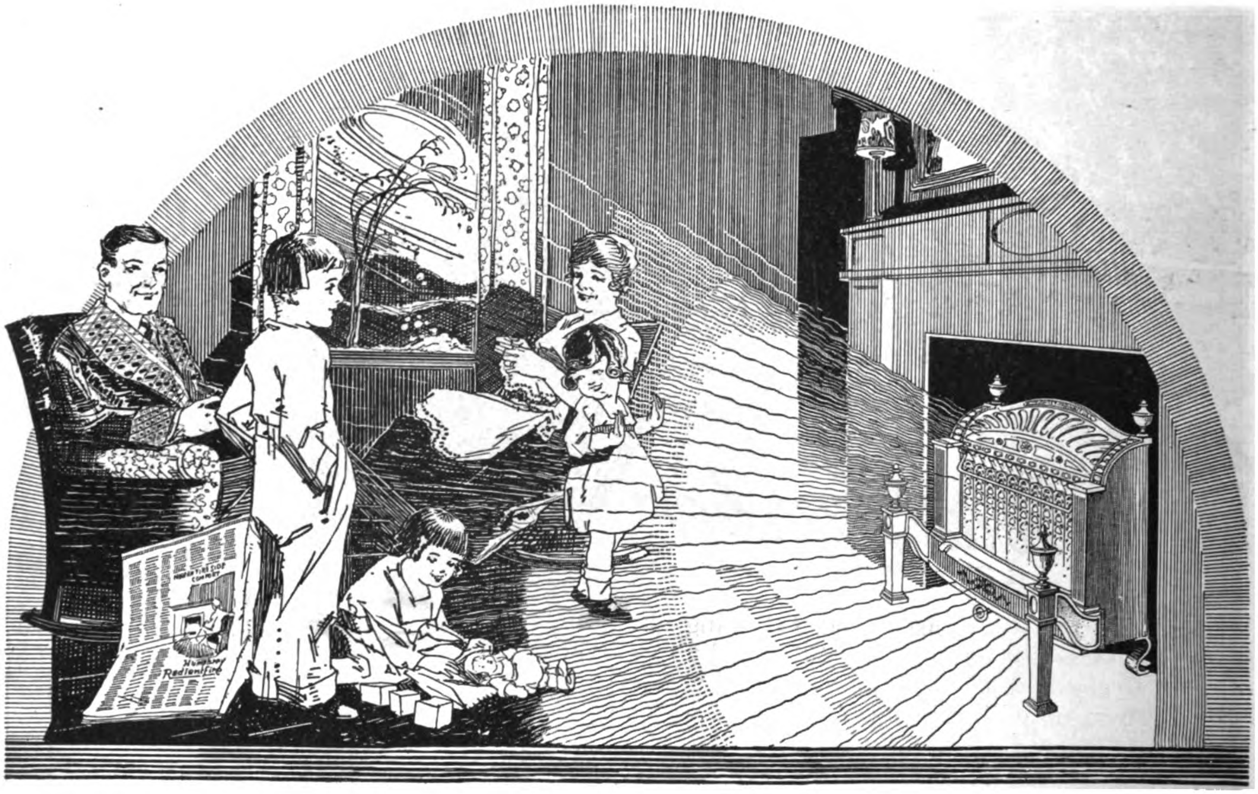


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# BUILDING AGE

NEW YORK, NOVEMBER, 1919

# A Farm Cottage at Locust Valley

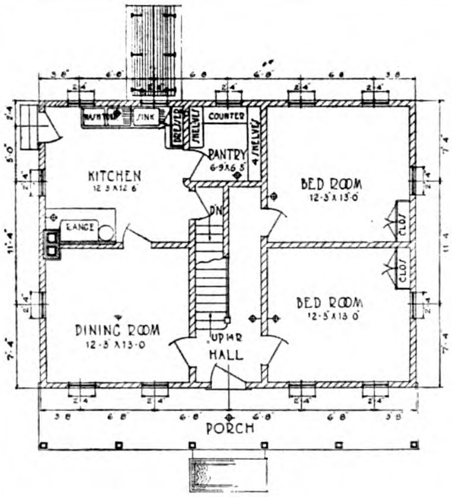
## *Modified Gambrel Roof the Dominating Feature —Two Bed-Rooms on First Floor*

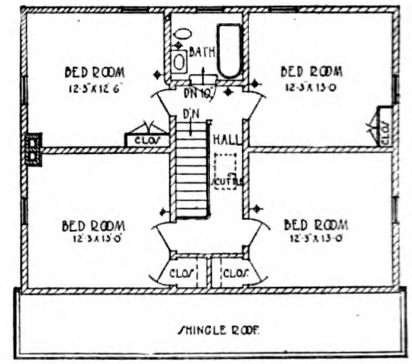
COLONIAL architecture in its simplest form appeals perhaps more to a home owner than most other styles, for it is adapted to extreme simplicity and therefore does not suffer from it. In fact, the degree of simplicity with which the Colonial type of house is designed is often a measure of its artistic success.

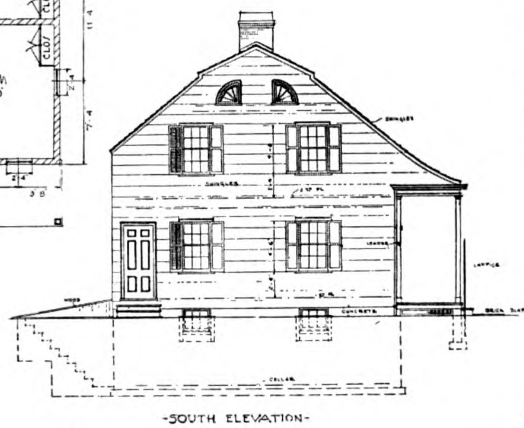
This characteristic feature of Colonial architecture forms the dominating motif of the little cottage illustrated, for simplicity is carried as far as possible. The design depends on excellence of proportion for its effect, disdaining any pretense of ostentatiousness. A trace of the Dutch Colonial influence is to be seen in the gambrel roof which breaks further up than is usual. The long sweep of the lower portion of the roof ending in a graceful curve over the porch cornice is by no means the least element in making the design effective, for it is this curve which perhaps is the first thing to strike one's notice.

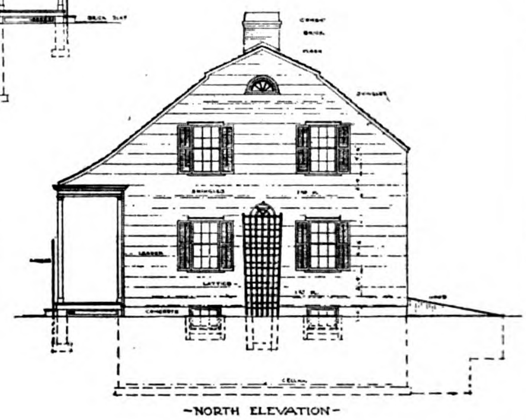
*An interesting example of how attractive even a very simple cottage may be*

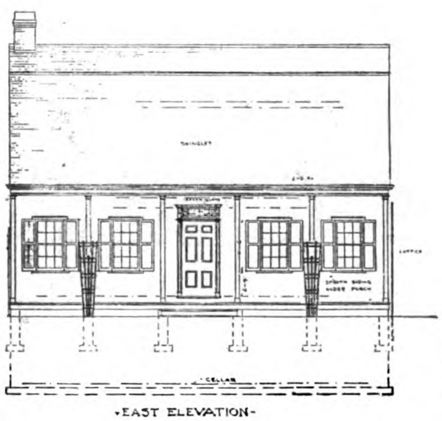
*Alfred Hopkins and Charles S. Keefe, Associate Architects*



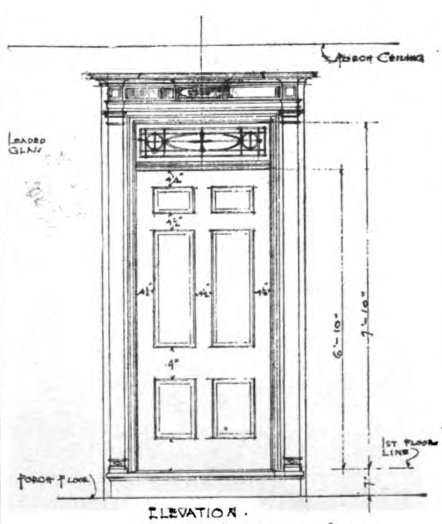



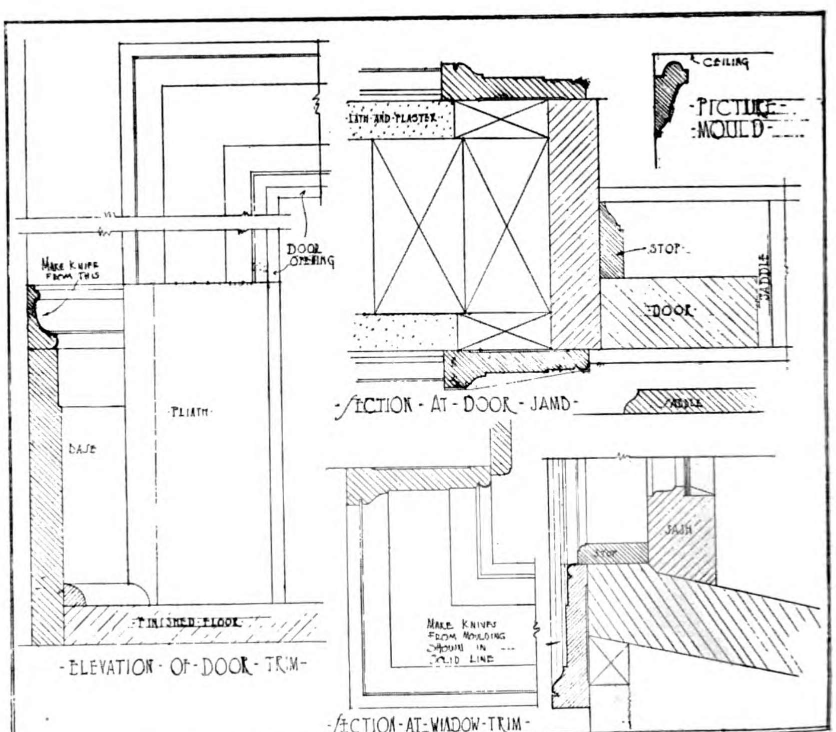




*Floor plans and elevations. Scale ¼ in. = 1 ft.*




*Detail of entrance door*




*Details of interior trim in living quarters*

In keeping with this gentle curve and slight overhang is the slender gracefulness of the porch columns, which are simply moulded and have a short necking. The motif of these columns is repeated in the pilasters where the porch cornice returns against the house.

The front doorway is interesting, although very simple. The pilasters at either side are very similar to those used for the porch, although the necking is longer and is simply panelled.

The windows are well placed in relation to the porch. The first story windows appear to be lower than is usually the case, due to the fact that the second floor is slightly below the porch roof, thus giving an effect that is interesting by reason of its very unusualness.

The louvre ventilators tend to keep circulation of air through the attic in summer time if desired, and also help to break up the exterior wall surface attractively below the ridge.

Both the roof and the sides of the house are covered with shingles.

Inside there is more space than is at first apparent from a casual glimpse at the exterior. The first floor has a good-sized kitchen and dining room. Two good-sized bed rooms are also provided. If desired, these bed rooms could readily be turned into a living room. Just off the kitchen is a large pantry.

The second story contains four bed rooms grouped around the central hall.

This cottage is located at Locust Valley, L. I., and was designed for Glenn Stewart by Alfred Hopkins and Charles S. Keefe, Associated Architects, 101 Park Avenue, New York City.

# Is More Coal Consumed When Concealed Radiators Are Used?

## *Data Giving Comparative Costs Which Would Seem to Show No Decrease in Economy of Operation*

By H. Vandervoort Walsh, Architect

THERE is no precedent in ancient art to follow in beautifying the radiator, and that is probably the reason for its ugly form. Art is supposed to ornament utilitarian objects, but perhaps the radiator is too youthful to have reached this stage of its development. Whatever are the causes of this condition, it is certain that the best way to rid a beautiful room of a radiator is to camouflage it behind a screen of panels.

However, in practicing this camouflage of the radiator, one is justified in asking whether it does not cost considerable in coal bills. Of a certainty, the radiator is greatly reduced in efficiency by the covering, and additional feet of radiation must be installed; but do these additions make the cost of running the plant greater?

**Perhaps the majority of architects and builders would unhesitatingly say "Yes" to the question, "Is more coal burned when concealed radiators are used?" As increased radiation is necessary for the securing of results which shall be equally as good, it seems to follow that more coal must be burned to take care of the increased radiation necessary.**

**Mr. Walsh in this article brings forth data which, he states, shows that this conclusion is erroneous, and that no increase in cost of operation is necessary when the radiators are concealed in order that the room be rendered more attractive.**

**What do you think about this? Why not send your opinion in to us, and give us an opportunity to publish it? This subject is a very important one and one that should be of wide interest to architects and builders in all parts of the country.**

Let us take an example and see. Suppose we have selected by calculations a radiator of sufficient size to heat a certain room. The calculations have been for a radiator left uncovered and lead us to choose a 20" high, 4-column radiator, with 42 square feet of radiating surface. By experiment, it has been found that this radiator will give off 240 British thermal units of heat each hour for each square foot of surface. But suppose now that we cannot countenance the sight of this ugly radiator in the room where beauty prevails, and we enclose it with panels and grilles in a way similar to figure 7. The bottom grille is made 2" high and as long as the radiator, and the top grille as wide and as long as the radiator. Immediately we have reduced the efficiency of our radiator by 25%, and, whereas the radiator gave off 240 British thermal units of heat for each square foot of surface per hour, it can now, under the enclosed condition, give off only 180 such units of heat. In fact, in order to heat the room properly, we must increase the size of our radiator from 42 square feet of surface to 56 square feet. This means also an increase in the size of pipes, and if many radiators are treated in this way, the total amount of radiating surface is materially enlarged.

Now comes the question of whether this increase in the amount of radiating surface will increase the amount of coal burned per season. A very common method of estimating the amount of coal which will be consumed during one season is to calculate 70 pounds for each square foot of radiation in the system. By increasing our radiator to overcome the reduction in efficiency, due to the camouflage, it appears, on the face of it, that the amount of coal consumed will be greater. In this one case, the increase in the number of square feet was 14, and it would seem that we would naturally burn $14 \times 70 = 980$ pounds of coal per season in addition, as the result of our covering.

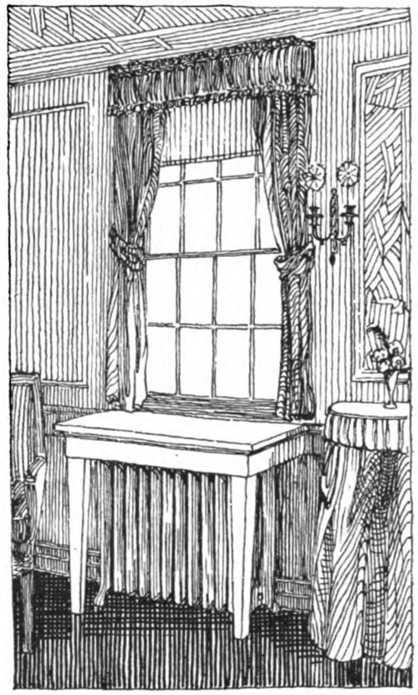


*Fig. 1. A manner in which a radiator may be partially concealed and yet retain much of its efficiency*

But such is not the case, and a careful consideration of the problem will show that the additional number of square feet of radiation will not increase the amount of coal consumed. In the first place, we required a radiator of 42 square feet of radiation, when left uncovered, and this gave off 240 British thermal units of heat per hour for each square foot. If the coal we burn gives off 8000 British thermal units of heat per hour for each pound burned, then the following relation is true:

British thermal units given off by rad.
× no. sq. ft., on rad.
divided by
No. British thermal units given off by the coal per pound for each hour,
gives us the
Amount of coal burned in one hour.

Therefore we have the following:

$$\frac{240 \times 42}{8000} = 1.25$$ pounds of coal required for the radiator per hour when left uncovered.

On the other hand, if we cover the radiator, its efficiency is reduced by 25%, and therefore we were obliged to increase its size to 56 square feet of surface, and in this case the number of British thermal units given off by the radiator for each square foot of surface is only 180. If we take, then, the same relation as the above, we have:

$$\frac{180 \times 56}{8000} = 1.25 \text{ pounds of coal required for the radiator per hour}$$ *when covered.*

From the above it is readily seen that

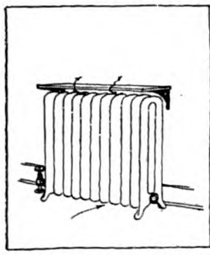


*Fig. 1. Shelves over a radiator reduce efficiency*

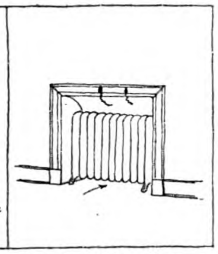


*Fig 2. The efficiency of a radiator placed in an open recess is reduced about 8 per cent.*

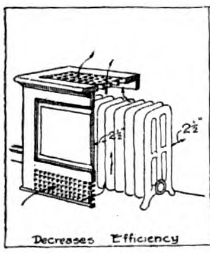



*Fig. 3. The radiator can have a removable cover so that on cold days increased efficiency may be had*

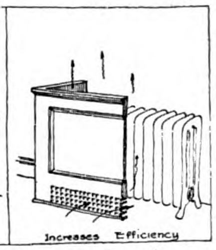



*Fig. 4. Cover removed, showing how increased efficiency is secured*

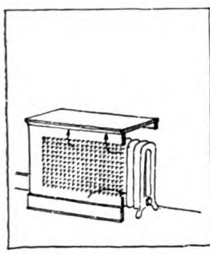


*Fig. 5. Where the radiator is enclosed by a grille like this, its efficiency is reduced 20 per cent. or more*

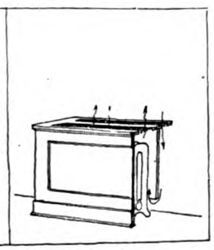


*Fig 6. This type of enclosure for a radiator reduces efficiency from 30 to 40 per cent.*

the consumption of coal is identical in both cases, although the covered radiator is larger. The effect, then, of the camouflaged radiator is not to increase the size of our coal bills, and this fact is sufficient to justify its use in any home.

With this fact in mind, some further considerations of the effect of the camouflaged radiator will not be amiss. It has been found that an enclosure without a top increases the efficiency of the radiator by 12% when the area of the inlet at the bottom is about 10 times the heating surface on the radiator. But a radiator so enclosed is of little value. However, it is quite possible to enclose a radiator as shown in Fig. 3 and Fig. 7, so that the top is hinged and removable. As most days in the winter do not require the full radiation, the loss of the heat due to the covering will not be noticeable, and on very cold days, when the radiator must work at its full efficiency, the top can be removed. Under these conditions the radiator need be no larger than that required for one left uncovered.

It has also been found that if the radiator is placed 2½" from the wall and the front covering, its highest efficiency is obtained. The design of the grille does not affect the efficiency one way or the other, but the size of the grille on the top does. In experiments, when the bottom grille was kept constant in size, it was shown that the efficiency was reduced 15% when the top screen was as long and as wide as the radiator, and that widening the top screen made no appreciable difference, while decreasing its width reduced the efficiency about 5% for each inch it was made narrower.

Even the use of shelves over a radiator, as shown in Figs. 1 and 9, will reduce its efficiency. Narrow shelves will decrease it about 2.5% and wide shelves about 5% when placed 1½" above the top of a radiator 32" high or more. The efficiency is decreased by shelves much more for low window radiators. As much as 10% decrease can be estimated for shelves placed 1½" above the tops of such radiators. An improvement can be made by lifting the shelves 3" above the top, however. Many have tried to overcome this reduction in efficiency by using curved metal deflectors under the shelves, but these have very little if any beneficial effect.

A radiator placed in an open recess as shown in Fig. 2 reduces its efficiency about 8%. Its best work is obtained when the distance from the wall to the radiator is 2½" and from the top of the radiator to the top of the recess is 3". If the radiator is enclosed with a grille in front, or arranged as shown in Fig. 5, the reduction in efficiency is 20% and higher.

The effect of the enclosure like that shown in Fig. 6 which is typical for a window treatment in which the fresh air is drawn down from the top at the rear and passes up and around the radiator at the front tends to reduce efficiency from 30% to 40%. The space between the back partitions and the wall is seldom made larger than 3" or 4".

Where hot-water radiators are used, the percentage of reduction due to the type of covering is practically the same as for steam, and can be calculated upon the same basis.

With the proper allowance made for the loss in the efficiency of the radiator due to its camouflage, the covering of the radiator is completely justified from an artistic and economical standpoint.

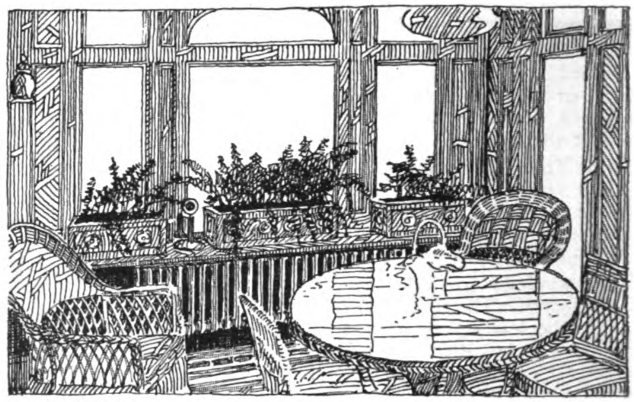


*Fig. 9. Wide shelves over a radiator serve to reduce efficiency about 5 per cent.*

## Lumber Prices Being Investigated by the Government

An investigation of prices in the lumber industry has been begun by the Federal Trade Commission at the request of the Department of Justice. Examiners are at work in various lumber centers, including New Orleans and Chicago. The commission will make recommendations, and report upon whether or not there has been any concerted effort at price fixing or in other directions which might violate anti-trust laws.

The various associations are co-operating with the commission as far as possible. A state investigation in Illinois some months ago resulted in the conclusion that prices at that time were justified by reason of the economic conditions prevailing. It is likely that the same conclusion will be reached in the present national investigation.

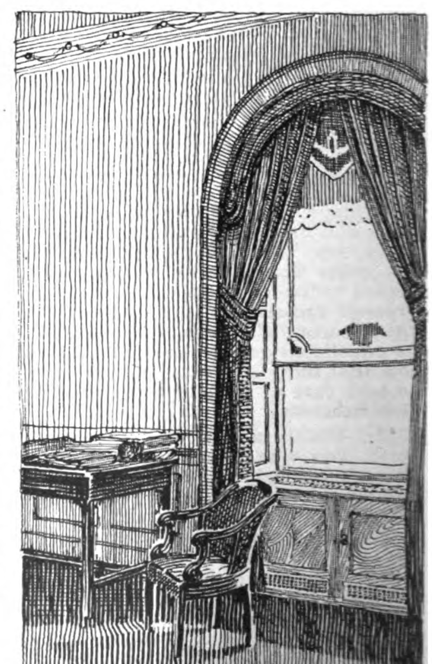


*Fig. 7. The appearance of a room is enhanced by concealing the radiator placed under windows, after this manner*

# Quick Method of Calculating Strength of Timber Posts, Struts or Columns

## *Tables That Economize Designer's Time and Reduce to a Minimum the Danger of Mistakes*

By Ernest Irving Freese

BY means of the two accompanying tables, the required size or safe carrying capacity of timber columns, posts or struts can be accurately and quickly determined merely by inspection.

Table No. 1 is to be used for columns of long-leaf yellow pine, Douglas fir (Oregon pine), or oak.

Table No. 2 is to be used for short-leaf yellow pine, white pine, eastern fir, spruce or hemlock.

*Example 1:*

What load can an 8" x 8" Douglas fir column safely support if the clear length is 12'—0"?

*Solution:*

Since the timber is Douglas fir, Table No. 1 is to be used. At the left-hand side of the table, under the heading "Length of Column", enter the horizontal division containing the given length of 12'—0". Follow this row across to the right until it intersects with the vertical row occurring directly under the 8" x 8" size. The tabulated load given at the point of intersection is the safe load, in *tons*, that the column can support. It is found to be 26.8 *tons*, or, multiplying by 2000, 53,600 *pounds*.

*Example 2:*

Suppose the above column were of hemlock. What would be its safe load?

*Solution:*

In this case, since the timber is hemlock, Table No. 2 is the proper one to use. Following across the horizontal row, corresponding to the given length of 12'—0", to the point of intersection of the vertical row, corresponding to the given size of 8" x 8", it is seen that the safe load is 21.4 *tons*.

*Example 3:*

A long-leaf yellow pine column is required to safely support a load of 30 tons. The length of the column is 18'—6". What size can be used?

*Solution:*

Use Table No. 1 for long-leaf yellow pine. At the left-hand side of the table, under the heading, "Length of Column," find the horizontal row corresponding to the given length of 18'—6". Follow this row across to the right until a load is found that is equal to, or next greater than, the given load of 30 tons. Then follow upward from this load to the top of the table, where the required size will be found. Any column having a greater capacity than 30 tons can be used. Hence, it is seen that either an 8" x 12" column or a 10" x 10" column can be used with safety, since the former has a capacity of 30.9 tons, while the latter will safely carry 37.8 tons. The adopted size should be governed by the width of the supported girder, although, where possible, preference should always be given to the column that most nearly approaches a square in cross-section.

*Example 4:*

Let it be required to determine the size of Douglas fir columns for the safe sup-

TABLE 1. SAFE LOADS, *IN TONS*, FOR TIMBER COLUMNS, POSTS & STRUTS. USE THIS TABLE FOR LONG-LEAF YELLOW PINE, DOUGLAS FIR & OAK.

| Length of Column | 3x3 | 3x4 | 3x6 | 4x4 | 4x6 | 4x8 | 6x6 | 6x8 | 6x10 | 6x12 | 8x8 | 8x10 | 8x12 | 8x14 | 8x16 | 10x10 | 10x12 | 10x14 | 10x16 | 12x12 | 12x14 | 12x16 | 14x14 | 14x16 | 16x16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6'-0" | 3.24 | 4.32 | 6.48 | 6.72 | 10.0 | 13.4 | 17.2 | 23.0 | 28.8 | 34.5 | 32.0 | 40.0 | 48.0 | 56.0 | 64.0 | 50.0 | 60.0 | 70.0 | 80.0 | 72.0 | 84.0 | 96.0 | 98.0 | 112. | 128. |
| 6'-6" | 3.06 | 4.08 | 6.12 | 6.48 | 9.72 | 12.9 | 16.9 | 22.5 | 28.2 | 33.8 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| 7'-0" | 2.88 | 3.84 | 5.76 | 6.24 | 9.36 | 12.4 | 16.5 | 22.0 | 27.6 | 33.1 | 31.6 | 39.6 | 47.5 | 55.4 | 63.3 | " | " | " | " | " | " | " | " | " | " |
| 7'-6" | 2.70 | 3.60 | 5.40 | 6.00 | 9.00 | 12.0 | 16.2 | 21.6 | 27.0 | 32.4 | 31.2 | 39.0 | 46.8 | 54.6 | 62.4 | " | " | " | " | " | " | " | " | " | " |
| 8'-0" | 2.52 | 3.36 | 5.04 | 5.76 | 8.64 | 11.5 | 15.8 | 21.1 | 26.4 | 31.6 | 30.7 | 38.4 | 46.0 | 53.7 | 61.4 | " | " | " | " | " | " | " | " | " | " |
| 8'-6" | | | | 5.52 | 8.28 | 11.0 | 15.4 | 20.6 | 25.8 | 30.9 | 30.2 | 37.8 | 45.3 | 52.9 | 60.4 | 49.8 | 59.7 | 69.7 | 79.6 | " | " | " | " | " | " |
| 9'-0" | | | | 5.28 | 7.92 | 10.5 | 15.1 | 20.1 | 25.2 | 30.2 | 29.7 | 37.2 | 44.6 | 52.0 | 59.5 | 49.2 | 59.0 | 68.8 | 78.7 | " | " | " | " | " | " |
| 9'-6" | | | | 5.04 | 7.56 | 10.0 | 14.7 | 19.6 | 24.6 | 29.5 | 29.2 | 36.6 | 43.9 | 51.2 | 58.5 | 48.6 | 58.3 | 68.0 | 77.7 | " | " | " | " | " | " |
| 10'-0" | | | | 4.80 | 7.20 | 9.60 | 14.4 | 19.2 | 24.0 | 28.8 | 28.8 | 36.0 | 43.2 | 50.4 | 57.6 | 48.0 | 57.6 | 67.2 | 76.8 | " | " | " | " | " | " |
| 10'-6" | | | | | | | 14.0 | 18.7 | 23.4 | 28.0 | 28.3 | 35.4 | 42.4 | 49.5 | 56.6 | 47.4 | 56.8 | 66.3 | 75.8 | 71.2 | 83.1 | 95.0 | " | " | " |
| 11'-0" | | | | | | | 13.6 | 18.2 | 22.8 | 27.3 | 27.8 | 34.8 | 41.7 | 48.7 | 55.6 | 46.8 | 56.1 | 65.5 | 74.8 | 70.5 | 82.3 | 94.0 | " | " | " |
| 11'-6" | | | | | | | 13.3 | 17.7 | 22.2 | 26.6 | 27.3 | 34.2 | 41.0 | 47.8 | 54.7 | 46.2 | 55.4 | 64.6 | 73.9 | 69.8 | 81.4 | 93.1 | " | " | " |
| 12'-0" | | | | | | | 12.9 | 17.2 | 21.6 | 25.9 | 26.8 | 33.6 | 40.3 | 47.0 | 53.7 | 45.6 | 54.7 | 63.8 | 72.9 | 69.1 | 80.6 | 92.1 | 97.4 | 111. | " |
| 12'-6" | | | | | | | 12.6 | 16.8 | 21.0 | 25.2 | 26.4 | 33.0 | 39.6 | 46.2 | 52.8 | 45.0 | 54.0 | 63.0 | 72.0 | 68.4 | 79.8 | 91.2 | 96.6 | 110. | " |
| 13'-0" | | | | | | | 12.2 | 16.3 | 20.4 | 24.4 | 25.9 | 32.4 | 38.8 | 45.3 | 51.8 | 44.4 | 53.2 | 62.1 | 71.0 | 67.6 | 78.9 | 90.2 | 95.7 | 109. | " |
| 13'-6" | | | | | | | 11.8 | 15.8 | 19.8 | 23.7 | 25.4 | 31.8 | 38.1 | 44.5 | 50.8 | 43.8 | 52.5 | 61.3 | 70.0 | 66.9 | 78.1 | 89.2 | 94.9 | 108. | 127. |
| 14'-0" | | | | | | | 11.5 | 15.3 | 19.2 | 23.0 | 24.9 | 31.2 | 37.4 | 43.6 | 49.9 | 43.2 | 51.8 | 60.4 | 69.1 | 66.2 | 77.2 | 88.3 | 94.0 | 107. | 126. |
| 14'-6" | | | | | | | 11.1 | 14.8 | 18.6 | 22.3 | 24.4 | 30.6 | 36.7 | 42.8 | 48.9 | 42.6 | 51.1 | 59.6 | 68.1 | 65.5 | 76.4 | 87.3 | 93.2 | 106. | 125. |
| 15'-0" | | | | | | | 10.8 | 14.4 | 18.0 | 21.6 | 24.0 | 30.0 | 36.0 | 42.0 | 48.0 | 42.0 | 50.4 | 58.8 | 67.2 | 64.8 | 75.6 | 86.4 | 92.4 | 105. | 124. |
| 15'-6" | | | | | | | | | | | 23.5 | 29.4 | 35.2 | 41.1 | 47.0 | 41.4 | 49.6 | 57.9 | 66.2 | 64.0 | 74.7 | 85.4 | 91.5 | 104. | 123. |
| 16'-0" | | | | | | | | | | | 23.0 | 28.8 | 34.5 | 40.3 | 46.0 | 40.8 | 48.9 | 57.1 | 65.2 | 63.3 | 73.9 | 84.4 | 90.7 | 103. | 122. |
| 16'-6" | | | | | | | | | | | 22.5 | 28.2 | 33.8 | 39.4 | 45.1 | 40.2 | 48.2 | 56.2 | 64.3 | 62.6 | 73.0 | 83.5 | 89.8 | 102. | 121. |
| 17'-0" | | | | | | | | | | | 22.0 | 27.6 | 33.1 | 38.6 | 44.1 | 39.6 | 47.5 | 55.4 | 63.3 | 61.9 | 72.2 | 82.5 | 89.0 | 101. | 120. |
| 17'-6" | | | | | | | | | | | 21.6 | 27.0 | 32.4 | 37.8 | 43.2 | 39.0 | 46.8 | 54.6 | 62.4 | 61.2 | 71.4 | 81.6 | 88.2 | 100. | 120. |
| 18'-0" | | | | | | | | | | | 21.1 | 26.4 | 31.6 | 36.9 | 42.2 | 38.4 | 46.0 | 53.7 | 61.4 | 60.4 | 70.5 | 80.6 | 87.3 | 99.8 | 119. |
| 18'-6" | | | | | | | | | | | 20.6 | 25.8 | 30.9 | 36.1 | 41.2 | 37.8 | 45.3 | 52.9 | 60.5 | 59.7 | 69.7 | 79.6 | 86.5 | 98.8 | 118. |
| 19'-0" | | | | | | | | | | | 20.1 | 25.2 | 30.2 | 35.2 | 40.3 | 37.2 | 44.6 | 52.0 | 59.6 | 59.0 | 68.8 | 78.7 | 85.6 | 97.9 | 117. |
| 19'-6" | | | | | | | | | | | 19.6 | 24.6 | 29.5 | 34.4 | 39.3 | 36.6 | 43.9 | 51.2 | 58.6 | 58.3 | 68.0 | 77.7 | 84.8 | 96.9 | 116. |
| 20'-0" | | | | | | | | | | | 19.2 | 24.0 | 28.8 | 33.6 | 38.4 | 36.0 | 43.2 | 50.4 | 57.7 | 57.6 | 67.2 | 76.8 | 84.0 | 96.0 | 115. |

*NOTE:* Loads above dotted zig-zag line are based on 1000#/□" safe compressive stress. Other loads are based on the following formula: $W = \frac{A}{100}(60 - \frac{l}{d})$, in which W = Safe load in TONS, A = Area of Section in SQ. INCHES, l = Length in INCHES, d = least side in INCHES.

## TABLE 2. SAFE LOADS, *IN TONS*, FOR TIMBER COLUMNS, POSTS & STRUTS.
USE THIS TABLE FOR *SHORT-LEAF YELLOW PINE, WHITE PINE, EASTERN FIR, SPRUCE & HEMLOCK.*

| LENGTH OF COLUMN | 3×3 | 3×4 | 3×6 | 4×4 | 4×6 | 4×8 | 6×6 | 6×8 | 6×10 | 6×12 | 8×8 | 8×10 | 8×12 | 8×14 | 8×16 | 10×10 | 10×12 | 10×14 | 10×16 | 12×12 | 12×14 | 12×16 | 14×14 | 14×16 | 16×16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6'-0" | 2.59 | 3.45 | 5.18 | 5.37 | 8.00 | 10.7 | 13.7 | 18.4 | 23.0 | 27.6 | 25.6 | 32.0 | 38.4 | 44.8 | 51.2 | 40.0 | 48.0 | 56.0 | 64.0 | 57.6 | 67.2 | 76.8 | 78.4 | 89.6 | 102. |
| 6'-6" | 2.44 | 3.26 | 4.89 | 5.18 | 7.77 | 10.3 | 13.5 | 18.0 | 22.5 | 27.0 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| 7'-0" | 2.30 | 3.07 | 4.60 | 4.99 | 7.48 | 9.92 | 13.2 | 17.6 | 22.0 | 26.4 | 25.2 | 31.6 | 38.0 | 44.3 | 50.6 | " | " | " | " | " | " | " | " | " | " |
| 7'-6" | 2.16 | 2.88 | 4.32 | 4.80 | 7.20 | 9.60 | 12.9 | 17.2 | 21.6 | 25.9 | 24.9 | 31.2 | 37.4 | 43.6 | 49.9 | " | " | " | " | " | " | " | " | " | " |
| 8'-0" | 2.01 | 2.68 | 4.03 | 4.60 | 6.91 | 9.20 | 12.6 | 16.8 | 21.1 | 25.2 | 24.5 | 30.7 | 36.8 | 42.9 | 49.1 | " | " | " | " | " | " | " | " | " | " |
| 8'-6" | | | | 4.41 | 6.62 | 8.80 | 12.3 | 16.4 | 20.6 | 24.7 | 24.1 | 30.2 | 36.2 | 42.3 | 48.3 | 39.8 | 47.7 | 55.7 | 63.6 | " | " | " | " | " | " |
| 9'-0" | | | | 4.22 | 6.33 | 8.40 | 12.0 | 16.0 | 20.1 | 24.1 | 23.7 | 29.7 | 35.6 | 41.6 | 47.6 | 39.3 | 47.2 | 55.0 | 62.9 | " | " | " | " | " | " |
| 9'-6" | | | | 4.03 | 6.04 | 8.00 | 11.7 | 15.6 | 19.6 | 23.6 | 23.3 | 29.2 | 35.1 | 40.9 | 46.8 | 38.8 | 46.6 | 54.4 | 62.1 | " | " | " | " | " | " |
| 10'-0" | | | | 3.84 | 5.76 | 7.68 | 11.5 | 15.3 | 19.2 | 23.0 | 23.0 | 28.8 | 34.5 | 40.3 | 46.0 | 38.4 | 46.0 | 53.7 | 61.4 | " | " | " | " | " | " |
| 10'-6" | | | | | | | 11.2 | 14.9 | 18.7 | 22.4 | 22.6 | 28.3 | 33.9 | 39.6 | 45.2 | 37.9 | 45.4 | 53.0 | 60.6 | 56.9 | 66.4 | 76.0 | " | " | " |
| 11'-0" | | | | | | | 10.8 | 14.5 | 18.2 | 21.8 | 22.2 | 27.8 | 33.3 | 38.9 | 44.4 | 37.4 | 44.8 | 52.4 | 59.8 | 56.4 | 65.8 | 75.2 | " | " | " |
| 11'-6" | | | | | | | 10.6 | 14.1 | 17.7 | 21.2 | 21.8 | 27.3 | 32.8 | 38.2 | 43.7 | 36.9 | 44.3 | 51.6 | 59.1 | 55.8 | 65.1 | 74.4 | " | " | " |
| 12'-0" | | | | | | | 10.3 | 13.7 | 17.2 | 20.7 | 21.4 | 26.8 | 32.2 | 37.6 | 42.9 | 36.4 | 43.7 | 51.0 | 58.3 | 55.2 | 64.4 | 73.6 | 77.9 | 88.8 | " |
| 12'-6" | | | | | | | 10.0 | 13.4 | 16.8 | 20.1 | 21.1 | 26.4 | 31.6 | 36.9 | 42.2 | 36.0 | 43.2 | 50.4 | 57.6 | 54.7 | 63.8 | 72.9 | 77.2 | 88.01 | " |
| 13'-0" | | | | | | | 9.76 | 13.0 | 16.3 | 19.5 | 20.7 | 25.9 | 31.0 | 36.2 | 41.4 | 35.5 | 42.5 | 49.6 | 56.8 | 54.0 | 63.1 | 72.1 | 76.5 | 87.2 | " |
| 13'-6" | | | | | | | 9.44 | 12.6 | 15.8 | 18.9 | 20.3 | 25.4 | 30.4 | 35.6 | 40.6 | 35.0 | 42.0 | 49.0 | 56.0 | 53.5 | 62.4 | 71.3 | 75.9 | 86.4 | 101. |
| 14'-0" | | | | | | | 9.20 | 12.2 | 15.3 | 18.4 | 19.9 | 24.9 | 29.9 | 34.8 | 39.9 | 34.5 | 41.4 | 48.3 | 55.2 | 52.9 | 61.7 | 70.6 | 75.2 | 85.6 | 100. |
| 14'-6" | | | | | | | 8.88 | 11.8 | 14.8 | 17.8 | 19.5 | 24.4 | 29.3 | 34.2 | 39.1 | 34.0 | 40.8 | 47.6 | 54.4 | 52.4 | 61.1 | 69.8 | 74.5 | 84.8 | 100. |
| 15'-0" | | | | | | | 8.64 | 11.5 | 14.4 | 17.2 | 19.2 | 24.0 | 28.8 | 33.6 | 38.4 | 33.6 | 40.3 | 47.0 | 53.7 | 51.8 | 60.4 | 69.1 | 73.9 | 84.0 | 99.2 |
| 15'-6" | | | | | | | | | | | 18.8 | 23.5 | 28.1 | 32.8 | 37.6 | 33.1 | 39.6 | 46.3 | 52.9 | 51.2 | 59.7 | 68.3 | 73.2 | 83.2 | 98.4 |
| 16'-0" | | | | | | | | | | | 18.4 | 23.0 | 27.6 | 32.2 | 36.8 | 32.6 | 39.1 | 45.6 | 52.1 | 50.6 | 59.1 | 67.5 | 72.5 | 82.4 | 97.6 |
| 16'-6" | | | | | | | | | | | 18.0 | 22.5 | 27.0 | 31.5 | 36.0 | 32.1 | 38.5 | 44.9 | 51.4 | 50.0 | 58.4 | 66.8 | 71.8 | 81.6 | 96.8 |
| 17'-0" | | | | | | | | | | | 17.6 | 22.0 | 26.4 | 30.8 | 35.2 | 31.6 | 38.0 | 44.3 | 50.6 | 49.5 | 57.7 | 66.0 | 71.2 | 80.8 | 96.0 |
| 17'-6" | | | | | | | | | | | 17.2 | 21.6 | 25.9 | 30.2 | 34.5 | 31.2 | 37.4 | 43.6 | 49.9 | 48.9 | 57.1 | 65.2 | 70.5 | 80.0 | 96.0 |
| 18'-0" | | | | | | | | | | | 16.8 | 21.1 | 25.2 | 29.5 | 33.7 | 30.7 | 36.8 | 42.9 | 49.1 | 48.3 | 56.4 | 64.4 | 69.8 | 79.8 | 95.2 |
| 18'-6" | | | | | | | | | | | 16.4 | 20.6 | 24.7 | 28.8 | 32.9 | 30.2 | 36.2 | 42.3 | 48.4 | 47.7 | 55.7 | 63.6 | 69.2 | 79.0 | 94.4 |
| 19'-0" | | | | | | | | | | | 16.0 | 20.1 | 24.1 | 28.1 | 32.2 | 29.7 | 35.6 | 41.6 | 47.6 | 47.2 | 55.0 | 62.9 | 68.4 | 78.3 | 93.6 |
| 19'-6" | | | | | | | | | | | 15.6 | 19.6 | 23.6 | 27.5 | 31.4 | 29.2 | 35.1 | 40.9 | 46.8 | 46.6 | 54.4 | 62.1 | 67.8 | 77.5 | 92.8 |
| 20'-0" | | | | | | | | | | | 15.3 | 19.2 | 23.0 | 26.8 | 30.7 | 28.8 | 34.5 | 40.3 | 46.1 | 46.0 | 53.7 | 61.2 | 67.2 | 76.8 | 92.0 |

*NOTE: Loads above dotted zig-zag line are based on 800 #/□" safe compressive stress. Other loads are based on the following formula: $W=\frac{A}{125}(60-\frac{l}{d})$, in which W = Safe load in TONS, A = Area of Section in SQ. INCHES, l = Length in INCHES, d = least side in INCHES.*

port of the roof and second floor of a two-story warehouse. The following data is given:

Height of first-story columns, 12'—6".

Height of second-story columns, 10'—0".

Column spacing, 16'—0" on centers, both ways.

Dead and live load on second floor, 150 pounds per sq. ft.

Dead and live load on roof, 50 pounds per sq. ft.

*Solution* (Second-story column):

The roof area supported by each second-story column is 16 × 16 = 256 sq. feet, which, at 50 pounds per sq. ft., makes the roof-load 256 × 50 = 12,800 pounds, or 6.4 *tons*. Looking in Table No. 1, it is found that, for a length of 10'—0", the nearest tabulated load to 6.4 tons, is 7.20 tons, which calls for a 4" x 6" column.

*Solution* (First-story columns):

The roof-load transmitted through the second-story columns is, as found above, 6.4 tons per column.

The second-floor area supported by each first-story column is 16 × 16 = 256 sq. feet, which, at 150 pounds per sq. ft., makes the second-floor load 256 × 150 = 38,400 pounds, or 19.2 *tons*. This floor load, added to the roof load from the second-story columns, makes the total first-story column load equal to 25.6 tons. Looking in Table No. 1, it is found that, for a length of 12'—6", the nearest tabulated load beyond 25.6 tons, is 26.4 tons, which calls for an 8" x 8" column.

*Example 5:*

Suppose the columns in the above example were to be of eastern fir instead of Douglas fir. What would be their required sizes?

*Solution:*

Following the same method of procedure as shown in example 4, but using Table No. 2 instead of Table No. 1, it is readily found that the second-story columns must be not less than 4" x 8", and the first-story columns not less than 8" x 10".

*Example 6:*

A mill-building column is required to safely sustain a total load of 125 tons. The length of the column is 12'—4". The timber is long-leaf yellow pine. What size is necessary?

*Solution:*

Looking in Table No. 1 it is seen that the nearest tabulated length beyond 12'—4" is 12'—6", and following this across the table to the nearest tabulated load beyond 125 tons, it is found that a 16" x 16" column is necessary. A 14" x 16" column would be unsafe, because its safe load for a length of 12'—6" is, as shown by the table, only 110 tons, whereas the 16" x 16" column will safely sustain a load of 128 tons, giving an additional margin of safety of 128 minus 125, or 3 tons.

## How to Keep Bark on Logs in Rustic Construction

For preventing the bark from flaking off logs used in rustic structures, the Forest Products Laboratory recommends the following methods of seasoning and preparing the timbers as the most effectual:

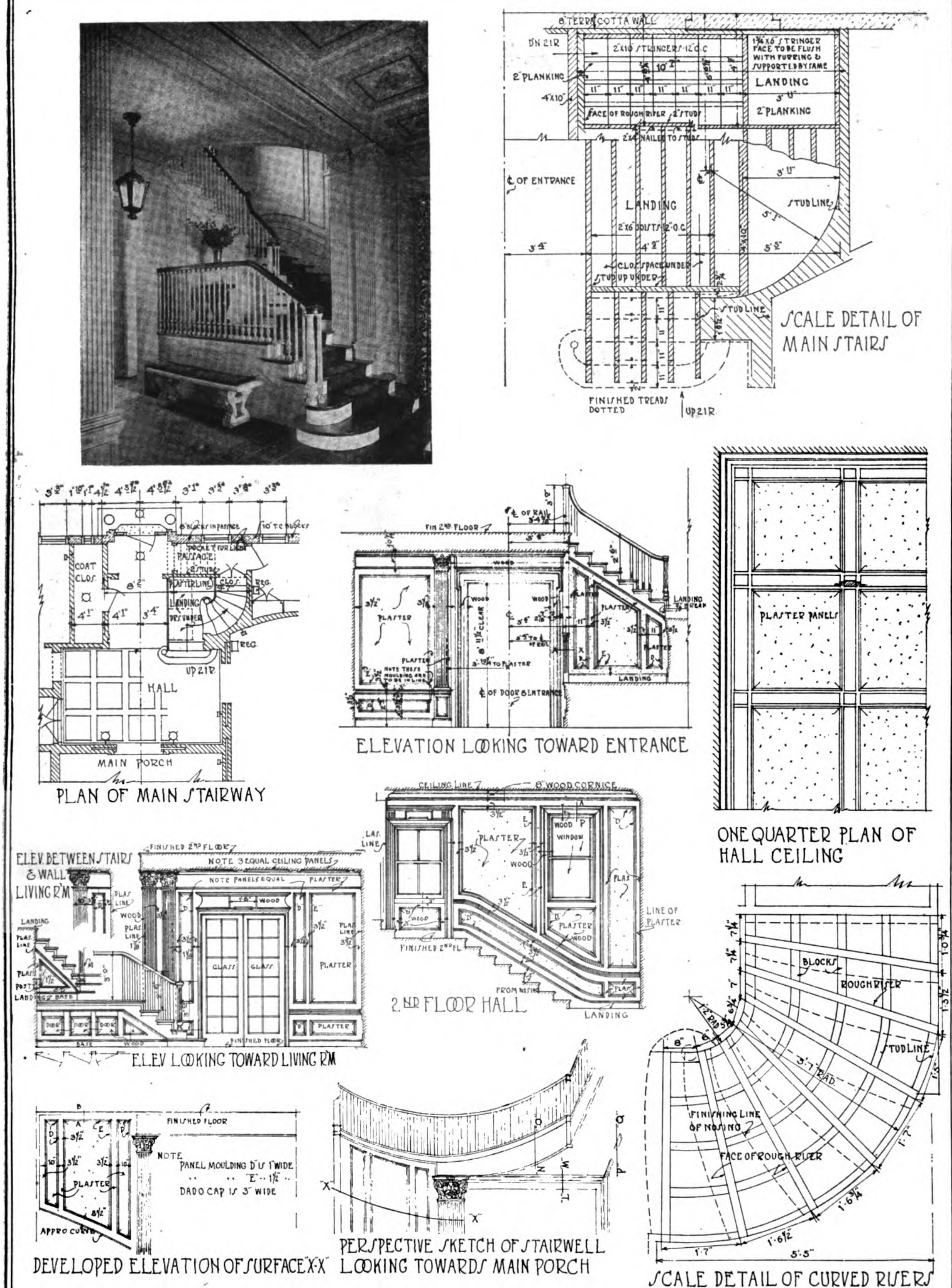
(1) Cut timbers late in summer and score on two sides; that is, cut off narrow strips of bark for the entire length. Pile in shade in open pile to allow thorough circulation of air. Allow timbers to season until following spring or summer before using.

(2) Proceed as in (1), and in addition coat ends, stripped portions, and knots with coal-tar creosote, using one coat a few days after timber is cut and another just before using the timbers.

(3) Proceed as in (1), but do not score bark. When timbers are in place, tack bark on with large-headed nails, placing one to every square foot of surface. Paint heads of nails to resemble color of bark.

(4) Tack or nail the bark on without particular attention to time of cutting or other treatment.

The nailing method has been used successfully by one western company which maintains numerous rustic hotels, and also on a large rustic building erected for exposition purposes.




DETAIL OF STAIRS IN HOUSE OF HENRY A. MORSS. ESQ.

COOLIDGE & CARLSON ARCHITS

*Fig. 1. A stone house identically the same in size and plan as that shown in Fig. 3, the difference in cost between the two houses being negligible*
*D. Knickerbacher Boyd, Architect*

# How to Lay Stone—I.

## *Various Methods of Securing Attractive Effects—Specifications that Bring Out the Full Beauty of Stone*

By Victor D. Abel, Architect *

IT would not be too much to say that the very conservative and solid character of Philadelphia and its immediate vicinity as shown by its unshaken loyalty since the formation of the Union has in large measure been influenced by the very solid foundation of its resources, of which stone is not the least important as a factor in the construction of its homes.

Perhaps no other section of the country is so fortunate in the wealth of its natural materials for the erection of buildings of all descriptions. While rich beyond measure in the variety and colors of its stone deposits, which only wait for man to lift it from its bed, we must not forget the unusual resources for the making of brick, tile and other materials. This has had the inevitable result of the architecture recognizing the close relations of the materials to their natural conditions and, no matter what material used, in a uniform endeavor to have such buildings "belong" to the surroundings; to fit the building as a part of the ground, rather than to attempt after the building is completed to fit the landscape to an artificial object. Here again the natural wealth of the district in the shape of its luxuriant foliage is a helpful factor.

Perhaps it was not alone the easily secured supply of stone ready at hand to build into the wall which caused its use to so great an extent, for who but has felt at some time in his life that he would wish for nothing better than a "house of stone". But it would be only the same reason that has caused many an outsider to have his house designed by one brought up in the study of stone and to have the very stone itself transported hundreds of miles in order to insure the result.

It cannot be disputed that the same house, of stone, appears larger and more impressive, and what is of greater importance, more an integral part of the surroundings than if built of any other material, even though stone may be used to some extent. This could not be better illustrated than by Fig. 1 and Fig. 3, showing two houses, the first all of stone and

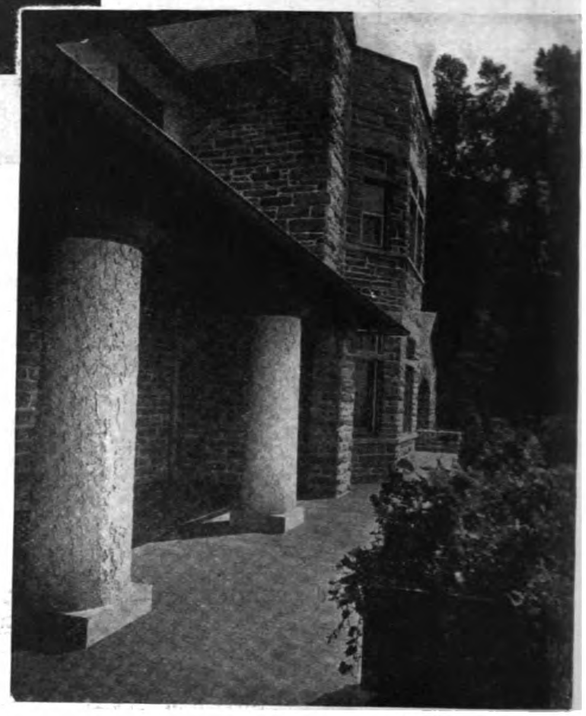


*Fig. 2. A typical example of a wall built with long, low stones. Note the effective contrast between the rough stuccoed columns and the stone walls. D. Knickerbacher Boyd, Architect*

*Fig 3. A half timber stucco and stone house at Haverford, Pa.*
*D. Knickerbacher Boyd, Architect*

* *Associated with D. Knickerbacher Boyd and Francis A. Gugert, Architects.*

the second of stone and half timbered. These are of identical plan and size, built by the same contractor at the same time and, strange to relate, the difference in cost was so little as to be negligible.

While this article will not in any way attempt to deal with the laying of stone from the technical point of view, the writer trusts that it will be of some use in the better and more sympathetic laying of this material. To the architect and contractor not familiar with stone, or not fully understanding the ease with which it can be correctly laid, it may enable them to approach it from the angle of a result to be obtained rather than just "what is the most convenient or the cheapest material we can pick up". For the same stone can be laid with no increase in cost at the time of building, and if well and properly done, adds dollars to the value of the building on completion.

In selecting the type of stone work for the particular building under consideration, and in carrying out its execution, which should always be under the direction of the designer, do not stop with the laying of the wall itself. Just as important as the stone is the pointing, its shape, type, color, finish and the materials which form its component parts. The pointing is an integral part of the wall and the very nature of the building can be changed and the result be disappointing if one does not study it most carefully from samples before it is applied.

*Fig. 4. Another type of house in which long, low stones were used. Note the design of the flat arch over the windows on the first story. D. Knickerbacher Boyd, Architect*

*Fig. 5. Stone used in an English design, specifications for laying which are given in the article. D. Knickerbacher Boyd, Architect*

*Fig. 6. Whitewash used over stone walls gives an effective rough finish that is very attractive. D. Knickerbacher Boyd, Architect*

A word or two as to its mixture and the method of application would not be amiss here, although the various kinds will be more particularly described with the different photos of walls. The original mortar for all stone work and pointing was straight lime, as cement was, of course, not in use at that time. As a result the finished pointing was white, forming a greater or less contrast with the stone, according to its width only. Modern good practice demands cement, both in the rough and pointing mortar. This is necessary not only for its greater strength but for its quicker ability to "set", an important requirement whereby the building can be erected much quicker than heretofore.

But the natural color of cement is gray. Unless the choice of wall has been for a premeditated gray effect the pointing mortar must be lightened in color by the use of either white cement, an expensive matter for any but the best work, or of white sand, or by the use of a proportion of lime. The latter is the most desirable, for it not only makes the mortar more easy to handle for the mason, but it retains its color and texture better. It is, however, dangerous unless the amount to be used is carefully considered and the mortar is well mixed and a sample has been set up for a week or so before actual pointing is done to test it as to color and result. If it shows hair cracks there is too much lime and the experiment must be repeated until it is right. A little practice will soon enable the mason to determine the approximate amount. Pure white mortar can only be obtained by the use of white cement and sand.

Pointing mortar, except where special "slushed" pointing is to be used should be applied with a small trowel. Most pointing is free-hand following the joints and keeping a general horizontal trend to conform to the wall as well as to give the impression of strength and scale.

Except for such walls which require pointing as the walls are built, care should be taken that before any pointing is applied and as the stone is laid the joints should be racked out deeply with the trowel. Usually there are pudlock holes left in the walls, being holes where the scaffold supports rest as the mason goes higher with his wall. When the roof is on and most of the woodwork in place the mason should start at the top and work down. The stone should be thoroughly cleaned, with acid, if necessary, before the finished pointing is done. The cleaning can be done, the pudlock holes filled and the pointing applied in the one operation and the wall is complete.

Now for the stone—the material itself. As mentioned before it is so general in this territory that it is not unusual to quarry the stone for the wall out of the cellar excavation. And it is almost invariably good stone, possessing the same general and unusual properties. The most important of these is its adaptability to all types of walls by the method of quarrying or of cutting and selection. The cutting is the most important to follow at the job, and the most of these stones have the strange property of being so soft on quarrying that they can be easily hammered into shape on laying and yet harden gradually on exposure until they are as hard as the cement in the mortar.

The greater majority of the face stones have a proportion of mica. The result is a reflection of light and a play of color in the wall rarely seen elsewhere. The color, too, of the stone is seldom the same. It varies in nearly all quarries from a blue gray to a fine rust color almost red. The majority is a warm gray with now and then a warmer brown tone. This gives a most unusual wall surface, capable of infinite variety.

With the stone on the ground and the face work about to start, it is now most important to work with the mason and describe to him and show if possible by photographs or by actual precept the result you wish. Every good stone mason's first thought is to lay the stone as straight as possible, to square up corners and have nice vertical joints, to true the beds just so they are at right angles to the ends, and then to lay up regardless.

No one, unless they have been through it, realizes how difficult it is to have him see the necessity of keeping the stone as near as is possible to its natural state suitable for laying as face work. Except for ashlar or coursed work, which we will only touch upon, as it is so seldom used, there should be as little tool work as possible. The most important feature is to have the stone laid on their natural beds and to select those beds to be as long as possible. The description of English work will cover the use of stone on edge. Whatever dressing is done for the body of the wall should be done with the hammer. The bed should be touched only sufficiently to take off any projections. The faces should not be touched, except for certain finished or special coursed work and for any dressed stone effects in connection with the design of the building. Ends should be merely straightened, not squared, and only sufficient to dovetail with not too close a joint into the stone next to it. This does not apply to corner stones, which must have edges squared so as to lay a vertical wall, and on occasion stones can be laid on end.

Not the least important is to have the wall structurally as well as architecturally correct. In the desire to gain the result do not lose sight of the necessary through or bonding stones. They not only tie the face work to the backing but the different texture of the end grain lends interest to the wall. All arches, openings, etc., must be so laid that they not only appear to but actually bond thoroughly into the rest of the wall. These are details which come only with experience and are points which can be taken care of at the building as the work progresses. They are as necessary as anything else and must be understood before stone as a material can be intelligently handled or before the descriptions which will follow can be thoroughly appreciated.

For the sake of ease in description, the writer is going to arbitrarily divide the methods into two sections; the first to deal with Colonial stone work and its variations, including the whitewashed wall, the second with half timbered and such other miscellaneous effects as are somewhat in use.

Before going into the descriptions, however, there follows a brief specification culled from several used by our firm in actual practice to describe for the benefit of contractors estimating the kind of stone to be used and the method of laying to be followed. All architects vary in their use of terms, however, so these are merely to be taken as suggestions stripped of all verbiage, and it must always be remembered that the only way the result is to be obtained is to get it started right at the site.

The following specification is applicable to Colonial houses with walls of long low stones, of the types shown by Fig. 2 and 4.

"All stone walls showing above grade including chimneys, porch columns, walls, terraces, etc., etc., to be of a selected type of stone, from the .................. or .................. quarries or similar to approval. Face stone to be laid with long thin stones, between 3" to 7" in height. Color to be warm gray. Pointing to be flat ridged pointing of white cement, and Jersey gravel and only sufficient lime for working properly."

For English work such as shown by Fig. 5, the following is used:—

"All stone walls, piers, etc., to be of selected stone from the ............, or ............... quarries or similar to approval. It shall be laid rubble with faces of various colors such as brown, gray, grayish blue and green, etc., on long horizontal beds with occasional seam face exposed. Heads of windows to be single stones, seam face out. Pointing to be flat ridged pointing, with bottom cut, of white cement annd white sand with sufficient lime paste for working properly.

For whitewashed walls as shown by Fig. 6, the following will cover:—

"All backing and face stone shall be of any good local stone, subject to approval of Quarry. To be laid and bonded together with through stones every six square feet in cement mortar consisting of one part cement to three parts Jersey gravel or bank sand with a slight amount of lime paste added. As walls are laid fill the joints thoroughly and scrape flush with face of stone with large trowel, leaving ready for whitewash."

*(To Be Continued)*

## Largest Building in the World

WHAT is said to be the largest building in the world is a hangar for the United States Navy, to be erected at Lakehurst, N. J. The hangar will be 800 ft. in length, 270 ft. wide and 180 ft. in height. It will supply housing space for a dirigible much larger than the British airship that recently visited America, and which was too large to be housed in any hangar here.

## Uneven Coatings on Wood Cause Warping

Coatings of equal moisture resistance should be applied to all surfaces of a wood product which would give dissatisfaction if it were to warp in service. Tests at the Forest Products Laboratory have shown that even when wood is properly kiln dried no coating entirely prevents it from picking up or giving off moisture and, consequently, from swelling and shrinking under the influence of varying atmospheric conditions Varnish, shellac, and other moisture-resistant finishes merely decrease the rate at which the moisture changes in wood occur. The higher the grade and the more coats applied, the slower will be the moisture changes.

Unequal coatings on opposite surfaces of a wooden article cause unequal rates of change in moisture content and hence unequal shrinkage on the two sides of the piece. The result is that the wood tends to cup or twist out of shape.

# Legal Department

## How Should this Young Contractor Proceed?

*From G. J., New Jersey.* — I have a chance to take a contract to build three or four houses for a firm in New York. I have never been in business for myself, so I do not know much about the building laws. Can you give me some hints? What is the best way to get a bondsman, as I have no money to start with? What security have I got to get my money when the houses are finished?

*Answer.* — If it becomes necessary for you to give bond under your contract, and you have no friend or friends who will be acceptable to the other party as surety or sureties, it will become necessary for you to get some surety company to go on your bond. Having no capital, you may meet difficulty in getting a bondsman. But if you can convince a surety company's agent of your integrity, it is possible that the company will go on your bond, provided that it is permitted to have a voice in application of payments to be made to you by the owner of the buildings, so as to be sure that you live up to the terms of your contract. The best thing for you to do, on finding it necessary to give bond, will be to consult some surety company agency.

As to security for your compensation under the contract, you should see that the agreement is so drawn as to provide for payments to you as the work progresses, based on the amount of work done. Under the laws of New York, you could also enforce a mechanic's lien against the property by filing notice of lien in the office of the clerk of the county in which the work is done, within four months after performance of the contract.

Since it would "take a book" to explain in even a brief way all the important legal angles involved in the making and performance of a building contract, we suggest that, since you are just embarking upon the building business on your own account, you should retain some attorney specializing in building law to assist you in getting your contract so worded that your rights will not be impaired. Should the owner fail to make his payments promptly, you should consult the attorney at once, to guard against loss of your mechanic's lien right.

In dealing with the attorney, be sure to have a distinct understanding with him in advance as to what fee he will charge you for drawing the contract, or in examining and passing upon such form of agreement as the other party may submit to you for execution.

## Should Architects Be More Careful to Secure Right to Pay?

I believe that a consideration of the decision of the Texas Court of Civil Appeals in the case of Roquemore vs. Emerson-Brantingham Implement Co., 214 Southwestern Reporter, 679, will show that this question should be answered in the affirmative. I believe that it will serve to suggest: (1) That, to avoid misunderstanding as to the terms on which compensation is to be paid, every important contract employing an architect should be in writing, although no formal agreement need be drawn; an exchange of letters will suffice. (2) That where an agent of the owner purports to employ an architect, the latter should make sure that the agent is acting well within his authority.

**If you are bothered by any point of building law, write to our Legal Advisor, A. L. H. Street, LL.B., who is retained for the benefit of subscribers to Building Age, and is at your service.**

In the Texas case, defendant considered the matter of building a branch warehouse at Amarillo. Its local agent engaged plaintiff, an architect, to prepare a sketch of a building, and, afterwards, to prepare detailed plans and specifications. The building project was, however, abandoned after plaintiff had done this work. Defendant refuses to pay for the services, and plaintiff sued, setting up a verbal agreement with defendant's agent for compensation for preparing the plans, etc., and supervising construction, on the basis of five per cent. of the lowest bid made by a responsible contractor on receipt of proposals requested by the defendant. Plaintiff also pleaded a custom under which three per cent. of the price at which a building could be constructed is treated as a reasonable compensation for preparing plans and specifications.

Defendant denied its local agent's authority to employ plaintiff, and also relied on a claim that no compensation was to be paid, in the event of defendant's failure to proceed with the construction.

Trial of the suit resulted in a judgment for plaintiff, but the Texas Court of Civil Appeals has reversed it, on the ground that the trial judge erred in certain technical rulings, which require a new trial. However, the opinion on appeal holds that there was sufficient proof at the trial to warrant the jury in reaching a conclusion that defendant's agent employed plaintiff on the terms asserted by the latter, and that plaintiff was justified under the peculiar circumstances in assuming that the agent was acting within the scope of his authority. The court finds a strong tendency of the evidence in the case to show that defendant was in no way dissatisfied with plaintiff's services, but abandoned the building project largely because of financial conditions, and a request from the War Department that building activities throughout the country be suspended.

This litigation would have been scarcely possible had the architect insisted upon a simple exchange of letters reducing to writing the terms of the contract, and making clear the fact that the agent was acting within the scope of his authority in retaining an architect.

## Just What Care and Skill Must Architects and Builders Use?

A suit involving the liability of a firm of architects for alleged negligence in drawing plans for a house, or in superintending the construction, resulting in destruction of the building by fire, was lately before the Texas Court of Civil Appeals. In this case—Presnall vs. Adams et al, 214 Southwestern Reporter, 357—the court made this general statement of legal principles:

"The authorities, as we gather from a careful reading, lead us to the conclusion that, where the same person is the architect and superintendent, he is liable in both capacities in damages for the lack of skill and care in the construction of the building. * * * They go further even than that, and hold a builder is bound to discover defects that are reasonably discoverable or patent, and where he has reason to know or believe, that the plans are defective, and follows such plans without pointing out the defects to the owner or architect, or has experts at his hands to inspect and pass on them, and has had large experience or holds himself out as competent, he is liable."

It is also held that where an architect makes mistakes in drawing plans and specifications, he is under legal obligation to correct them on discovering their existence while performing services to the owner as superintendent of construction.

The opinion of the court deals more specifically with the question as to whether defendant architects might be sued in the county where the building was located and where the owner resided, or whether they were entitled to insist on suit being brought in another county, in which they resided and where their office was situated. It is decided that the contract was so far performed in the owner's county as to permit him to sue there, under statutes of Texas prescribing where suits shall be brought.

### What Constitutes a "Scaffold"?

A statute requiring "scaffolds or structures" used in erecting or demolishing buildings to be specially safeguarded to avoid injury to persons working on them, or passing beneath, is broad enough to apply to a swinging and shifting platform used as a scaffold. It was so decided by the Missouri Supreme Court in the late case of Propulonris vs. Goebel Construction Co., 213 Southwestern Reporter, 792. The court reaffirms this statement made in an earlier decision:

"It is plain that the statute does include by the use of the words 'scaffolds or structures' all stationary platforms, staging trestles, and other similar false work used in erecting, or in tearing down, buildings of any kind, in addition to the contrivance connoted by the use of the general word scaffold."

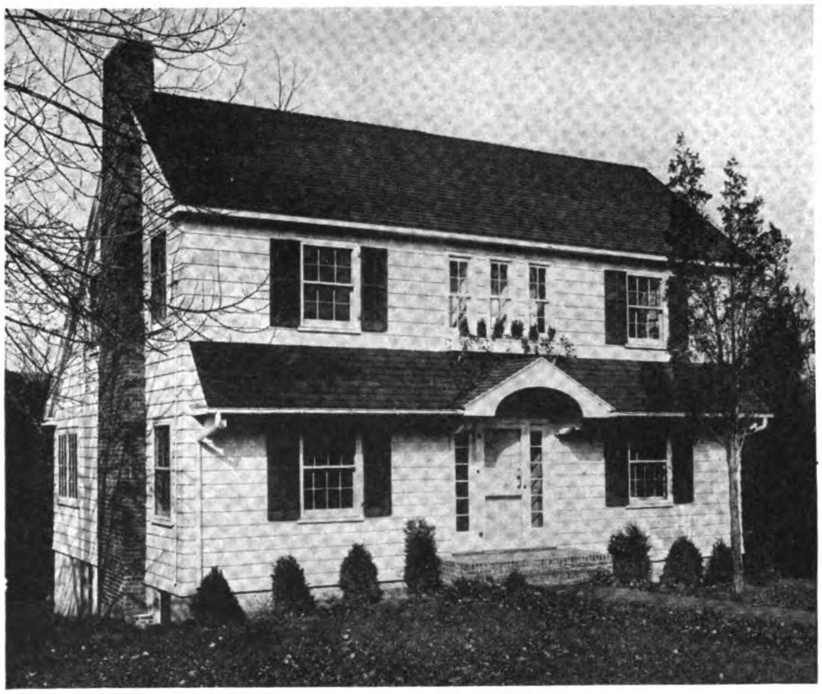
Incidentally, it is declared in the same case that the mere fact of a scaffold falling and injuring an employee raises a presumption of negligent failure on the part of the employer to use due care to have the scaffold in reasonably safe condition. The burden then falls upon the employer, in order to avoid liability, to prove his freedom from negligence, and not upon the injured man to affirmatively show specific negligence.

### What is Collectible When no Price is Fixed? What Fixtures are Lienable?

In the recent case of Fehr Construction Co. vs. Postl System of Health Building, 124 Northeastern Reporter, 315, the Illinois Supreme Court lays down these important rules of law:

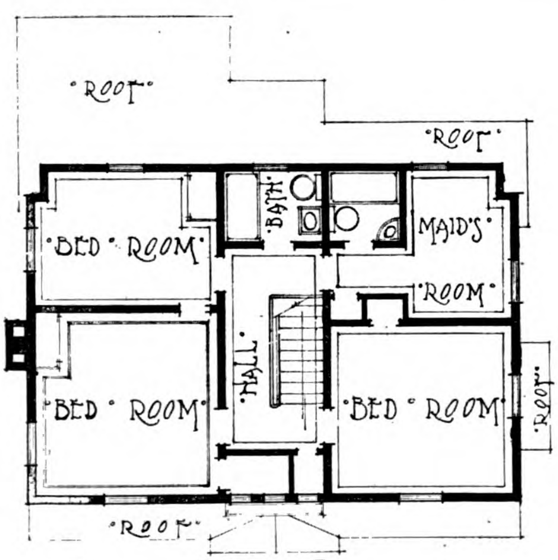
When an agreement for the furnishing of work or materials does not fix the price to be paid, there is an implied understanding that the materialman or contractor shall receive the reasonable cash market value of the materials and the compensation usually paid for such work.

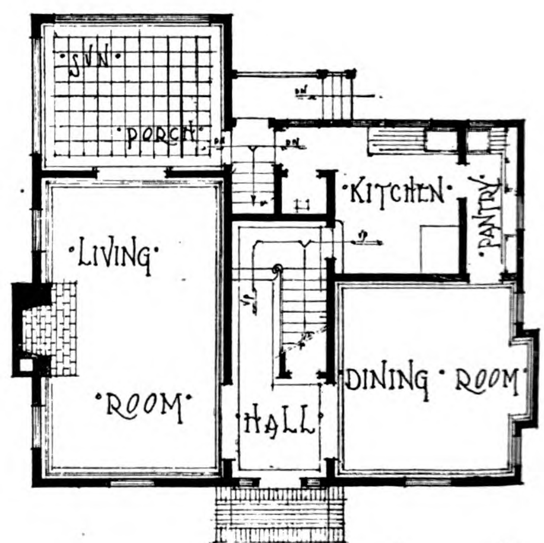
Under the Illinois Lien Law a contractor who installed shower baths, boilers, etc., in a building at the instance of a lessee was entitled to enforce a lien against the building to secure payment of the price due him, where the lease authorized the lessee to install such appliances as permanent features to become the property of the owner of the building, and where the leasing owner of the building knew that the baths, etc., were being installed.

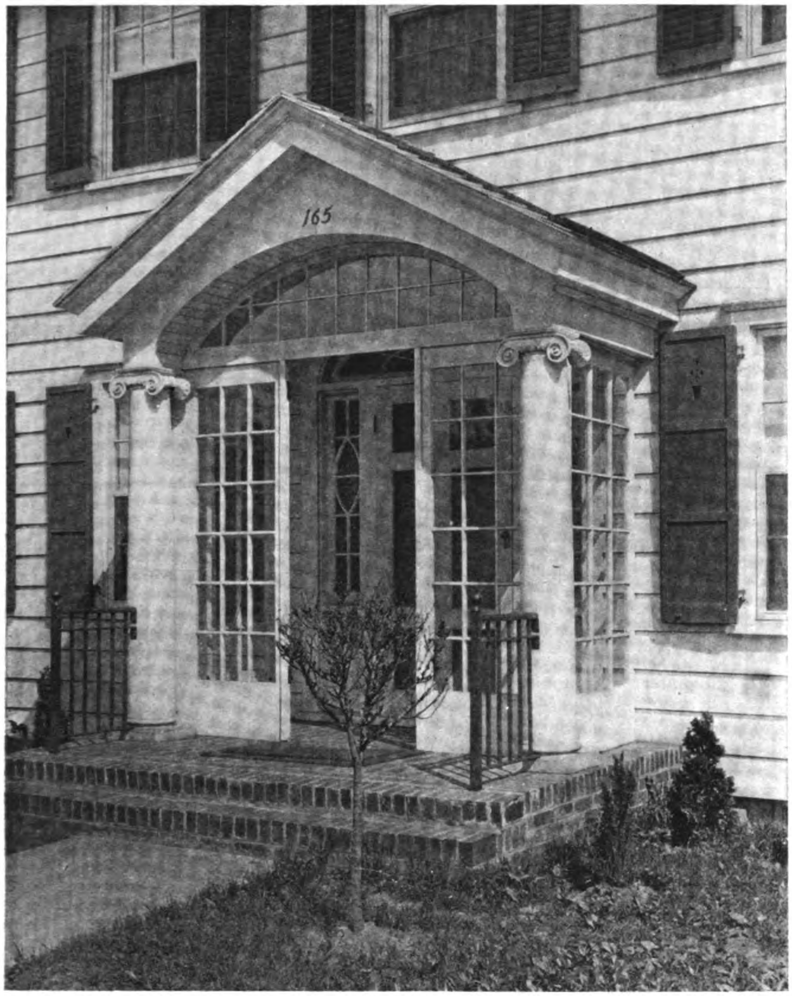


*House at Maplewood, N. J.*

*Kenneth W. Dalzell Architect*

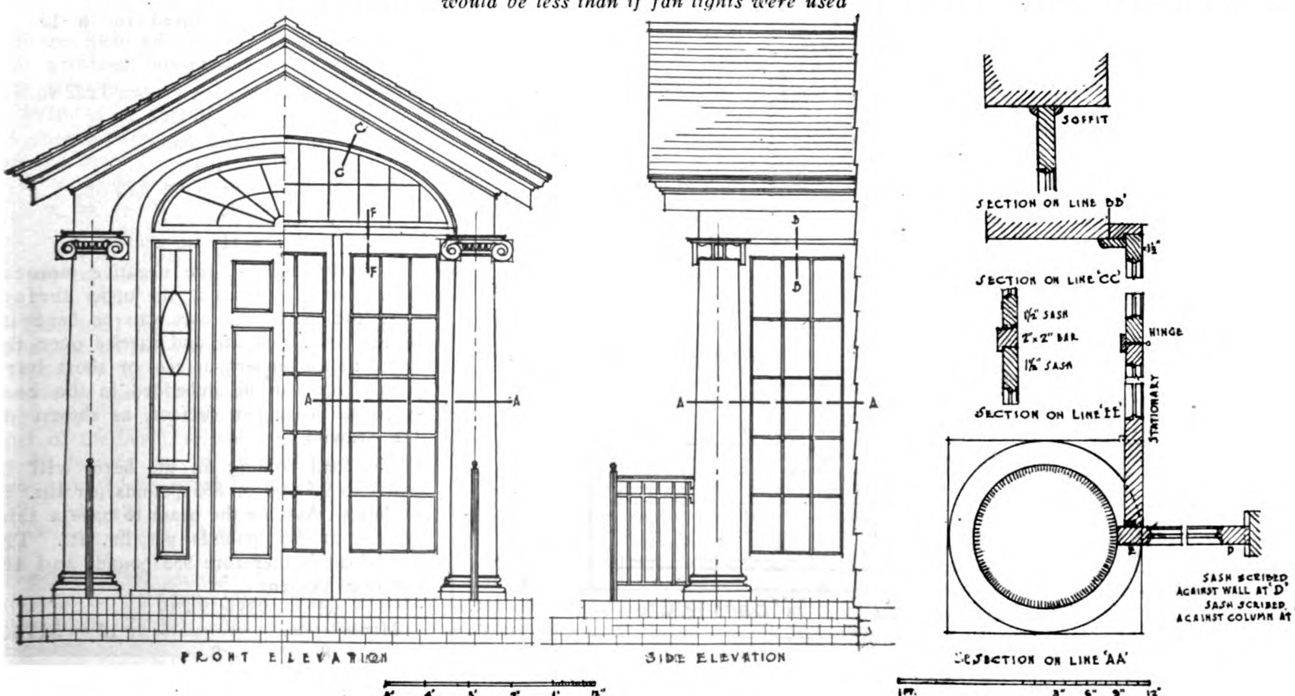


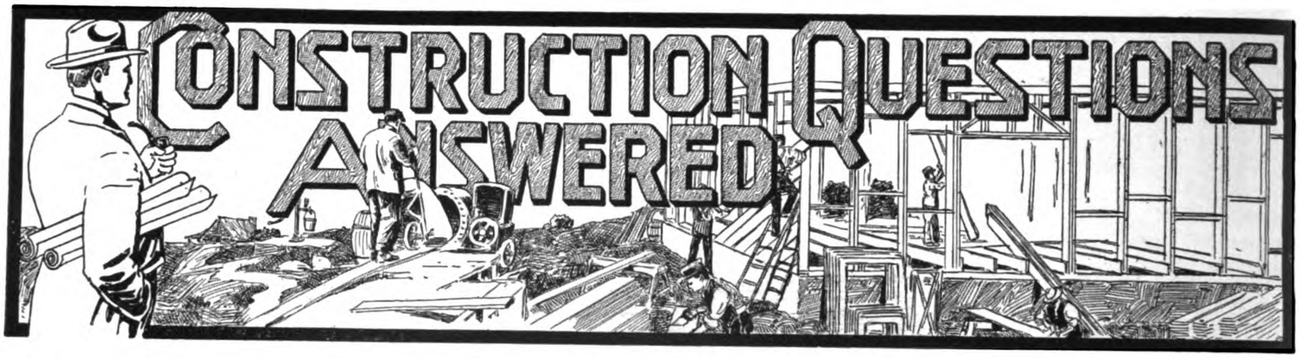





# Storm Door for Enclosed Porch

*Usually a storm door is an unsightly thing, but this illustration shows what can be done in the way of making a storm door that, if anything, adds beauty to the doorway. Each of the various sections is fastened in place by screws and so all are easily removable. Perhaps the only criticism that might be made is that some would prefer a fan light in the transom instead of the vertical bars. As this transom, however, is removable, and the glass is apt to be broken, the cost of repairing a pane of glass would be less than if fan lights were used*






## The Construction of a Concrete Floor of a Porch, that also Serves as the Roof of a Garage

*From S. E. T., New York.*—Will you please tell me the best way and also give detail sizes of supports and bars to use, to support a concrete porch floor that is to make a roof for a garage. Outside measurements to be 19 ft. by 20 ft. and side walls to be of 8 in. or 10 in. concrete.

*Answer.*—A simple form of construction is to have a beam perpendicular to the main house, thus dividing the floor slab into two bays the spans of which will be practically 9'-6" each.

Assuming a live load of 40 pounds per square foot and a 4 in. floor slab weighing 50 pounds per square foot we have a total load of 90 pounds per square foot.

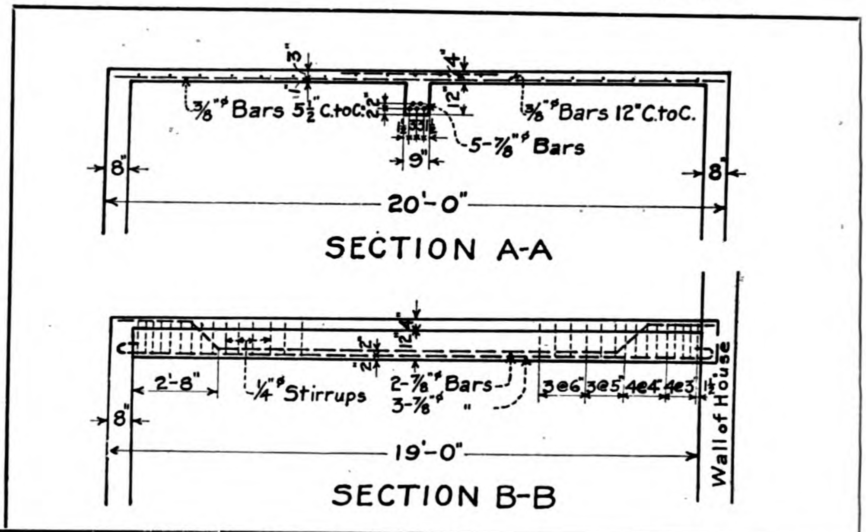
A beam continuous over two spans should be designed for a bending moment of $M=wl^2\div10$ at the middle of each span.

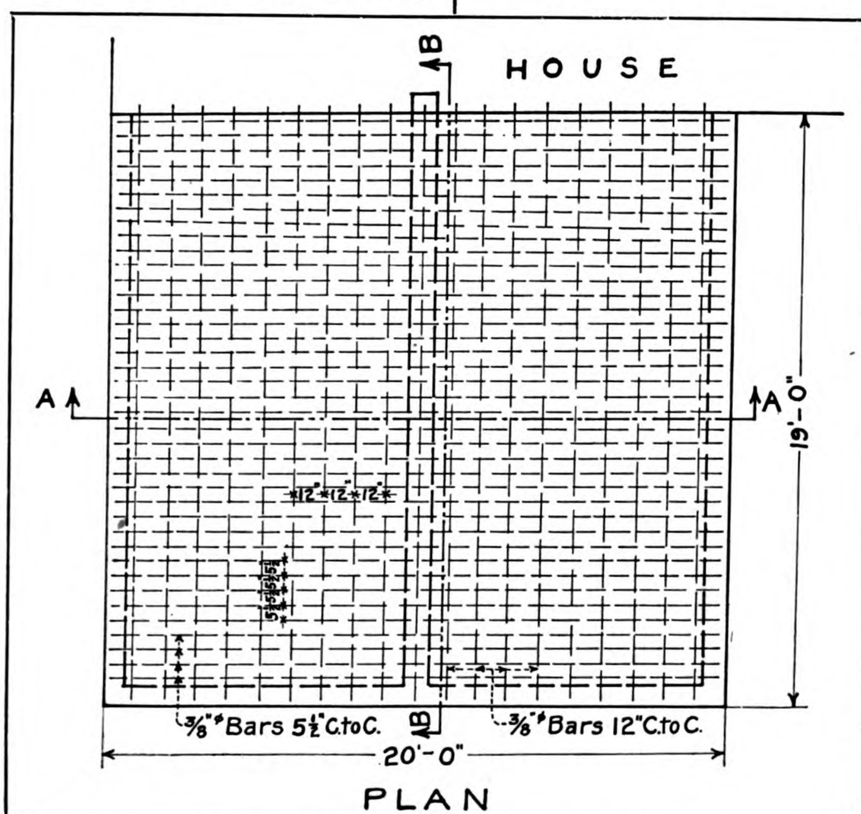
The bending moment for a strip of the slab 12 in. wide will therefore be equal to

$$M=\frac{wl^2}{10}=\frac{90\times9.5\times9.5}{10}\times12=9750 \text{ in. lbs.}$$

The effective depth

$$d=\sqrt{\frac{M}{Kb}}=\sqrt{\frac{9750}{107.4\times12}}=2.75 \text{ in.}$$




Use a 4 in. slab and place the steel one inch above the bottom giving an actual $d$ of 3 in.

The steel area required for a 12 in. strip.

$$A_s=\frac{M}{f_sjd}=\frac{9750}{16000\times874\times3}=0.232 \text{ sq. in.}$$

With 3/8 in. round bars

$$\text{Spacing}=\frac{12\times.1104}{.232}=5.71 \text{ in.}$$

Space the bars 5½ in. centers.

To take care of the negative moment which causes tension at the upper surface over the beam, the bars can be bent up at the quarter points and carried over the beam at the upper surface, or short bars, 5 ft. long, can be imbedded in the concrete at the upper surface, as shown on the drawing.

The load coming on the beam will be equal to 9.5×90 or 855 pounds per lin. ft. of beam. Assume the beam to have a trial weight of 100 pounds per lin. ft. The total load is therefore 955 pounds and the bending moment

$$M=\frac{wl^2}{8}=\frac{955\times19\times19}{8}\times12=517100 \text{ in lbs.}$$

The section of a T-beam is mainly controlled by shear, which should not exceed 100 pounds per sq. in. when bent bars and vertical stirrups are used.

The total shears

$$V = \frac{955 \times 19}{2} = 9070 \text{ pounds.}$$

With a beam 9 in. by 12 in. below the slab the unit shear accuming $j$ at 0.9, is equal to

$$v = \frac{V}{b'jd} = \frac{9070}{9 \times .9 \times 13} = 85 \text{ pound per}$$

sq. in., which is a good working value.

The area of steel required for the beam,

$$A_s = \frac{M}{f_s jd} = \frac{517100}{16000 \times .9 \times 13} = 2.76 \text{ sq. in.}$$

Use 5⅞ in. round bars, the area of which is 3.00 sq. in.

$$\text{The actual } p = \frac{A_s}{bd} = \frac{3.00}{57 \times 13} = .004$$

The T-beam falls under Case I, for which the rectangular beam formulæ can be used, giving $k$=0.292 and $j$=0.903, and no revision of the design is necessary.

Two of the bars will be bent up to assist in taking care of the shearing or diagonal tension stresses, while the remaining three bars will be run straight through as shown on the drawing.

The bond stress on the lower bars at the end of the beam will be equal to

$$u = \frac{V}{\Sigma_o jd} = \frac{9070}{3 \times 2.749 \times .903 \times 13} = 93 \text{ pound}$$

per sq. in.

As the allowable bond stress for plain bars is 80 pounds per square inch the ends are bent up to form hooks. Should deformed bars be used these hooks would not be necessary as the allowable bond stress for deformed bars is 100 pounds per square inch.

The unit shear exceed the 40 pounds per square inch allowed for plain concrete, and provision must be made for the shearing stresses.

With ¼ in. round bars for stirrups, the U shaped stirrup can be spaced at the end of the beam

$$s = \frac{3}{2} \times \frac{a_s f_s jd}{V} = \frac{3}{2} \times \frac{.098 \times 16000 \times .903 \times 13}{9070} = 3 \text{ in.}$$

The total number of stirrups required is equal to two-thirds of the total shear divided by the value of one stirrup. Two-thirds of the total shear from the end of the beam to a point 60 inches from the end of the beam, at which point the shear is 40 pounds per sq. in. and no stirrups are required, is equal to

$$\frac{2}{3} \times \frac{vb + v'b'}{2} \times 60 = \frac{2}{3} \times \frac{85 \times 9 + 40 \times 9}{2} \times 60 = 22500 \text{ pounds.}$$

The value of one stirrup is $2 \times 0.049 \times 16000 = 1570$ pounds. Therefore $22500 \div 1570 = 15$ stirrups are required.

The question was answered on the assumption that the foundation wall of the house can be used for supporting one end of the beam. Should this be impracticable a column can be built against the foundation wall to take the reaction of the beam. A 9 in. by 9 in. column reinforced with 4½ in. round bars will suffice for the purpose.

To prevent shrinkage cracks ⅜ in. round bars, spaced 12 in. centers, are placed at right angles to the slab reinforcement.

The concrete floor as designed should make a watertight roof if the work is carefully done, but it might be well to give it a slight pitch to shed the water, and if desired a mortar finish might be used on top.

L. GOODMAN, C. E.

## What Kind of Refrigerator Is Best?

*From McCray Refrigerator Co.* — We have just received the August issue of BUILDING AGE and read with great interest the article which you ran on page 273 entitled "Bringing Efficiency to the Kitchen," by Arthur Weindorf, Architect.

You know that the Architect or Builder does not design or build the kitchen range, the vacuum cleaner system or the heating plant. He simply specifies this equipment. Why should then an Architect design and build the refrigerator? The refrigerator is more important than these other features, as upon its efficiency depends the health of the family.

The refrigerator illustrated in connection with the article by Mr. Weindorf is from a refrigerator engineer's viewpoint not at all practical. Mr. Weindorf suggests zinc lining and glass shelves, both of which have been abandoned by responsible refrigerator manufacturers many years ago. The zinc lining is dangerous to the health of the family because it brings about ptomaine poisoning and the glass shelves will not permit the circulation of the air and therefore decreases the efficiency of the refrigerator.

## Tables of Thickness of Hollow Tile Walls for Various Heights

*From H. P., Va.*—Feeling that a table giving thickness for different heights of bearing walls of hollow building tile laid with cells horizontally will be of interest to many of your subscribers, so I am asking if you will try to get Mr. Cosgrove to give you such a table for publication in your department Masonry Construction, in an early issue.

*Answer.*—The right thickness for walls of hollow tile laid with cells horizontal instead of vertical, is a matter builders in general are showing an increasing interest in. This is due to the fact that although designed for end construction, hollow tile possesses sufficient strength when laid on side to serve as bearing walls for buildings of average size and use. On account of this great strength when laid on side, builders are laying them in that position, when not prevented from doing so by the specifications, notwithstanding the fact that manufacturers recommend laying them on end.

The chief reason they are laid on side is the greater speed with which they can be laid, consequently the greater amount of wall that can be laid up in a given time by a workman.

This practice, while not recommended, is at least safe for buildings not over five stories in height; and the thickness of the walls in such cases need not be greater as a rule than corresponding walls of hollow tile laid on end. There is this exception to note, however. No wall of less thickness than 8 inches should be laid on side.

The thickness of walls of hollow tile for buildings from one to five stories in height can be seen in the accompanying tables. For convenience in comparing, the tables are given. One shows the thickness of hollow tile walls when the blocks are laid on end, the other shows the thickness of walls of hollow tile when the blocks are laid on side.

TABLE I

Thickness of Bearing Walls of Hollow Tile Laid with Vertical Cells

| Number of Stories in Height | Thickness of Walls, Inches | | | | |
|---|---|---|---|---|---|
| | First Story | Second Story | Third Story | Fourth Story | Fifth Story |
| One | 6 | .. | .. | .. | .. |
| Two | 8 | 6 | .. | .. | .. |
| Three | 10 | 8 | 6 | .. | .. |
| Four | 12 | 10 | 8 | 6 | .. |
| Five | 12 | 10 | 10 | 8 | 6 |

TABLE II

Thickness of Walls of Hollow Tile Laid with Horizontal Cells

| Number of Stories in Height | Thickness of Walls, Inches | | | | |
|---|---|---|---|---|---|
| | First Story | Second Story | Third Story | Fourth Story | Fifth Story |
| One | 8 | .. | .. | .. | .. |
| Two | 8 | 8 | .. | .. | .. |
| Three | 10 | 8 | 8 | .. | .. |
| Four | 12 | 10 | 8 | 8 | .. |
| Five | 12 | 10 | 10 | 8 | 8 |

A little thought will show that hollow tile laid on side are strong enough to support ordinary loads. The arches used in buildings of fireproof construction if not of the side type of construction will be found to contain some blocks of side construction, and as a chain is no stronger than the weakest link, so an arch is no stronger than the weakest course of tile in it. The blocks used in combination side and end construction are usually the key blocks, and if they were not sufficiently strong for the purpose would neither be used or permitted. If they can safely be used for arches of tall buildings, they may with equal safety be used for bearing walls of low buildings not heavily overloaded.

The thickness of walls given in the accompanying tables are for ordinary buildings only, such as residences, stores and apartments. For warehouses carrying extra heavy loads, factories, loft buildings and like structures, the thickness of the bearing walls would have to be worked out from the loads they would have to sustain. Knowing the live loads the walls would have to bear, and the safe strength of the hollow tile, the thickness of wall to carry that load would be calculated with but little trouble.

J. J. COSGROVE.

# Good Design in Rectangular Type of House

## *Horizontal Lines Predominate. Two Bath Rooms on the Second Floor a Feature*

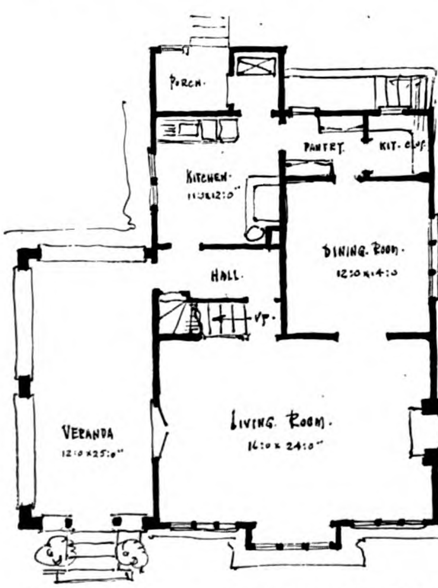
*Book cases at either side of a fireplace like this are quite popular, although care should be taken to place them far enough on either side so that the bindings will not be injured by the heat*

THE type of house illustrated in this article is one of the most popular in practically every section of the country. Being plain and with no complicated roof framing, it is easy to build and, therefore, comparatively inexpensive. As the house is usually rectangular in plan, the rooms can readily be placed to excellent advantage. Indeed, it is perhaps easier to prepare a good economical plan with this type of house than with any other.

Because this type of house is inexpensive to construct, it is generally built by contractors who desire to erect a house on speculation, and who often pay little attention to the architectural niceties. As a result, many of the houses of this type are an eyesore to the community, since they usually have little to recommend them besides a good plan.

The house illustrated, however, shows what can be done with this type of house by a competent architect. The body of the house is so proportioned as to be decidedly attractive, and the slope of the roof harmonizes with the rest of the house. The overhang is not too heavy and the mistake of having rafters jut out and heavy brackets provided is avoided.

*Detail of the entrance*




*First floor plan. A change when the house was built provides for the entrance directly into the living room instead of on to the veranda*

The placing and proportions of the windows should be noted, as it is in the scaling of minor details like this that the designers of such buildings usually go astray. Much of the success of any design is dependent upon the handling of the window openings and their proper balance to contrast with the walls of the house.

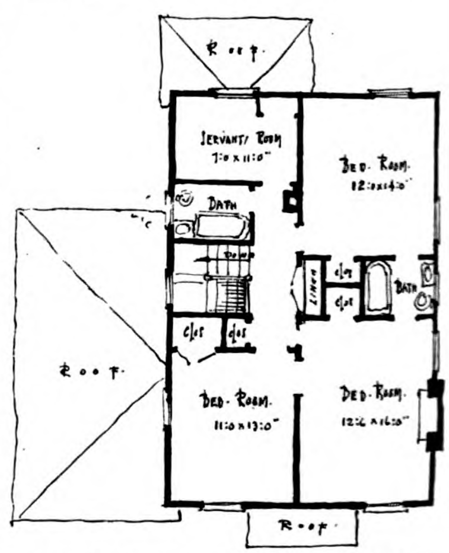
Perhaps the center of interest of the front elevation is the entrance hood over the doorway, which is curved just enough at the eaves to form an agreeable contrast to the straight, horizontal lines of the rest of the house.

One enters directly into the living room, at the right of which is a brick fireplace with a wooden mantel and flanked on either side by book cases. The center of interest of this room is the well designed stair, which opens directly from it. The stairs are of the combination type. This arrangement of the stairs is a change from what was decided on, as shown in the floor plans presented.

The living room communicates with the dining room through a cased opening. Communication between the kitchen and dining room is established through a pantry which contains ample cupboard space.

Four bed rooms and two bath rooms are provided on the second story. One of these bed rooms is small and intended to be a service room, just off of which is one of the bath rooms.

This house is located at Hackensack, N. J., and was built for Mr. Johnson in accordance with plans and specifications prepared by Mann and MacNeille, architects, 70 East 45th street, New York City.




*Four bed rooms and two bath rooms are located on the second floor*



House at Hackensack, New Jersey. Mann & MacNeille, Architects

# How to Build and Fireproof With Hollow Tile—XIX

## *Why Character of Job Influences the Estimate—What Equipment Should Be Charged For*

By J. J. Cosgrove

TO say that a certain number of hollow tile can be laid by a bricklayer in an 8-hour day is to state a fact without interpreting it. The statement is a true one, perhaps, so far as it goes, but it does not go far enough in many cases.

A mason can lay so many hollow tile blocks in a day and do it day in and day out; but he must do it from a scaffold already prepared for him, on forms already placed for him, and with materials carried to him no matter what the height of the building.

The cost of laying hollow tile, then, is not the total cost for the contractor, and the careful estimator must take into account those various items which run up the unit cost for labor, even though the number of hollow tile blocks laid by the workmen does not vary from day to day.

When working on the first floor of a building, up to breast high, the cost per square foot of wall surface will be the least of any in that building. This is because the material is close at hand and can be delivered to the masons with the least possible loss of time. There are no stagings required, no runs, and no forms. The same care is not required to insure safety from accidents as when the bricklayers are working at a dizzy height and caution is necessary to keep from falling off the scaffold. When working under tension of any kind one cannot put forth his best efforts, and at no point in the building is there less tension than when laying the first several feet in height of the wall.

As the height of the wall increases, it requires more labor to bring material to the masons, and this necessitates an increase in the number of masons' helpers employed.

If the building is a large one, or at all events a tall one, a hoisting apparatus must be employed to elevate the material to the floors where it will be used. When the walls of th building reach the height where it is necessary to use a hoisting apparatus, about double the number of masons' helpers will be required to carry material, but no more are of course needed to mix or temper mortar. It will take one set of helpers to carry material from the storage heaps in yard or street to the elevators, and another set of helpers to remove the materials from the hoists at the several floors and distribute it to the workmen.

Do not forget that an engineer must be employed to operate the hoisting engine, and that this engineer must be licensed. Sometimes, however, the cost of operating the hoist can be distributed pro rata among the various contractors according to the amount of material hoisted or the total length of time the machine is used by each contractor. Carpenters, plasterers, plumbers, steamfitters, electricians, tile and marble setters, sheet metal workers—all have more or less material to put off at the various floors, and by combining on the expense of installing and operating the hoist, the cost to no one is excessive.

Coal is no small item of expense in connection with the operation of hoisting apparatus, and ropes and cables, as the case may be, will hardly outlive one large job and be in good condition for another one. Therefore the cost of rope or cables should be added as material in making out an estimate. Take a building thirty or more stories in height and considerable cable would have to be provided for the battery of hoists that are needed.

The cost of erecting hoisting apparatus in a very tall building is no inconsiderable amount. Of course the extension of the system is gradual as story after story is added to the building, but it is real, nevertheless, and takes as much or more time and as much material as though put in at one time.

Just whether to charge to material the staging, forms, and other lumber used when installing hollow tile blocks, or furnish it without cost as part of the equipment, often is a question the estimator is at a loss to answer, so a few words about equipment here will not be amiss. There are times when it is not only permissible but eminently proper to charge all staging lumber and other equipment as expendable material. Suppose, for instance, in a small town with buildings seldom exceeding three stories in height, a tall state or Government building was to be figured on. Such a building would require many thousand feet of lumber which would have but little market value after the masons got through with it, and would be of no further use to the contractor. Yet, the lumber would be absolutely necessary as a means to the end in building the structure.

Of course the lumber would still be useful for similar purposes on other large jobs, but there would be no other large jobs in that locality, so the material would be a practical loss unless it is bought and paid for as material, not used as equipment.

Equipment itself is an item to be considered. Many masons in estimating the cost of work make no item of equipment as they happen to have it on hand. Most masons have in their yards sufficient planking, mortar boards, mortar boxes, wheelbarrows, hoes, shovels, hose and like equipment to carry on their several jobs. Having it on hand and not expending it—but simply using it for a few weeks or months and then returning it to their yards again, they come to look upon it as workmen look upon the trowels they purchase—something which ought to be supplied free of cost.

Such is not the case, however. Everything the contractor has to furnish in putting through a job ought to be charged for. Not the total cost, of course, but rental, interest on cost, depreciation or anything you may want to call it.

Look at it in this light. Suppose you did not have the necessary equipment but had to rent it. What would it cost? You would have to pay something for it, and that amount would be a fair value to set on what you supply others. It is an expense or "cost" to you, and you ought to realize on everything used in your business. When you purchased the equipment originally you had to pay good money for it. If you had not purchased it you would still have the purchase money in the bank and that purchase money in bank would bring you in certain percentage or interest every year which you are losing unless you get it back for rental of equipment.

Again, the equipment is not used at all times, so you have to provide a place to store it when not in use. A mason usually has a store yard and sheds. If the yard were not used for that purpose it could be rented to some one else, so the equipment is costing monthly rental for the place in which it is stored.

Once more; equipment depreciates in value with time, whether it is in use or in storage. Pick handles break; shovels wear out, lumber gets broken, burned or lost; hoes get stolen or mislaid, and thus the end of each year finds the mason's equipment of less value than it was at the same time the preceding year. This is a loss the contractor must stand unless he makes a charge for the use of his equipment every time he estimates on work, either directly as rental, or included in his overhead.

To summarize, there is a loss of interest on money invested, there is loss due to rental of storage space, and there is loss through depreciation of the equipment from rot, rust, breakage, theft and other causes. To offset all these leaks, something must be added to the contract price for equipment, unless the contractor knowingly wishes to ignore those items of expense and throw them in with the work for good measure. Even if he does so, he must do it with full knowledge that he is giving something of value for nothing, and with the mistaken belief that he is supplying nothing for something.

The same is true of teaming or trucking. It is not good cost-estimating just because you happen to have teams and trucks to consider the expense attached to them as belonging to "overhead" and not charging it to any one job when you can do so. The IDLE time of trucks, teams and equipment are properly charged to "overhead," but the work they actually perform should be charged to that job.

It is true, of course, that large department stores will sell—and deliver—a spool of thread and cover the cost by charging back as overhead the operation of delivery wagons. But there is a vast difference between the operation of a department store and the running of a contracting business laying hollow tile.

The store sells and delivers goods. The contractor sells and uses up his goods in construction. To serve its customers a department store keeps a number of delivery wagons covering certain districts or routes. It has, or aims to have, every householder in the city as customers, so has to maintain a delivery service whether all buy or not. The delivery service is a proper overhead charge in such a case, and the percentage having been determined it is added to the cost of all goods sold so that whenever anything is purchased the delivery of that article is paid for even though the purchaser carries it home.

The teaming, trucking or "delivery" of building material to the site of contracts cannot be predetermined in the same way in the case of building contractors, so the best way is to include the cost as one of the items of expense when making out an estimate of the cost of each building figured on.

The question of overhead is such a broad one that many installments could be written about it without exhausting the subject. Space being limited, however, we will leave it for some other pen, simply touching the high spots here by asking the questions:

Do you pay yourself a salary, or allow for it as "superintendent" when figuring a job?

Or do you expect to get your stipend for your service out of the profit of the business?

Suppose there is no profit; what would you get it out of then?

*(The End.)*

# How to Finish Common Woods—II.

## *Data Worth Preserving for Specification Reference*

**By A. Ashmun Kelly**

*Oak.*—Open grain and mostly coarse, requires paste filler. Fill full, to make a solid foundation for the varnish coats to lie on. Oak may be finished in more ways than any other of the woods employed in the house trim. The entire color scale has been used in refinishing oak, and then some. Fantastic colors, from brilliant vermilion to black. Even white has been used. But the most enduring styles have been the antique and mission. A little stain, of course, does good in making the work more uniform of color, and this is true of many other woods. In its natural state selected oak makes a very attractive finish, either in dead or luster varnish. White oak is the best for fuming effects, owing to its greater content of tannin. But it is a mighty scarce wood now. Staining may be done with such pigments as burnt umber, Vandyke brown, asphaltum, etc. The latter gives a very fine antique oak, but varnish does not do well on it. Drop black also may be used, and is used for certain finishes, but umber and Vandyke brown are very satisfactory.

*Rosewood*—This wood has a course grain, hence needs a paste filler, which must be colored to suit the color of the wood; two coats of filler do best. The filler can be stained with rose pink or rose lake, burnt sienna and drop black. For staining use a mahogany stain, but it will require several coats to secure a desirable depth of color.

*Redwood.*—Paste filler, well rubbed into the wood, and this rubbed off in the usual manner after about 15 minutes. After 24 hours sandpaper smooth, apply two coats of shellac, then from two to five coats of polishing varnish, for the best work. Rub last coat with pumice-stone powder and water, let stand 24 hours, then rub with powdered rotten-stone and water, let it dry, then wash off with water and chamois. Then rub with sweet oil and wipe off with a rag slightly damp with alcohol to remove oil. Cheaper finish may be had by two coats of varnish over one coat of shellac, rubbing the last coat of varnish with curled hair.

*Red Gum.*—Same as for birch, which see.

*Sycamore.*—Same as indicated for maple, only that a dark shellac may be used if preferred, orange shellac giving it a nice color. Sycamore should not be stained, but be finished in the natural.

*Walnut.*—Fill with paste filler, colored with burnt umber. Over this apply shellac, rubbing the last coat with flour pumice stone and raw oil, with a woolen or hair rubber. Walnut may also be done entirely with shellac, preserving the natural color of the wood. If the wood is not evenly colored naturally, it should be stained with burnt umber. Walnut may be oil-rubbed and polished, or French polished.

*White Pine.*—This is seldom finished as the harder woods are, yet it makes a beautiful bedroom finish, done in the natural. White shellac should be used for the coating, with varnish for the finish if desired, though shellac finish does very well too. Two coats of shellac with rubbing down with fine sandpaper should be followed with two coats of pale finishing varnish. White pine does not take stains well, hence it is not often done.

*Yellow Pine.*—Shellac, white if a light colored wood, and orange if a darker wood. Much of the finishing of this wood for cheap work is done with liquid wood filler, one coat, and a coat of hard oil varnish. School furniture made of this wood is usually sized with glue size, then a coat of cheap varnish, another glue size and lastly a coat of hard cheap copal varnish. This makes a very durable finish, too. A very difficult wood to stain, owing to the fact that its grain is readily hidden or blurred by stains.

*Whitewood.*—The best first-coater for this wood is Damar varnish, which will best preserve its natural white color. Thin the varnish by adding one part of turpentine to four parts of Damar. Over this may be applied a pale copal varnish. Usually white shellac does very well on light color woods, like maple, holly, whitewood and white and yellow pine. Shellac is the hardest gum varnish, Damar the softest. Whitewood may be stained as desired, and for cheap work stain and filler may be combined by making a filler-stain with whiting and raw sienna, with a trifle of burnt sienna. Apply as a thin paste. Common furniture is finished with this stain filler in water color, with cheap furniture varnish for the finish.

*(The End.)*

## How Much Should Property Rent For?

Present day high rentals are subjected to much unfavorable comment. Undoubtedly in more than a few cases there has been profiteering, but not nearly to so great an extent as is generally supposed. For years real estate has been a poorly paying investment, due to the fact that it was often owned by those ignorant of sound business principles. Such persons considered six per cent. a good interest on their money, overlooking the fact that taxes, repairs, depreciation, mortgage charges, etc., ate up practically all of the rental and not infrequently even more.

Fifteen per cent return on the real value of property is necessary if the investment is to be a paying one, according to Herbert V. Nelson of the Minneapolis Real Estate Board. He figures that the owner is entitled to a net return of six per cent. on his investment to begin with. To this he adds 2.6 per cent. to cover taxes and water rates and 1 per cent. for vacant periods, based on a ten-year period. In addition he computes that repairs will necessitate yearly expenditures amounting to 1½ per cent. of the valuation and insurance one-tenth of 1 per cent, while the services of a broker or the owner's own time spent in looking after the property is worth at least 5 per cent.

Lastly he believes that depreciation will annually cost the Landlord 3 per cent. and should be charged off at this rate, whether the house be new or old. These total 14.7 per cent., which Nelson says is the lowest sane figure on which to base rentals.

# Increase in Building Costs Predicted

## *J. P. H. Perry of Turner Construction Co., Gives His Views*

IN response to a request for authoritative information on the future trend of industrial construction costs J. P. H. Perry, vice-president of the Turner Construction Company of New York, said that they are likely to be 15 per cent higher next year. Following are questions put to Mr. Perry and his answers:

*What do you think will be the trend of industrial costs in the future?*

They will increase. It would not surprise us to see the figures in the spring of 1920 at least 15 per cent higher than on September 1, 1919.

*What is the reason for this increase?*

Steadily and rapidly advancing labor and materials costs due to higher wages, labor shortage, labor unrest and, particularly, curtailed production per man.

*What do you think will influence a reduction in building material costs?*

Increased production, greater labor efficiency in factories and on the jobs.

*How do present prices compare with pre-war conditions?*

We have just completed a study of the costs of two average buildings, built in each of the years from 1909 to 1919, and find that the costs (using 1909 costs as a base, or 100 per cent.) have fluctuated as follows: 1909, 100.0 per cent; 1910, 98.9; 1911, 93.3; 1912, 95.4; 1913, 92.3; 1914, 90.4; 1915, 87.9; 1916, 103.5; 1917, 138.6; 1918, 171.6; 1919 (first half), 174.8. There was a gradual decline from 1909 to 1915 of 12 per cent. The increase since 1915 has been fairly uniform, except that there was a considerable drop between November, 1918, and May, 1919.

*Were there any economic reasons to explain the low building costs of* 1915?

The year 1915 was the first year since 1867 that the average costs of building materials were below other commodities, with the exception of a few months in 1897. Between 1867 and 1891 building material costs averaged about 20 per cent above other commodities. From 1897 to 1915 building materials kept well above general commodities.

*Have you any authorities for those figures?*

Yes. In a bulletin issued by the United States Department of Labor on March 4, 1919, general commodities, exclusive of building materials, were relatively 52 per cent higher than building materials, using 1913 as a base. Revising the foregoing figures and basing on 1914, we find the following variations: 1914, 100.0 per cent; 1915, 97.2; 1916, 114.5; 1917, 154.0; 1918, 190.0; 1919 (first half), 193.0.

*What items enter into the compilation of these figures?*

They have been based upon the following items, which are the major ones entering into the average industrial building. The percentage indicates the proportion of cost that each item bears to the others: Sand, 3.8 per cent; cement, 18.5; form lumber, 11.6; floor form labor, 18.4; stone, 8.5; steel, 24.4; concrete labor, 8.6; steel labor, 7.2; total, 100.0.

*In view of the present prices, how do manufacturers feel about building?*

Since July 1, 1919, we have closed many contracts for factories and warehouses.

*Have you in mind any special reasons for this revival of industrial building?*

Yes. We are in for a period of high prices—possibly from three to five years—before conditions influenced by the war adjust themselves. The destruction of billions of dollars of property and the loss of millions of human lives represent an economic loss the world will have to pay for before anything like pre-war costs or prices can return. A highly inflated world money market has also had a very important effect on the present purchasing value of the dollar. The loss of human life is responsible for the present world-wide labor shortage. An almost complete cessation of immigration has made labor conditions in the United States especially bad. The present abnormal demand for buildings is due to the pre-war tightness of the money market and the curtailment of material and labor during the war. Today as a nation we are more under-built than at any other time in our history.

*How do you explain the present activity in business at such high prices?*

Following the close of the war the demand that existed for all materials, occasioned by world-wide under-production, created a wild era of buying unprecedented in the history of industry. Furthermore, a general let-down and freedom from war anxiety released many purse-strings. The present wage-earning level of laboring people generally is abnormally high. They have at their command more ready money than at any past period. With more money than they ever expected to handle, they are spending it extravagantly.

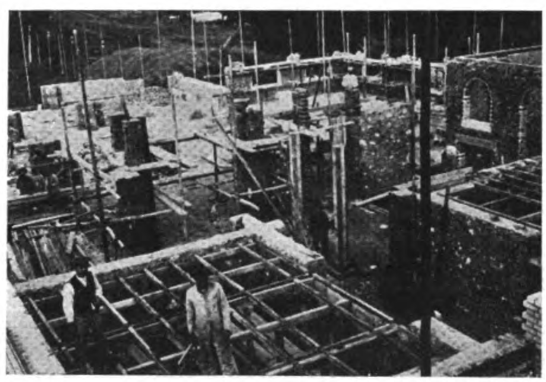
# Building Conditions in France

## *A Shortage of Materials—What the Government and the American Red Cross Have Done*

IT is well known that the demand in Europe for building materials will affect building costs here in the United States very considerably. As a measure of the demand from foreign quarters, a glance at the work to be done in France will give an idea of what may be expected.

According to figures compiled by the American Red Cross, 5 per cent of France was invaded, nearly half of which territory was entirely devastated, the loss being 1,223 communes with 500,000 buildings. The total devastation of buildings alone in France has been estimated by government engineers at $6,000,000,000.

Prior to the war, building in France annually was 7 per cent of the amount destroyed during the war. Owing to the numerous casualties which have brought down the number of builders from 750,000 to 500,000 it will require 20 years to replace the destruction of the war, calculated on the pre-war rate.



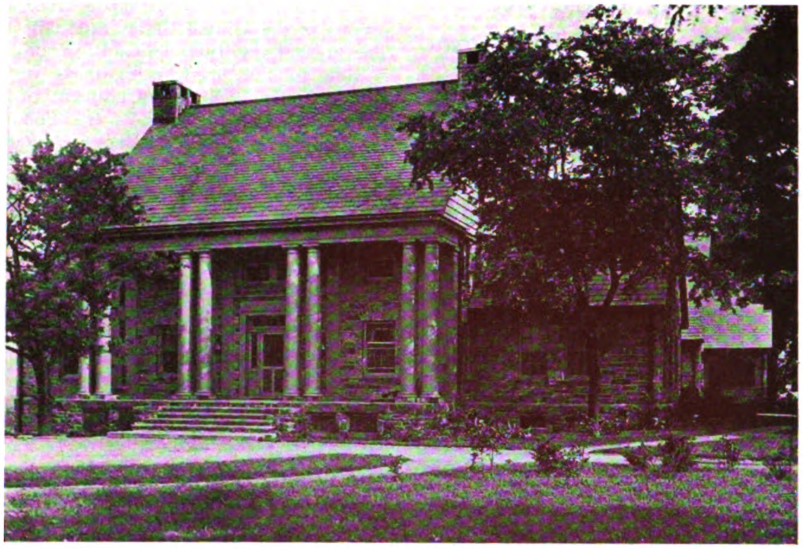
*Discharged French soldiers building a Red Cross hospital*

An obstacle to the reconstruction of devastated territory is the shortage of material, for 2,000,000,000 feet of lumber were destroyed by the Germans, who have made much of the great forest lands in France of no value.

At the beginning of the war about 1,800 apartment houses were under construction in Paris. Owing to the great shortage of homes, which made many people shelterless, the American Red Cross completed these apartment houses and carried on like activities in other cities. In order to help solve the

(*Continued on Ad. page* 24)

*Red Cross workmen rebuilding a commune destroyed by German shells*



*Read Memorial Community House at Purchase, New York. An unusually successful example of this interesting type of building Donn Barber, Architect*

# How the War Memorial Problem Has Been Solved

## *What Small Communities Have Done to Commemorate the Heroes of the Grea. War*

By Martha Candler

THE municipality of from 25,000 to 50,000 may be spoken of, for the sake of convenience, as the average American city. It ranks half-way between the large metropolis and the village or rural community; it furnishes the homes of a goodly percentage of the population of the country, and, taken by and large, it compares most favorably in the matter of education, of prosperity, and of general progressiveness with the larger city or the small town.

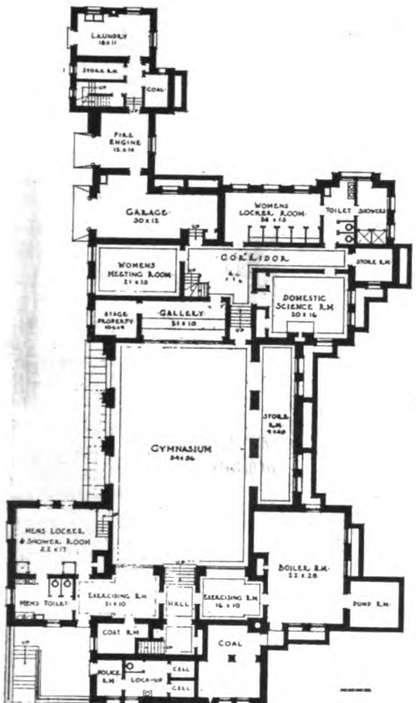
It is not surprising, therefore, that such large numbers of cities belonging to this category should already have turned their attention to the erection of war memorials. The sort of memorial they decide upon is of the greatest importance, both because of the example they will furnish for smaller communities not in a position to act so readily, and because of the effect they may be expected to have upon the future art and architecture of the country as a whole.

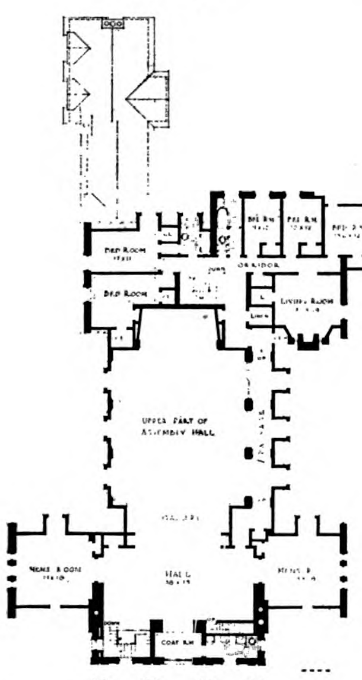
There is a general realization of the fitness of devising "living" monuments, such monuments as shall perpetuate the spirit of service in which our heroes went to war. This realization has resulted in a nation-wide movement for the erection of memorial buildings, which, while commemorating the dead, shall offer an ever-increasing service to the living, to the returning soldiers and to the civilians of the community. There has been much talk of the erection of arches. Victory arches do well enough in their way, but seldom can they be placed to advantage in our fast-growing cities. Even at the time of erection, if centrally located, they must be crowded into small space and surrounded by buildings with which they are entirely out of harmony. Besides, the arch is the symbol of autocracy, first devised as the victory monument of some king who went forth and captured a city and brought back the people into slavery.

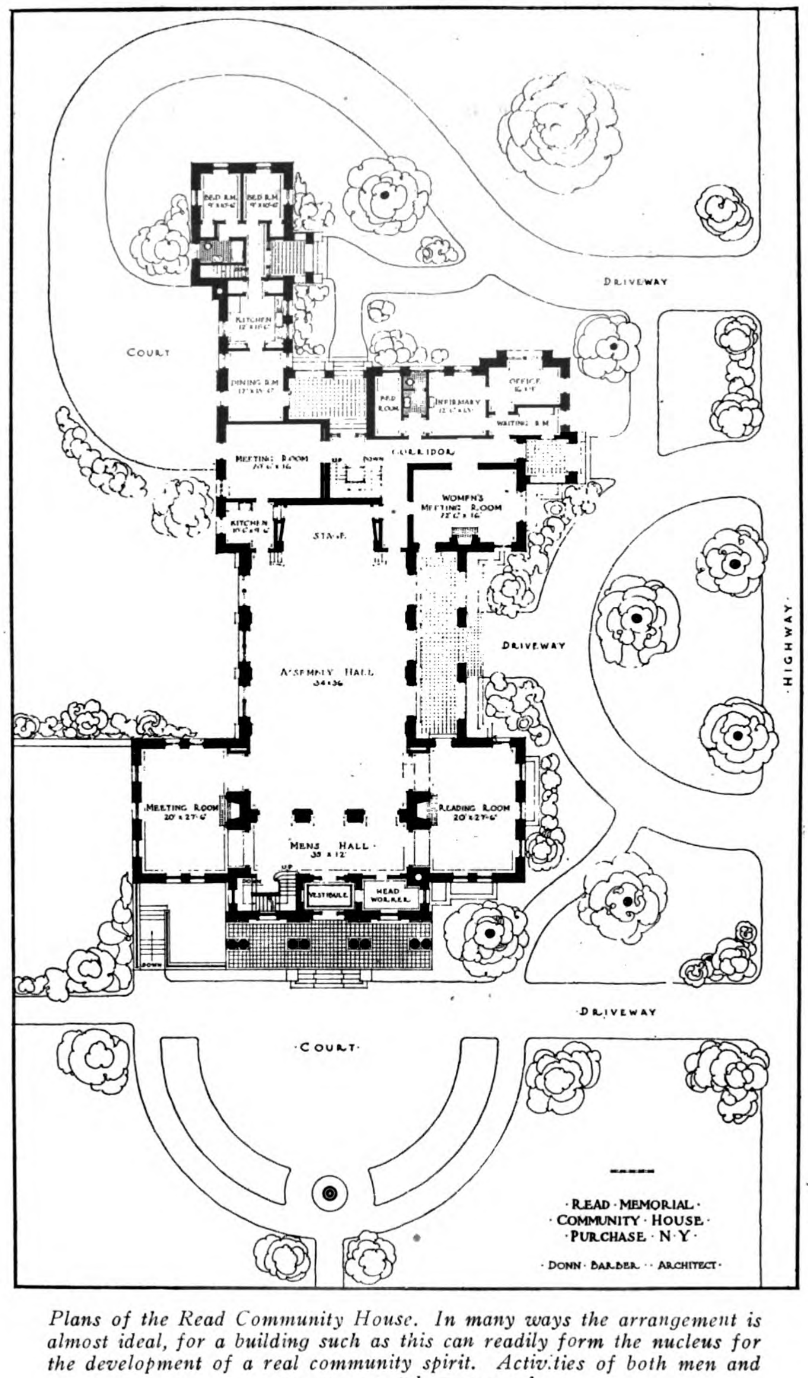
But our victory was greater than the taking of a city; it was a spiritual victory, a triumph of the principles of justice and democracy. How symbolic then is the building provided through the efforts of the whole community, for use by the whole community, and standing for the victory of that community over narrow personal prejudices and selfishness?

Such buildings, many of which are under way all over the country, while designed everywhere to house all non-partisan and non-sectarian activities, vary widely in their nature (and fittingly so) with the varying needs of the communities undertaking their erection. The latest reports of the Bureau of Memorial Buildings of War Camp Community Service show a

*A general view from rear, Read Community House, Purchase, New York* total of 306 memorial buildings assured and 450 more proposed. Of those assured, 154 are community houses, 54 are auditoriums and similar, 8 are club houses, 6 are municipal buildings, 28 are hospitals, 5 are schools, 10 are libraries, 5 are Y. M. C. A., 6 are church buildings and the others are for various uses.



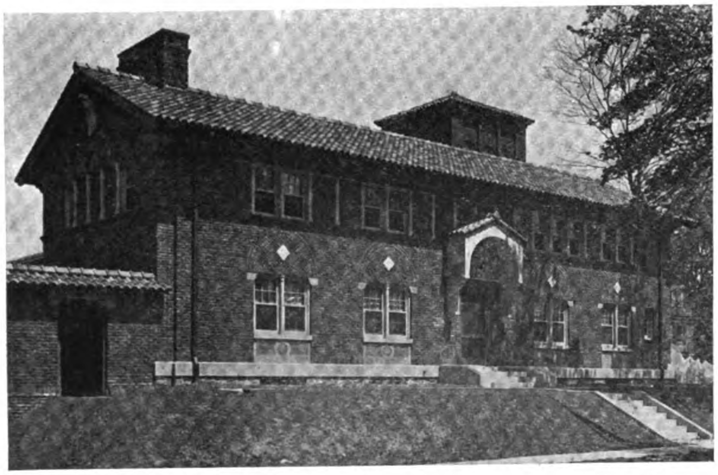




*Plans of the Read Community House. In many ways the arrangement is almost ideal, for a building such as this can readily form the nucleus for the development of a real community spirit. Activities of both men and women are taken care of*

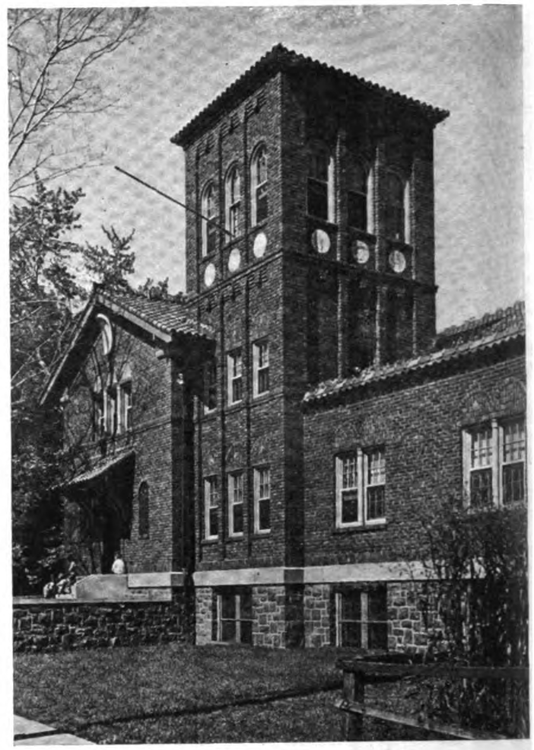
By these reports it will be seen that by far the larger number of buildings are in the form of community houses. In addition to the memorial features, such community houses have usually a large auditorium and a group of smaller assembly rooms, as well as provision for dances and other purely social activities. A branch library, game rooms, a gynasium and swimming pool, and a community kitchen are other features which are often included.

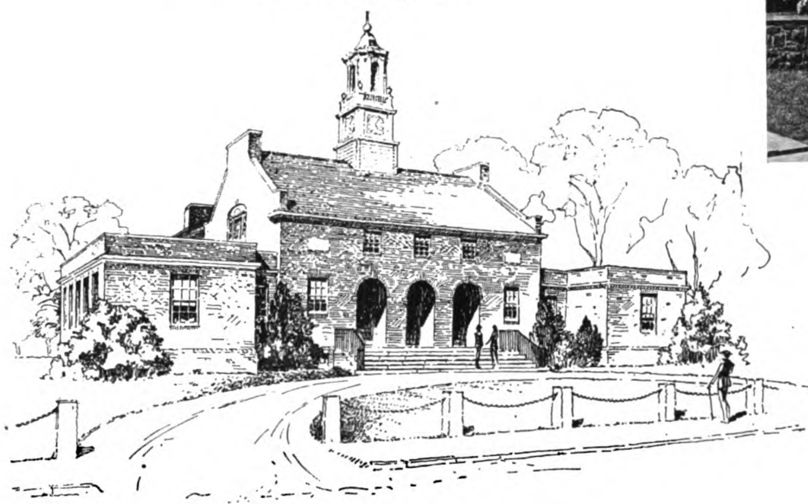
The question of cost will prevent many smaller towns from erecting the ideal community house with full equipment of every sort. But our average American city is not too large to be a community in the strict dictionary sense—"a body of persons having common interests, common privileges, etc.; a sharing or participation." It is not too large to have a community spirit which may well find its home in a community house. It is not too limited in its resources to strike a really worth-while note in American architecture.

The problem of a community memorial is largely a technical one. Much of the responsibility for its success or failure will rest upon the intelligence and energy with which the local architect acts. He may be the only man in the community with sound artistic standards as to what monuments will be of lasting merit, and what ones are likely to survive, as the conventional soldiers in bronze and stone of the Civil War have done, to shame a later generation by their inferiority. When the memorial committee is appointed it is none too early for the architect to be heard from. Often a word when the discussion is open will be more effective than volumes of

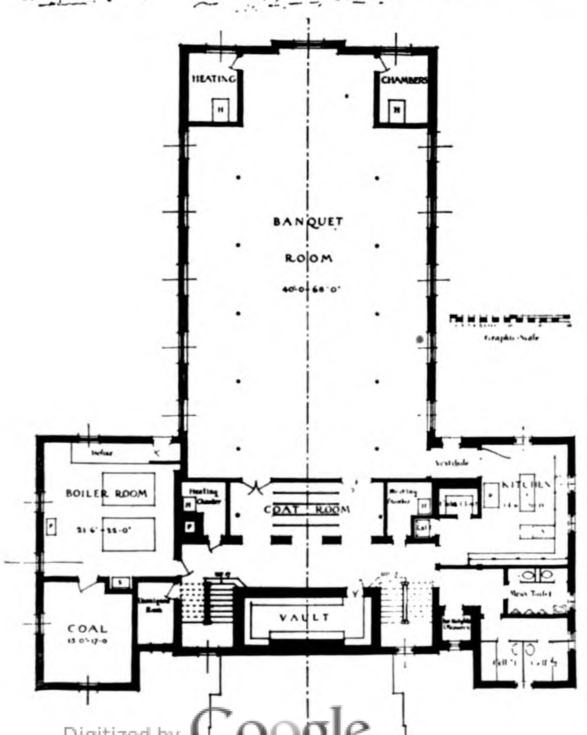


*The Neighborhood House at Englewood, N. J. Mann & MacNeille, architects. A brick building intended for general community use, built in 1916 at a cost of $30,000*
*(Plans on next page)*

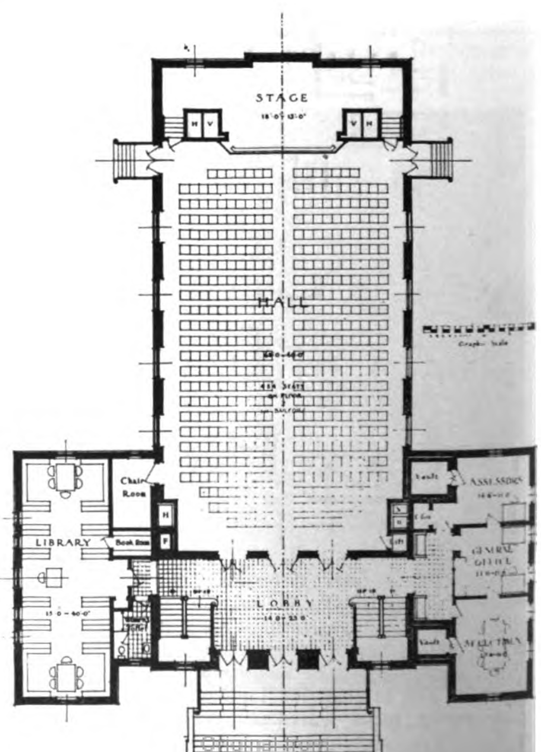


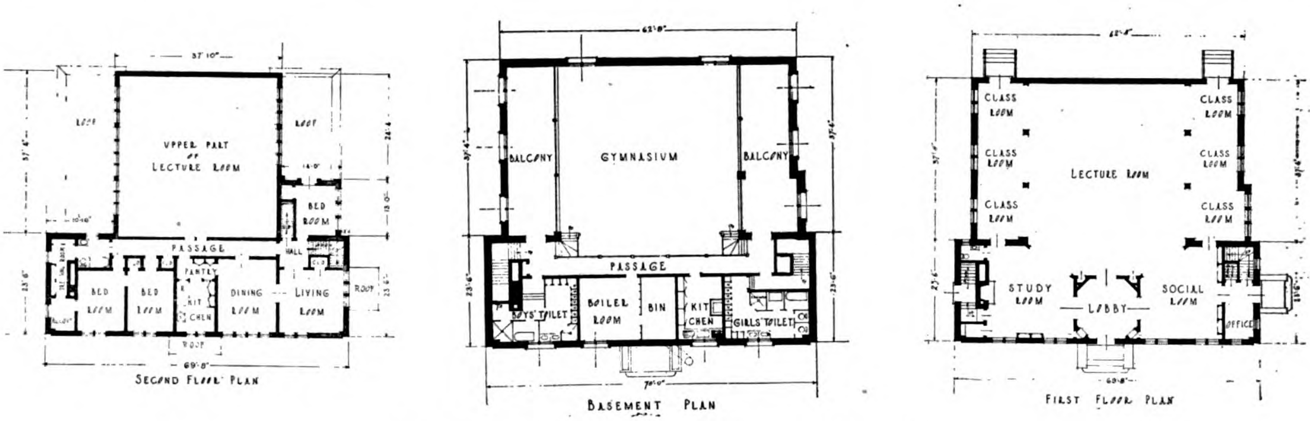


*Perspective sketch and plans of Memorial Town Hall and Community Building at Tewkesbury, Mass. A combination such as this is often the best solution for the smaller community*

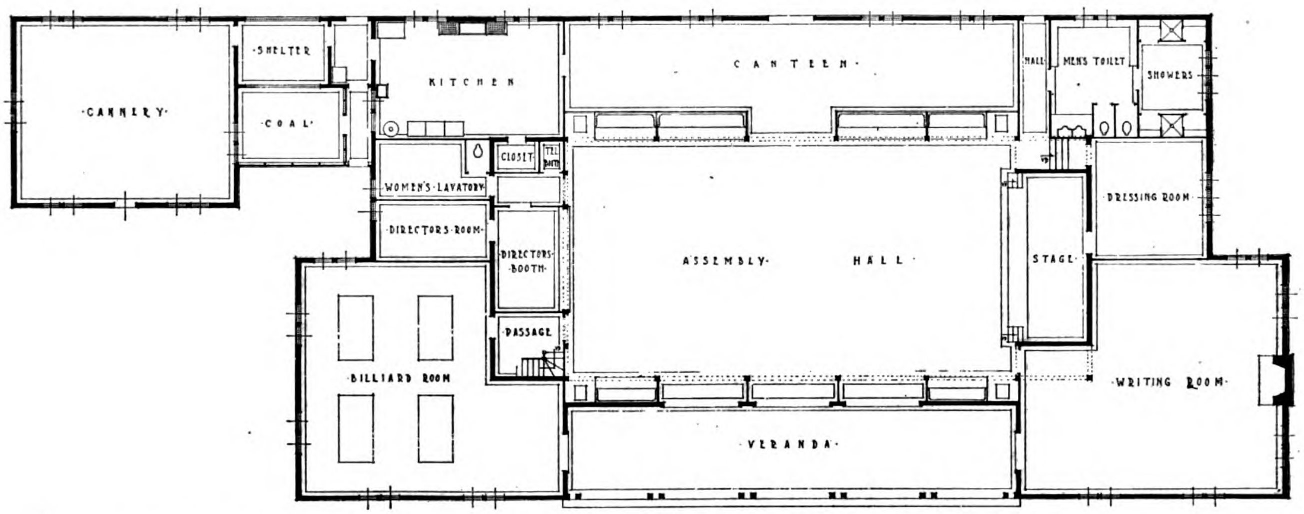



*Kilham and Hopkins, Architects*



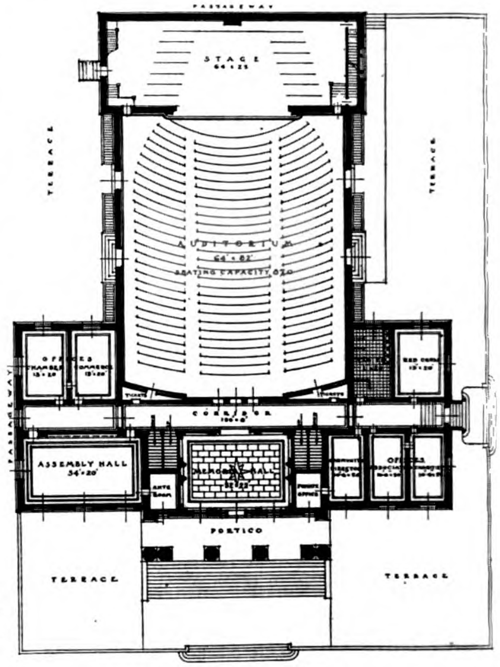



*Floor Plans of the Neighborhood House at Englewood*




*Plan and Perspective Sketch of Community House at Newport News, Va. Mann & MacNeille, architects.*

*Perspective sketch of Memorial Community Building at Goldsboro, N. C. C. Adrian Casner, architect. Cost of this structure, including equipment and grounds, is estimated at* $250,000




*Second Floor Plan*

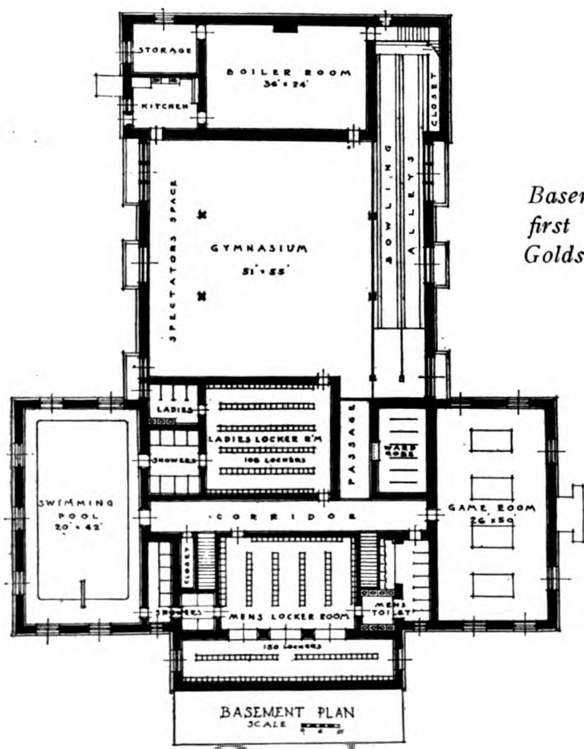
criticism directed against an ill-chosen scheme after prominent citizens have publicly committed themselves to it.

Here is a challenge to the local architect or the local architectural society. Their influence rightly brought to bear at the right moment cannot fail to result in the country at large being enriched by such dignified and permanent memorial buildings as will noticeably advance American architecture.

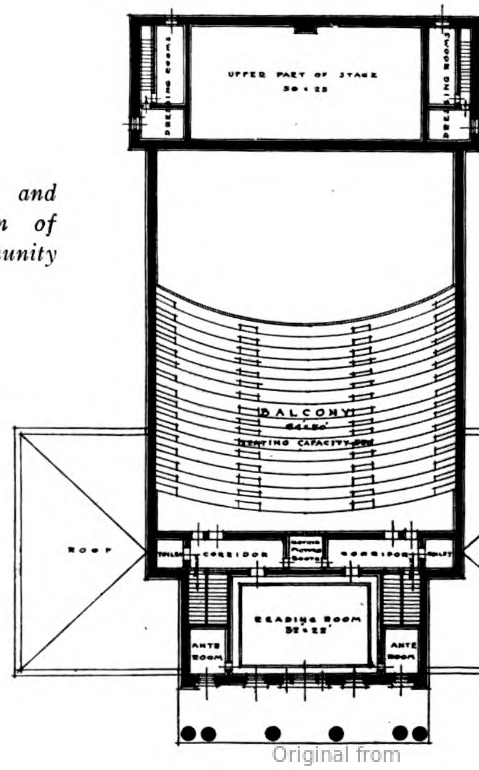
"The buildings are an experiment," some architects will object. "How do we know they will work?" There has even been a noticeable tendency in some quarters to submit to the erection of factory-made monuments rather than shoulder responsibility. But precedent is not lacking. There are numbers of community buildings built before the war and being successfully operated today. Almost invariably where there has been such a center for community activities there has been a big increase in community consciousness, and the development of a better social and civic spirit. But even if precedent had been entirely lacking before, there were enough examples of centers for hospitality and service successfully operated during the war inside the military camps, and in every town and city where soldiers and sailors spent their leisure time, to prove the worth of community social buildings.

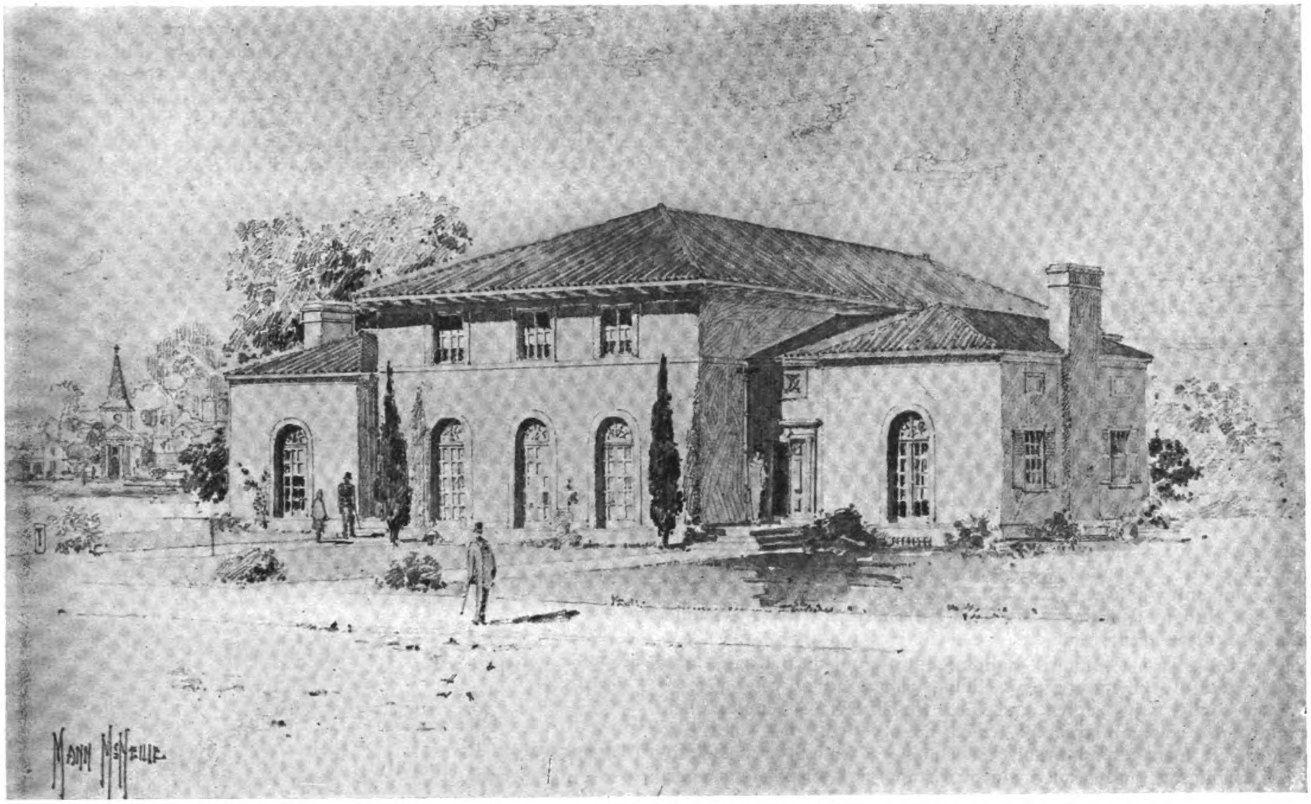
In most cases these were in the form of service clubs, occupying vacant stores, theatres, or residences, church basements, unused school houses, or any other available space. In a number of camp towns the spirit of hospitality toward the soldiers and sailors aroused by the W. C. C. S. resulted in the erection of completely equipped Community Houses, which, if lacking in permanent architectural beauty, embody the same friendly, informal atmosphere as did the Hostess Houses in camp and as should the memorial Community House.

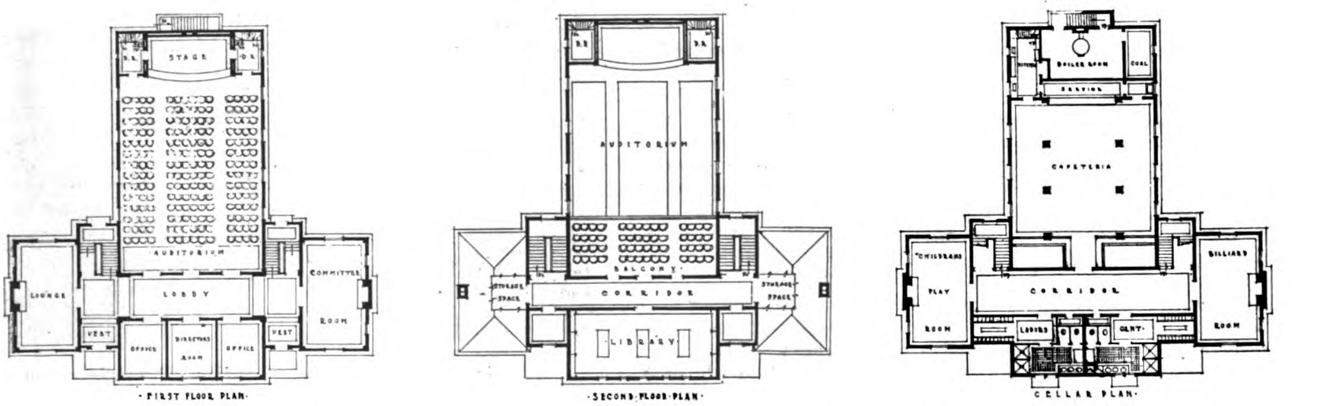
Much valuable information is also available from enterprising cities over the country that have gone forward with their community house plans. Key West, Florida, with a population of 25,000, will have a $250,000 building; Hammond, Indiana, with



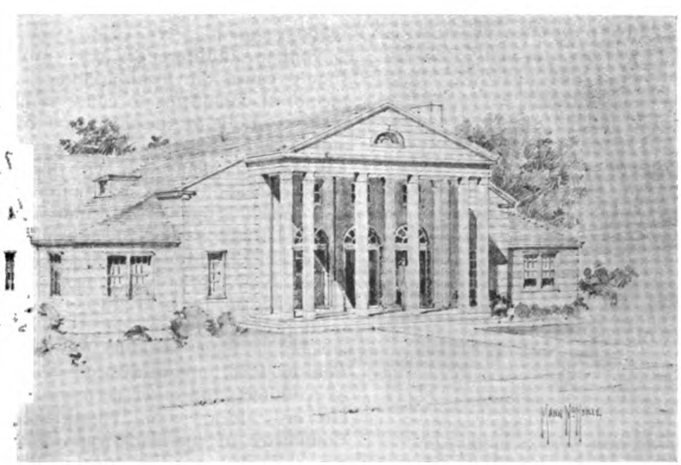

*Basement plan and first floor plan of Goldsboro Community Building*

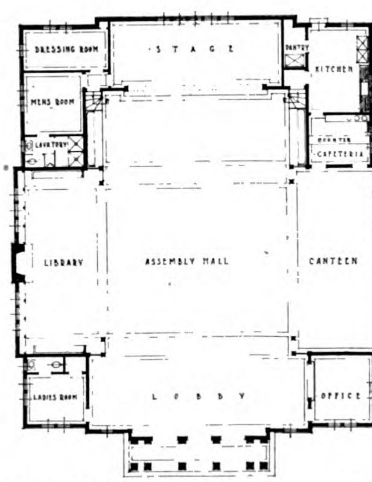




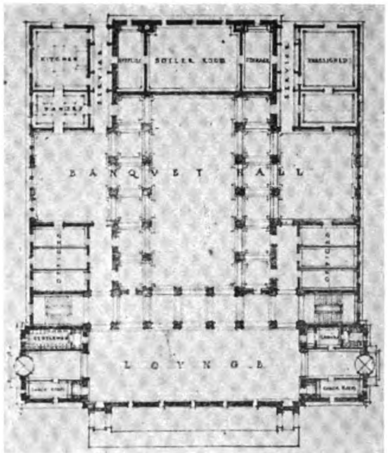



*Perspective sketch and plans of proposed community building. Mann & MacNeille, architects*



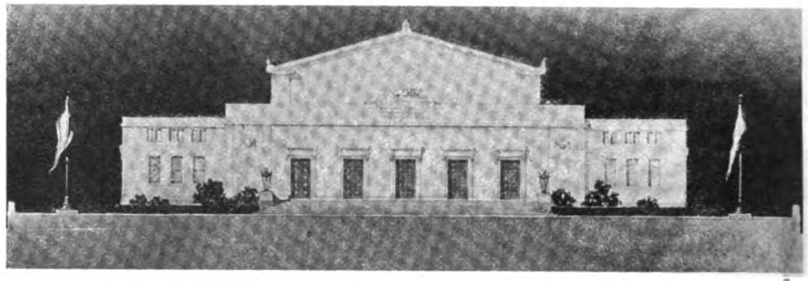



*Perspective sketch and plan of Community House erected at Beaufort, S. C. Mann & MacNeille, architects*



will be embodied in our memorial Community Building we can in some slight measure do honor to them and honor ourselves in the doing."

While the mentioned building projects all belong to one class, the situation the country over offers the widest range of buildings as to cost, architecture, and facilities, from that of Germantown, Md., and Barnum, Minn., each with a reported population of 150, to the big national memorial building for Washington, D. C., upon which it is planned to spend $10,000,000. The building for Seattle, as planned, will in-



*Suggested Memorial Building for Mankato, Minn., a town of 15,000 inhabitants. Mann & MacNeille, architects*

a population of 28,500, will spend $250,000 on her building; Burlington, Ia., with a population of 26,500, will spend a similar amount. The community house in Newark, Ohio, a city of 30,000, will cost $250,000, and in Goldsboro, N. C., a little city of 11,000, a similar amount will be spent.

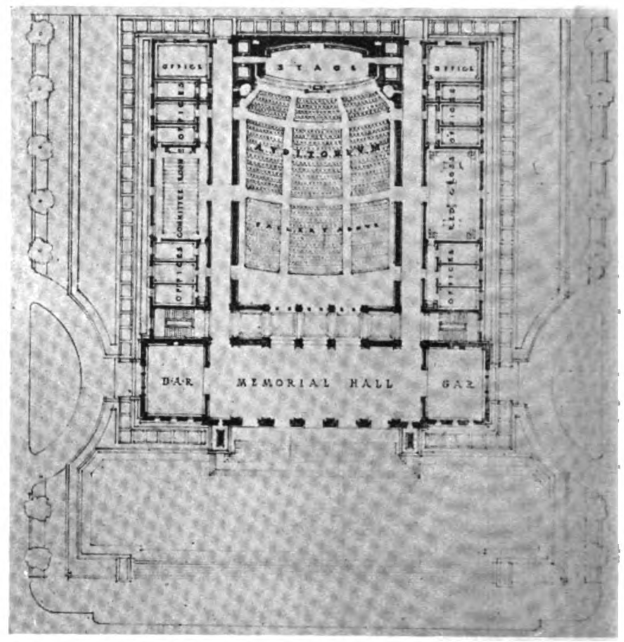
The Goldsboro Comunity Building, "to be dedicated and used by a grateful community as a living tribute to all the men of Wayne county who served and died for liberty," is an excellent example of colonial structure which preserves the best local traditions. It manages admirably to combine a feeling of hospitality with the dignity and beauty which are appropriate to its memorial character.

It is proposed that the building shall contain a memorial hall on whose walls shall be inscribed the names of all the men from the county who served in the army or navy. In addition provision will be made for special memorial tablets, records, relics and trophies of the war.

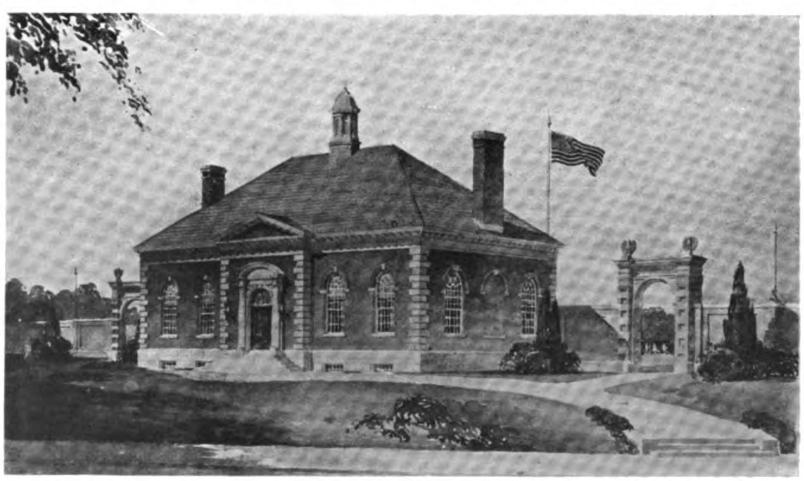
It will also contain an auditorium suitable for large county and community gatherings, with a modern theater stage equipped and lighted in conformity with the most progressive ideas; suitable rooms for all county and city public welfare agencies and social organizations; a reading room, a gymnasium, a swimming pool, with showers for the use of both men and women; a game room, a bowling alley, a lunch room and kitchenette, and suitable lounging room, wash room and comfort station facilities.

Characteristic of the spirit that is abroad is the following passage which appeared at the foot of the Goldsboro memorial committee's resolutions adopting this plan of buildings:

"Not granite, not marble, nor shaft nor pile can adequately serve as a tribute to their valor, but in a living act of service such as




*Main Floor Plan, Mankato, Minn., Memorial*



*Proposed Memorial Building to be erected in connection with a memorial playground at Frankford, Philadelphia, Pa. Wm. F. Gray, architect. A memorial such as this affords a place where baseball, football, etc., may be played by the town's team*

clude the largest indoor auditorium in the world, and Seattle, Boston and Portland (Oregon), are among the cities considering a memorial civic center of which the building will be but one feature.

Neither indifference nor professional pride should cause the local architect to wait for the memorial committee to come to him. He should make a study of the civic and community needs and inform himself on the technical problems that will arise in connection with the question of design and facilities of any building. He will find that much valuable information and assistance on the subect is available through the Bureau of Memorial Buildings, 124 East Twenty-eighth Street, New York City, which exists primarily as an agency to assist architects and local memorial committees, in order that the building may serve adequately their purpose. Through the co-operation of this bureau with the American Institute of Architects and other permanent agencies, such as city or state art commissions, the War Memorial Committee of the American Federation of Arts, etc., it is in a position to give advice on the type of building advisable as well as certain highly

(Continued on Ad Page 24)

# THE EDITOR'S PAGE

## Why This Issue Is Late

THIS issue of BUILDING AGE is late in reaching you because of a strike in several branches of the printing trades in New York City. Although the employing printers have offered to arbitrate all points at issue, a settlement has been impossible, due to the refusal of arbitration by several of the local unions not in harmony with their Internationals.

Next month's issue will also probably be late, but we shall make every effort to get back on our schedule. Contractors and architects themselves have so often recently been placed in a position similar to our own that they will not hold this unavoidable delay against us.

## The Community House as a War Memorial

IT is fitting that the Great War, fought for Democracy, should give birth to a movement for truly democratic memorials, for memorials which should commemorate the victory of a great people rather than be a monument to the vanity and power of one man.

In days past, let us hope forever, it was an Alexander, a Caesar, a Napoleon, to whose name the glory of victory attached, not to the name of a people. It was the ruler who led his armies to victory who was commemorated, rather than a principle or the achievements of a great nation. The symbols of such victory quite fittingly took the form of monuments for the personal glorification of the leader.

Today, victory rests upon the arms of the people and those chosen to represent them. And memorials to their victory should be such as to enter into the life and spirit of the nation if the victory is to be fittingly celebrated.

This feeling has permeated the United States. A few communities still hold to the erecting of a memorial arch, monument, or other traditional commemoration of the victories of autocratic government. But by far the greater number are, with a true American democratic spirit, seeking to erect memorials that will be a part of the life of the people and cultivate the community spirit.

No better way in which to express this spirit can be found than in the sentiment for so-called community buildings, for buildings which shall provide a meeting place for the citizens where recreation may be had, theatrical, sports or other. Such buildings in their highest development form a center for the life of the community and foster a spirit that cannot help but make better citizens of us all.

Such buildings for the average town should contain a gymnasium, which may be in the basement; an auditorium where public meetings or entertainments may take place, perhaps a swimming pool, and even meeting places for the select men or town officials, in which case the building may take the place of a city hall. Outside, the grounds may be laid out so as to provide space for a football and baseball field, tennis courts, etc. It needs little imagination to picture what a boon such a memorial will be to the average community, for it will provide a place which, perhaps, may long have been desired, but which the town has heretofore been unable to afford.

Such a memorial need not be expensive or pretentious. In fact, the degree of informality of the building may be in direct proportion to its success. A number of such buildings, suitable for smaller communities are illustrated in this issue.

Unlike the formal monument which is often looked at but seldom seen, the community building enjoys the throb of life. The realization of this has caused most communities to feel that it is far better to spend money in such a way as to be an investment, rather than to so spend it that it will be a useless eyesore to the town which has not felt the democratic urge to commemorate the Great War in the same spirit in which it was fought—and won.

## What's This Country Coming To?

OF deep significance is that part of a campaign circular announcing the candidacy of Miles Poindexter for the Republican nomination for the Presidency in 1920, which states: "This government was founded on the principles that no special class should control it; . . . the safeguarding of the general welfare of our people by keeping the government at all times under their own control, both as against any *special class at home*, and as against any foreign power or combination of powers; and the active use by the government, in the sphere of its action, of the full powers of the nation to protect every citizen, of whatever station he may be, both at home or in a foreign land, or on the sea, from unlawful injury to his person or his property by any individual or *special class*, or by any foreign power."

And simultaneous with this was the announcement by Timothy Shea, acting president of the Brotherhood of Locomotive Firemen and Engineers, that any anti-strike legislation which might be passed by Congress will not be recognized by the union. In plain English, his organization will not obey any law which it sees fit to break. And this attitude is only too general among unions, which in many cases are repudiating the leadership of honest men who would have them keep their contracts.

It matters not what you call this, Bolshevism, Anarchism, or what. It simmers down to the attitude on the part of labor, "The public be damned." It, as a class, is appropriating to itself special privileges, considering itself above both the law and public welfare. In the Industrial Conference it showed itself unwilling to compromise, insisting on an interpretation of collective bargaining which would give it the whip-hand in every dispute. At a similar conference in Canada, labor managed to go so far as to shove through a resolution that an employer should treat with a union committee whether or not it represented the majority of his employees, stating that it was the fault of the workers if they were not represented on that committee.

In the New York longshoremen strike, the insurgent union men ordered back to work by their leaders in their own words frankly declared war, and started in with a riot in Brooklyn. It is an unfortunate fact that life and property are not respected by the more radical elements in labor.

During the printers' strike in New York City *Life* decided to publish in Boston. The pressmen there refused to run off one of the forms, objecting to a cartoon stigmatizing labor. This is the first time in this country that a union has taken it upon itself to exercise a press censorship. And censorship, even by the Government, is a thing to be greatly deplored.

Labor has consistently shown itself unwilling to accept decreases in wages as the cost of living may go down, insisting rather on increases which will tend to more and more make it a favored class. It wants a class privilege and, urged on by a radical element, it is in many cases ready to start a small war of its own in order to get what it wants. As P. J. Connoly, vice-president of the Interborough Rapid Transit Brotherhood, New York City, said during a recent strike by that body, "We are hungry for money and that is all we will be satisfied with."

And all this lends force to the fact that a candidate for the nomination of the Presidency has deemed the encroachments of labor so unreasoning as to consider it the best plank in his platform to state that in the interests of public policy he stands for the administration of the country on an impartial basis, undictated to by any special class, labor or otherwise. It is going far when a candidate states in his platform that he bases his plea for the nomination on the defending of the Government against a special class.

## What Will Stimulate Building?

THERE is dire need for more houses, more apartments, more buildings of all kinds. From villages, towns and cities all over the country comes the cry for more building.

In response to this urgent demand, various plans have been advanced for the stimulation of building. Perhaps that which has received wider approval than any of the others is the proposal to exempt buildings erected now from taxation for various terms of years, usually five to seven. This proposal is an artificial stimulant, a stimulant which has little to recommend it. It will probably cause more buildings to be erected. But many of these buildings would have been erected, exemption or no exemption. Furthermore, exemption from taxation of one class of capital will only throw a heavier burden on the rest. If building is exempted, this does not mean that the revenue will not go to the Government, but only that an equivalent amount of taxes must be secured from some other source. Taxation is high, and an even rather than an uneven distribution of the burden is the desirable thing.

The trouble with building is the very same trouble that is causing high prices and slackened production all over the country. Sugar coating the trouble will not remove it; any remedy that will do good must strike at the very heart of the reason for lack of sufficient building. That trouble is high prices of materials, high prices of labor, and uncertainty as to when labor will take it into its head to strike, illegally or otherwise.

Any contractor will tell how unions have curtailed the number of brick that can be laid in a day, of how production has been slackened up under the influence of the false theory that the less work a man does, the more men will be required to do it and, therefore, the more jobs and the less unemployment. That is a dangerous fallacy.

A man gets paid for what he does. If he lays 1,500 brick a day he may get $6. If he lays 1,000 and gets $10, that does not mean that he is $4 the gainer. No, indeed, the extra cost is tacked onto the building, his rent goes up to meet the cost of new construction, workmen in other industries follow his tactics, and he pays more for his food, his clothing, his pleasures, and he has no more than when he was getting $6, except perhaps temporarily. The amount of money he receives is greater, its purchasing power is proportionately less.

But let that man getting $6 a day lay 2,000 brick instead of 1,500 and the building goes up more quickly. Prices are lower, other industries speed up—food, clothing and rent come down due to the lower cost per unit. And more men are employed. The bricklayer can afford to buy more clothing, more food, more necessities, because prices are lower, and his surplus will go into savings and into luxuries that will make his life happier and his family more comfortable. Curtailment of production means high cost and lessening demand, a lessening demand that throws men out of work instead of creating more jobs.

And that is where the trouble lies—strikes and lessened production. No temporary expedient will serve to better the building situation. Any remedy that will do real and permanent good must go to the very heart of the cause of high material prices and high labor cost, not only in this industry, but in other industries also.

High wages, yes—but greater production, a production that will keep prices low in spite of the high wages paid.

# Building Activity During September

ACCORDING to reports received by BUILDING AGE, direct from 187 city building departments, the number of permits granted for September, 1919, shows an increase in estimated value of 275 per cent compared with September, 1918; 172 cities show increases over last year. The total estimated value of contemplated construction for the country is $142,652,510 as against $38,037,420 for September, 1918.

The number of permits granted totals 38,741 for September, 1919, as against 20,363 for September, 1918—an increase of 90 per cent, the average value per permit being $3,682 as against $185. This latter figure clearly shows the influence of war restrictions, when most of the work, outside of government building, was necessary repairs.

Much of this large increase over last year is only apparent. Government restrictions were in effect from the last of September till November 21, and this curtailment naturally witnessed a corresponding decline in building, which was, therefore, at an extremely low level.

Eastern cities show an increase of 295 per cent, 70 out of 74 reporting gains; middle state cities 336 per cent increase, 46 out of 51 reporting gains; southern cities, 282 per cent increase, 35 out of 38 cities reporting gains; and western cities 89 per cent increase, 21 out of 23 cities reporting gains.

As compared with August, 1919, the September total shows a decrease of 19 per cent. This is only natural, as the slack season for building is approaching.

During the past year the cost of frame dwellings has risen considerably and next spring a further advance can be looked for. Houses costing about 30 cents per cubic foot in the vicinity of New York City in the spring of 1919 now cost about 40 cents. Yet, in spite of this advance, which is typical of all kinds of construction, the demand is so great that people simply must build, and so construction is active and will continue to be so for several years at least in spite of expected higher costs for next year.

The coal strike, if won, will have considerable effect on the building situation. Soft coal, which is at present more than a third cheaper than anthracite, will, of course, advance considerably, if the strike is won, thus forcing up the prices of all commodities depending on coal for their manufacture, and not the least of these will be building materials. Furthermore, freight rates will quite likely be raised to meet the new cost of fuel, and a higher price level all along the line may looked for.

Figures in detail follow:

CITIES IN EASTERN STATES

| | November, 1919 | | | | November, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Albany, N. Y. | 22 | $203,875 | 134 | $95,480 | 8 | $20,650 | 102 | $18,215 |
| *Allentown, Pa. | 35 | 375,495 | 8 | 12,700 | 5 | 8,975 | 5 | 3,050 |
| *Altoona, Pa. | 15 | 69,425 | 83 | 23,087 | 8 | 11,670 | 39 | 10,055 |
| *Atlantic City, N. J. | 19 | 160,420 | 74 | 37,130 | 4 | 15,685 | 38 | 21,597 |
| *Auburn, N. Y. | 7 | 85,900 | 11 | 5,287 | 7 | 20,250 | 4 | 3,515 |
| *Bayonne, N. J. | 30 | 600,000 | 20 | 7,900 | 14 | 15,400 | 10 | 4,000 |
| *Binghamton, N. Y. | 79 | 78,327 | 150 | 76,780 | 62 | 20,323 | 76 | 11,423 |
| *Boston, Mass. | 114 | 1,273,157 | 486 | 637,767 | 47 | 202,205 | 367 | 263,546 |
| *Bridgeport, Conn. | 147 | 521,031 | ... | ...... | 108 | 509,845 | ... | ...... |
| *Brockton, Mass. | 28 | 85,785 | 22 | 51,350 | 10 | 7,950 | 8 | 8,700 |
| *Buffalo, N. Y. | 346 | 1,128,600 | 102 | 127,400 | 277 | 483,000 | ... | ...... |
| *Cambridge, Mass. | 32 | 433,150 | 53 | 263,442 | 47 | 476,981 | ... | ...... |
| Camden, N. J. | 98 | 249,353 | ... | ...... | 36 | 365,960 | ... | ...... |
| *Chelsea, Mass. | 4 | 85,700 | 10 | 14,680 | ... | ...... | 13 | 26,250 |
| *Chester, Pa. | 16 | 248,300 | 20 | 10,000 | 13 | 41,500 | 36 | 9,265 |
| *Churpee, Mass. | 31 | 132,900 | 4 | 19,800 | 26 | 47,800 | 6 | 5,700 |
| *Cranston, R. I. | 41 | 49,950 | 11 | 12,000 | 2 | 11,000 | 3 | ...... |
| *Danbury, Ct. | 10 | 167,515 | 4 | 13,840 | 2 | 2,500 | 12 | 2,855 |
| *Easton, Pa. | 13 | 63,285 | 10 | 10,240 | 7 | 38,720 | 5 | 4,400 |
| *East Orange, N. J. | 46 | 482,725 | 27 | 84,285 | 8 | 31,150 | 13 | 8,782 |
| *Elizabeth, N. J. | 67 | 375,569 | 10 | 17,800 | 11 | 32,994 | 6 | 13,925 |
| *Erie, Pa. | 98 | 176,480 | 53 | 592,950 | 82 | 258,005 | 33 | 132,943 |
| *Fall River, Mass. | 45 | 131,480 | ... | ...... | 16 | 12,865 | ... | ...... |
| *Fitchburg, Mass. | 32 | 281,865 | 5 | 2,730 | 9 | 7,850 | 8 | 14,960 |
| *Harrisburg, Pa. | 48 | 276,150 | ... | ...... | 19 | 36,200 | ... | ...... |
| *Hartford, Conn. | 107 | 351,762 | 34 | 108,181 | 29 | 72,230 | 37 | 51,385 |
| *Haverhill, Mass. | 24 | 53,700 | ... | ...... | 6 | 5,550 | ... | ...... |
| Hoboken, N. J. | 5 | 9,750 | 18 | 17,270 | 5 | 54,500 | 6 | 3,700 |
| *Holyoke, Mass. | 18 | 49,070 | 10 | 7,250 | 2 | 19,600 | 3 | 1,650 |
| *Jersey City, N. J. | 49 | 242,299 | 56 | 87,402 | 28 | 83,482 | 28 | 140,511 |
| *Lancaster, Pa. | 9 | 49,983 | 17 | 23,082 | 6 | 11,450 | 4 | 3,700 |
| Lawrence, Mass. | 24 | 69,495 | 17 | 28,850 | 12 | 795,850 | 12 | 49,390 |
| *Lewiston, Me. | 6 | 300,000 | 16 | 100,000 | 4 | 80,000 | 8 | 40,000 |
| *Lowell, Mass. | 55 | 915,835 | 56 | 146,810 | 18 | 10,075 | 16 | 5,530 |
| *Lynn, Mass. | 33 | 16,755 | 24 | 25,975 | 8 | 9,20 | 15 | 5,265 |
| *Malden, Mass. | 24 | 29,730 | 18 | 12,095 | 3 | 920 | 10 | 3 155 |
| *Manchester, N. H. | 43 | 81,760 | 43 | 52,060 | 18 | 11,322 | 27 | 15,975 |
| *Medford, Mass. | 60 | 134,240 | ... | ...... | 14 | 27,790 | ... | ...... |
| *Montclair, N. J. | 46 | 263,335 | 17 | 20,135 | 12 | 17,565 | 4 | 3,275 |
| *Mount Vernon, N. Y. | 24 | 95,995 | 16 | 8,500 | 11 | 18,020 | 11 | 3,075 |
| *Newark, N. J. | 278 | 2,428,445 | ... | ...... | 126 | 468,215 | ... | ...... |
| *New Bedford, Mass. | 53 | 317,300 | ... | ...... | 43 | 69,600 | ... | ...... |
| *New Haven, Conn. | 163 | 429,921 | ... | ...... | 94 | 203,915 | ... | ...... |
| *New Rochelle, N. Y. | 43 | 539,000 | 15 | 46,975 | 16 | 25,205 | 9 | 17,700 |
| New York: | | | | | | | | |
| *Manhattan | 31 | 3,318,800 | 262 | 1,419,625 | 13 | 275,700 | 159 | 443,170 |
| *Bronx | 98 | 1,706,000 | 206 | 229,690 | 9 | 135,600 | 94 | 124,956 |
| *Brooklyn | 696 | 6,319,908 | 612 | 1,053,987 | 144 | 1,156,175 | 518 | 417,735 |
| *Queens | 711 | 4,299,532 | 335 | 306,585 | 242 | 758,127 | 271 | 106,109 |
| *Richmond | 132 | 370,979 | 62 | 47,883 | 62 | 184,646 | 40 | 24,520 |
| *Niagara Falls, N. Y. | 72 | 291,890 | 9 | 11,525 | 25 | 81,225 | 20 | 16,150 |
| Nutley, N. J. | ... | ...... | ... | ...... | ... | ...... | ... | ...... |
| Orange, N. J. | 9 | 35,000 | 31 | 14,599 | 13 | 62,850 | 26 | 9,054 |
| *Passaic, N. J. | 30 | 162,400 | 10 | 7,000 | 13 | 33,900 | 2 | 1,550 |
| *Paterson, N. J. | 149 | 455,452 | ... | ...... | 60 | 68,932 | ... | ...... |
| *Philadelphia, Pa. | 748 | 4,805,565 | 475 | 428,860 | 187 | 770,890 | 237 | 291,310 |
| *Pittsburgh, Pa. | 366 | 1,038,677 | 65 | 131,314 | 130 | 616,586 | 58 | 99,315 |
| *Portland, Me. | 46 | 83,390 | 30 | 23,680 | 12 | 6,000 | 18 | 18,605 |
| *Quincy, Mass. | 88 | 164,180 | ... | ...... | 69 | 89,370 | ... | ...... |
| *Reading, Pa. | 48 | 175,000 | 149 | 62,900 | 27 | 27,725 | 115 | 31,300 |
| *Revere, Mass. | 22 | 87,650 | 23 | 20,840 | 9 | 3,315 | 13 | 6,325 |
| *Rochester, N. Y. | 219 | 1,169,485 | 92 | 106,280 | 59 | 116,145 | 36 | 26,100 |
| *Salem, Mass. | 59 | 35,350 | ... | ...... | 22 | 3,085 | ... | ...... |
| *Schenectady, N. Y. | 69 | 307,005 | 17 | 15,585 | 45 | 201,020 | 24 | 8,525 |
| *Scranton, Pa. | 40 | 186,260 | ... | ...... | 16 | 66,675 | ... | ...... |
| *Somerville, Mass. | 22 | 40,945 | 18 | 14,919 | 2 | 750 | 7 | 8,250 |
| *Springfield, Mass. | 100 | 374,917 | 33 | 63,115 | 40 | 89,145 | 31 | 45,735 |
| *Syracuse, N. Y. | 132 | 808,280 | 91 | 170,360 | 45 | 35,660 | 59 | 43,495 |
| *Trenton, N. J. | 111 | 438,411 | ... | ...... | 34 | 13,230 | ... | ...... |
| *Troy, N. Y. | 3 | 83,500 | 29 | 15,215 | 27 | 16,735 | ... | ...... |
| *Utica, N. Y. | 26 | 213,950 | 14 | 20,600 | 18 | 67,050 | 6 | 7,650 |
| *West Hoboken, N. J. | 17 | 25,000 | 3 | 225 | 10 | 8,250 | 3 | 400 |
| *Wilkes-Barre, Pa. | 62 | 139,244 | ... | ...... | 34 | 41,554 | ... | ...... |
| *Worcester, Mass. | 126 | 434,929 | 87 | 208,475 | 34 | 95,700 | 42 | 55,160 |
| *Yonkers, N. Y. | 49 | 353,400 | ... | ...... | 17 | 25,10 | ... | ...... |
| *York, Pa. | 18 | 97,835 | 3 | 6,935 | 6 | 29,050 | 29 | 3,792 |
| | 6786 | $42,087,746 | 4337 | $7,028,430 | 2707 | $9,744,157 | 2782 | $2,696,198 |

CITIES OF WESTERN STATES

| | November, 1919 | | | | November, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Per. mits | Value | Permits | Value | Permits | Value |
| Alameda, Cal. | 14 | $ 44,225 | 25 | $ 14,044 | 11 | $402,650 | 24 | $10,911 |
| *Berkeley, Cal. | 102 | 186,445 | ... | ...... | 72 | 61,4 0 | ... | ...... |
| *Boise, Idaho | 8 | 29,7 0 | 39 | 16,390 | ... | ...... | 15 | 5,316 |
| *Colorado Spgs., Colo. | 18 | 3.420 | 32 | 21,085 | 6 | 1,575 | 10 | 21,800 |
| *Denver, Colo. | 203 | 555,950 | 137 | 111,800 | 85 | 111,200 | 79 | 44,650 |
| *Long Beach, Cal. | 280 | 679,431 | ... | ...... | 318 | 491,288 | ... | ...... |
| *Los Angeles, Cal. | 878 | 2,168,047 | 381 | 279,746 | 263 | 575,896 | 257 | 148,195 |
| *Oakland, Cal. | 281 | 532,173 | 109 | 42,177 | 233 | 528,179 | 100 | 36,075 |
| *Ogden, Utah | 201 | 723,345 | 41 | 34,342 | 108 | 246,035 | ... | ...... |
| *Ontario, Cal. | 14 | 27,225 | ... | ...... | 2 | 2,000 | ... | ...... |
| *Pasadena. Cal. | 27 | 222,555 | 77 | 89,027 | 26 | 14,978 | 35 | 18,573 |
| *Phoenix, Ariz. | 32 | 407,066 | 49 | 31,592 | 29 | 72,085 | 19 | 5,660 |
| *Portland, Ore. | 453 | 1,195,290 | 447 | 174,745 | 348 | 339,536 | 265 | 136,235 |
| *Pueblo, Colo. | 12 | 95,750 | 30 | 45,825 | 7 | 5,985 | 30 | 4,139 |
| *Salt Lake City, Utah | 73 | 315,683 | 17 | 22,590 | 34 | 276,200 | 22 | 16,100 |
| *Sacramento, Cal. | 30 | 182,344 | 113 | 52,723 | 7 | 29,350 | 51 | 62,233 |
| *San Diego, Cal. | 89 | 160,505 | 62 | 40,122 | 29 | 22,632 | 50 | 16,684 |
| *San Francisco, Cal. | 119 | 1,117,010 | 363 | 114,911 | 242 | 795,096 | ... | ...... |
| *San Jose, Cal. | 20 | 24,705 | 26 | 24,046 | 14 | 13,231 | 9 | 18,900 |
| Seattle, Wash. | 1356 | 1,340,695 | ... | ...... | 1458 | 1,402,310 | ... | ...... |
| *Spokane, Wash. | 94 | 333,100 | 63 | 61,015 | 40 | 17,497 | 17 | 51,174 |
| *Stockton, Cal. | 62 | 87,890 | ... | ...... | 45 | 38,550 | ... | ...... |
| *Tacoma, Wash. | 187 | 156,658 | 188 | 95,712 | 279 | 171,280 | 114 | 54,987 |
| | 4553 | $10,589,212 | 2199 | $1,271,892 | 3656 | $5,618,953 | 1097 | $651,632 |

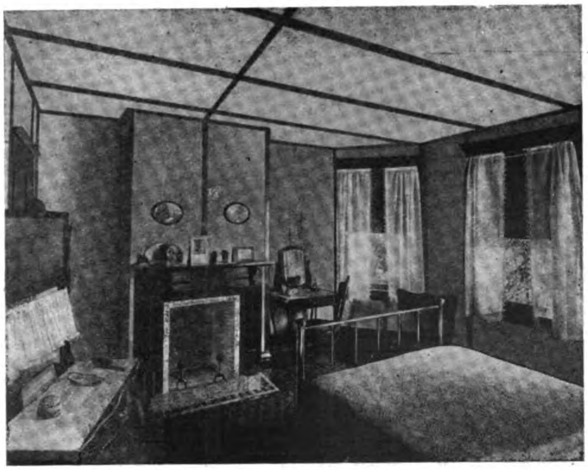
CITIES IN SOUTHERN STATES

| | September, 1919 | | | | September, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Atlanta, Ga. | 291 | $1,113,522 | ... | ........ | 181 | $377,890 | ... | ........ |
| *Augusta, Ga. | 30 | 63,800 | 131 | $33,206 | 5 | 10,930 | 200 | $19,479 |
| *Baltimore, Md. | 555 | 1,864,670 | 791 | 237,900 | 101 | 246,588 | 395 | 174,000 |
| *Beaumont, Texas | 100 | 157,320 | ... | ........ | 59 | 57,710 | ... | ........ |
| Birmingham, Ala. | 112 | 227,209 | 272 | 67,162 | 35 | 430,315 | 170 | 25,867 |
| Charleston, S. C. | 18 | 43,450 | 10 | 4,365 | 8 | 78,650 | 7 | 4,00 |
| *Chattanooga, Tenn. | 216 | 168,925 | ... | ........ | 107 | 12,714 | ... | ........ |
| *Covington, Ky. | 13 | 45,285 | 14 | 8,650 | 5 | 7,800 | 3 | 6,100 |
| *Dallas, Texas | 89 | 1,039,580 | 40 | 36,538 | 6 | 90,000 | 18 | 30,262 |
| *El Paso, Texas | 95 | 206,547 | ... | ........ | 74 | 29,463 | ... | ........ |
| *Fort Worth, Tex. | 124 | 1,847,455 | 60 | 67,732 | 36 | 85,792 | 43 | 19,852 |
| *Ft. Smith, Ark. | 17 | 39,700 | 9 | 2,400 | 10 | 18,700 | 2 | 278 |
| *Galveston, Tex. | 423 | 56,000 | ... | 36,191 | 388 | ........ | ... | 15,286 |
| *Houston, Texas | 123 | 803,628 | 286 | 60,627 | 90 | 176,275 | 160 | 29,125 |
| Huntington, W. Va | 93 | 311,935 | ... | ........ | 37 | 547,510 | ... | ........ |
| *Jacksonville, Fla. | 30 | 243,700 | 31 | 109,113 | 21 | 63,500 | 24 | 11,060 |
| *Knoxville, Tenn. | 21 | 130,333 | 63 | 25,367 | .. | ....... | 61 | 54,489 |
| *Lexington, Ky. | 50 | 110,000 | 31 | 29,163 | 20 | 4,925 | 17 | 2,000 |
| *Little Rock, Ark. | 22 | 87,975 | 59 | 57,296 | 11 | 25,650 | 48 | 20,815 |
| *Louisville, Ky. | 89 | 282,365 | 63 | 59,100 | 30 | 56,365 | 39 | 18,680 |
| *Memphis, Tenn. | 169 | 1,006,400 | ... | ........ | 55 | 27,960 | ... | ........ |
| *Miami, Fla. | 42 | 94,600 | ... | ........ | 32 | 32,700 | ... | ........ |
| *Muscogee, Okla. | 6 | 16,000 | ... | ........ | 5 | 15,600 | ... | ........ |
| *Nashville, Tenn. | 42 | 296,000 | 253 | 51,403 | 18 | 20,970 | 320 | 27,440 |
| *New Orleans, La. | 50 | 405,250 | 38 | 134,050 | 38 | 96,775 | 24 | 124,055 |
| *Norfolk, Va. | 90 | 819,988 | 16 | 21,150 | 36 | 174.110 | 6 | 6,550 |
| *Oklahoma City, Okla. | 173 | 1,026,389 | ... | ........ | 60 | 130,540 | ... | ........ |
| *Portsmouth, Va. | 54 | 218,467 | 22 | 25,436 | 6 | 19,580 | 12 | 7,215 |
| *Richmond, Va. | 103 | 478,087 | 97 | 108,056 | 12 | 147,616 | 51 | 137,954 |
| *Roanoke, Va. | 79 | 90,130 | ... | ........ | 16 | 7,152 | ... | ........ |
| *San Antonio, Texas | 205 | 549.048 | ... | ........ | 203 | 242,680 | ... | ........ |
| *Savannah, Ga. | 50 | 195,700 | 28 | 32,790 | 13 | 9,010 | 6 | 2,125 |
| *Shreveport, La. | 65 | 279,285 | 87 | 27,351 | 20 | 61,530 | 35 | 12,410 |
| *Tampa, Florida | 23 | 40,810 | 81 | 18,977 | 12 | 2,095 | 35 | 12,780 |
| *Tulsa, Okla. | 143 | 393,025 | 56 | 67,035 | 59 | 274,365 | 28 | 10,840 |
| *Washington, D. C. | 205 | 899,620 | 372 | 229,888 | 35 | 75,705 | 192 | 166,460 |
| *Wheeling, W. Va. | 30 | 113,480 | 23 | 5,765 | 12 | 11,225 | 19 | 2,760 |
| *Wilmington, Del. | 127 | 335,873 | ... | ........ | 31 | 62,185 | ... | ........ |
| | 4167 | $16,101,551 | 2933 | $1,756,711 | 1887 | $3,732,575 | 1915 | $941,882 |

CITIES IN MIDDLE STATES

| | November, 1919 | | | | November, 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | | Repairs | | New Work | | Repairs | |
| | Permits | Value | Permits | Value | Permits | Value | Permits | Value |
| *Aurora, Ill. | 12 | $ 36,575 | 15 | $24,355 | 6 | $13,250 | 10 | $10,325 |
| *Battle Creek, Mich. | 78 | 125,000 | 38 | 10,000 | 26 | 60,000 | 24 | 6,000 |
| *Bay City, Mich. | 63 | 65,850 | ... | ...... | ... | ...... | ... | ...... |
| *Canton, Ohio | 205 | 729,190 | ... | ...... | 55 | 72,790 | ... | ...... |
| *Cedar Rapids, Ia. | 61 | 436,000 | 8 | 9,000 | 12 | 58,000 | 5 | 5,000 |
| *Chicago, Ill. | 654 | 13,483,600 | ... | ...... | 200 | 2,447,600 | ... | ...... |
| *Cincinnati, Ohio | 1197 | 1,159,475 | ... | ...... | 605 | 212,080 | ... | ...... |
| *Cleveland, Ohio | 1217 | 6,285,625 | ... | ...... | 843 | 1,565,995 | ... | ...... |
| *Columbus, O. | 233 | 461,625 | 99 | 164,355 | 102 | 208,315 | 67 | 52,840 |
| *Davenport, Ia. | 114 | 234,985 | ... | ...... | 72 | 106,050 | ... | ...... |
| *Dayton, Ohio | 147 | 482,161 | 61 | 29,381 | 127 | 382,732 | 28 | 17,580 |
| *Decatur, Ill. | 68 | 137,100 | 18 | 72,600 | 14 | 64,095 | 6 | 7,400 |
| Des Moines, Ia. | 150 | 1,012,330 | ... | ...... | 67 | 1,033,400 | ... | ...... |
| *Detroit, Mich. | 2104 | 14,854,985 | 449 | 2,488,100 | 448 | 1,508,887 | 269 | 1,150,537 |
| *Dubuque, Ia. | 33 | 113,780 | ... | ...... | 5 | 11,200 | ... | ...... |
| *Duluth, Minn. | 234 | 313,180 | ... | ...... | 120 | 243,829 | ... | ...... |
| *East St. Louis, Ill. | 48 | 107,934 | ... | ...... | 15 | 85,690 | ... | ...... |
| *Ft. Wayne, Ind. | 70 | 172,205 | 13 | 17,450 | 11 | 32,300 | 11 | 24,175 |
| *Fargo, N. Dak. | 32 | 380,000 | 15 | 22,000 | 14 | 6,000 | 9 | 20,000 |
| *Grand Rapids, Mich. | 156 | 270,705 | ... | ...... | 64 | 32,811 | ... | ...... |
| *Hamilton, Ohio | 12 | 116,256 | 20 | 43,903 | 4 | 23,450 | 10 | 5,976 |
| *Indianapolis, Ind. | 368 | 1,005,966 | 381 | 173,503 | 151 | 254,325 | 286 | 135,194 |
| Jackson, Mich. | 76 | 140,630 | 23 | 93,700 | 30 | 231,990 | 12 | 4,775 |
| *Joplin, Mo. | 7 | 113,400 | 6 | 6,575 | 12 | 25,755 | 7 | 1, 830 |
| *Kalamazoo, Mich. | 24 | 165,450 | 9 | 7,050 | 8 | 19,050 | 5 | 4,100 |
| Kansas City, Kan. | 25 | 252,300 | 18 | 4,530 | 20 | 373,150 | ... | ...... |
| **Kansas City, Mo. | 390 | 2,117,625 | ... | ...... | 213 | 306,250 | ... | ...... |
| *Lansing, Mich. | 169 | 297,960 | 32 | 19,865 | 18 | 11,635 | 5 | 1,950 |
| Lincoln, Nebr. | 62 | 109,745 | ... | ...... | 44 | 126,960 | ... | ...... |
| *Lorain, Ohio | 61 | 175,650 | 25 | 12,150 | 36 | 102,050 | 12 | 4,500 |
| *Milwaukee, Wis. | 321 | 2,464,778 | 127 | 410,919 | 176 | 594,740 | 77 | 115,484 |
| *Minneapolis, Minn. | 716 | 1,892,155 | ... | ...... | 332 | 373,855 | ... | ...... |
| *Omaha, Nebr. | 202 | 1,046,380 | ... | ...... | 98 | 175,682 | ... | ...... |
| *Peoria, Ill. | 65 | 107,325 | 41 | 52,210 | 23 | 90,785 | 34 | 11,950 |
| *Quincy, Ill. | 3 | 38,000 | ... | ...... | 2 | 7,000 | ... | ...... |
| *Richmond, Ind. | 20 | 59,320 | 9 | 4,850 | 1 | 200 | 13 | 5,760 |
| *Saginaw, Mich. | 162 | 186,391 | 91 | 51,752 | 35 | 46,988 | 7 | 2,545 |
| *St. Joseph, Mo. | 20 | 66,000 | 45 | 38,300 | 13 | 21,000 | 7 | 635 |
| *St. Louis, Mo. | 406 | 2,662,430 | 345 | 182,550 | 168 | 146,510 | 239 | 159,895 |
| *St. Paul, Minn. | 314 | 1,077,810 | ... | ...... | 87 | 182,394 | ... | ...... |
| *Sheboygon, Wis. | 6 | 26,160 | 64 | 17,792 | 1 | 2,370 | 34 | 8,389 |
| *Sioux City, Ia. | 151 | 610,116 | ... | ...... | 36 | 122,950 | ... | ...... |
| *South Bend, Ind. | 184 | 626,519 | ... | ...... | 99 | 183,766 | ... | ...... |
| *Springfield, Ill. | 28 | 1,100,700 | 57 | 62,635 | 15 | 60,165 | 42 | 15,835 |
| *Springfield, Ohio | 72 | 191,550 | 23 | 28,065 | 8 | 6,410 | ... | ...... |
| *Superior, Wis. | 116 | 118,425 | ... | ...... | 89 | 39,685 | ... | ...... |
| *Terre Haute, Ind. | 27 | 72,600 | 54 | 27,383 | 9 | 20,800 | 41 | 11,277 |
| *Toledo, Ohio | 219 | 849,110 | 132 | 137,523 | 85 | 146,461 | 70 | 88,272 |
| *Topeka, Kans. | 66 | 109,100 | 13 | 10,485 | 11 | 5,785 | 6 | 5,519 |
| *Wichita, Kans. | 141 | 372,781 | ... | ........ | 82 | 170,455 | .. | ...... |
| Youngstown, Ohio | 194 | 658,985 | 37 | 44,245 | 255 | 751,710 | 21 | 20,510 |
| *Zanesville, Ohio | 28 | 28,320 | ... | ........ | 8 | 7,570 | ... | ........ |
| | 11507 | $59,556,792 | 2259 | $4,260,176 | 4967 | $12,757,870 | 1352 | $1,894,153 |

* *Indicates an increase over last year.*



*Wallboard used with battens covering wall and ceiling joints*

# Wallboard on the Farm

## *Can Be Used Not Only for House, but Also for Miscellaneous Farm Buildings—Quick Work Possible—Business Prospects Plentiful*

By L. H Harvey

WALLBOARD is a favored material for farm construction and reconstruction. Aside from its other advantages, it can be brought to the farm quickly and easily and it can be put up at any time of the year. Winter is a quiet time for the farmer and wallboard lets him have his buildings overhauled and repaired regardless of weather conditions.

The farmer may take his time when it comes to buying a piano or a motor car, but when he has a fallen ceiling to restore, or his cow barn needs a warm lining to keep the cattle healthy, he appreciates quick action just as much as the man in town.

Some farmers already are aware of the advantages of wallboard for farm construction, but there are many others who have been holding off on much needed repairs who would order the work done at once were they made familiar with the possibilities of speedy and simplified work by the use of wallboard.

The war has enlarged the farm viewpoint. The farmer saw his work as a contributing force toward victory. He has a broader vision than just keeping the Jones grocery store supplied with butter and eggs, or speculating on the higher price his wheat might bring by selling it a few weeks later than he did last year.

The farmer has found it profitable, as well as patriotic, to force his farm productive capacity to the limit. That has led to the use of many modern farm implements which the farmer has managed to go without before. Now with increased crops to store and, in many cases, added farmhands to house, the farmer finds that his barn and house must keep pace with the development of the rest of the farm.

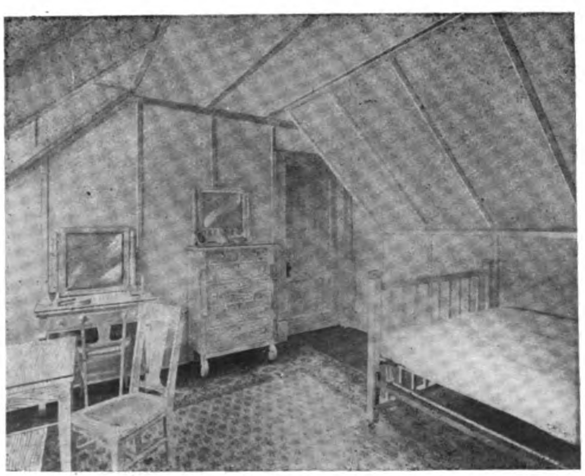
When spring comes the farmer will need extra rooms for the additional help. He may also require emergency sleeping quarters. He will want better storage space for his newer implements. He will need larger space for holding his crops. He will be more interested than ever in having sanitary, warm barns for horses and cattle. And in doing all these necessary improvements the farmer can use wallboard to marked advantage.

If the farmer needs more sleeping quarters for his own growing family, or extra help, wallboard will let him find those rooms in the present farmhouse without erecting new buildings. If the house has an unusued attic, he need only build in wallboard walls and ceilings to have from one to four additional rooms. Or if there is a large woodshed next to the kitchen it will pay to line the shed with wallboard and make an attractive room or two for the hired help.

If it is one of those large, imposing, but antiquated farm house, there are doubtless several needlessly large rooms that could just as well be divided into smaller, but more plentiful living quarters. It will be strange if the walls are not cracked and crumbling so that they already need a thorough-going repair. By partitioning the big room with wallboard and permanently repairing the old walls and ceilings at the same time, the house will have a complete restoration, not only in usefulness, but also in modern attractiveness. Instead of having decreased in value, the house will give a renewed service that will add to the entire financial worth of the farm.

For the tenant house that has to be built somewhat hastily, wallboard also clearly offers the most practical means for finishing walls and ceilings. It means making the house habitable at the earliest possible moment. It adds a homelike, cozy, and modern appearance to the rooms that will make the hired man and his family better contented with his work and prospects. Structurally, of course, it is as much of an advantage to use wallboard in such new farm buildings as in repair and remodeling because of the ease with which the board can be brought to the farm and the rapidity with which it can be used to complete the building, regardless of weather conditions.

The advantages of wallboard construction extend to practically every other farm building besides the farmhouse and tenant house. Take the cow barn as an example. Cold cows cannot give as much milk as when they are warm and healthy so it pays to line the cow stable with wallboard,



*Effective utilization of attic space*

*The living room brought up to date with wallboard* whether the stable is new or old. It is the least expensive way to line the old stable and it is doubly desirable when new stables are being built because it saves one layer of wood sheathing.

The poultry farmer can use wallboard for much the same reasons as the dairyman. The young chicks must be protected from weather conditions and sudden drafts whenever possible, and the hens, of course, will lay better when the chicken house is warm. Wallboard makes an especially practical insulator for the chicken house, incubator, brooder or colony house.

There are a multitudinous number of miscellaneous uses for wallboard about the farm. It can be employed for paneling feed bins, seed boxes, etc., or lining old leaky bins. Wallboard may be used for paneling crates, and packing boxes, particularly where the insulating properties would be of value as in packing or storing eggs and other farm products susceptible to spoilage by cold weather.

Wallboard is of value in lining and frost-proofing poultry houses, vegetable storage rooms, engine rooms, water pipes or tank rooms, It is the handy material for making old doors storm tight or covering broken door panels. It can be used for bee keepers' boxes and fittings, bird boxes, brooders, seed starting boxes, harness closets or sign boards. It is even handy in repairing sleight bodies or delivery wagon bodies.

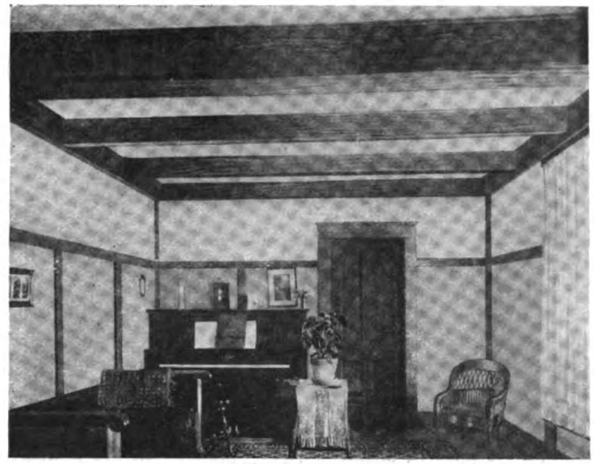
Where the possibilities of wallboard are explained to a farmer, an original order for remodeling the farmhouse or lining the cow stable often can be extended into several other needed repairs about the farm that the farmer will be glad to have made before the workmen leave. Wallboard increases the profit possibilities of farm buildings and rebuilding and makes the farm field additionally worth while for the contractor and builder who specializes on farm work.

A personal visit to the farmer is often necessary to make a sale.

# Hints on Wrecking Buildings

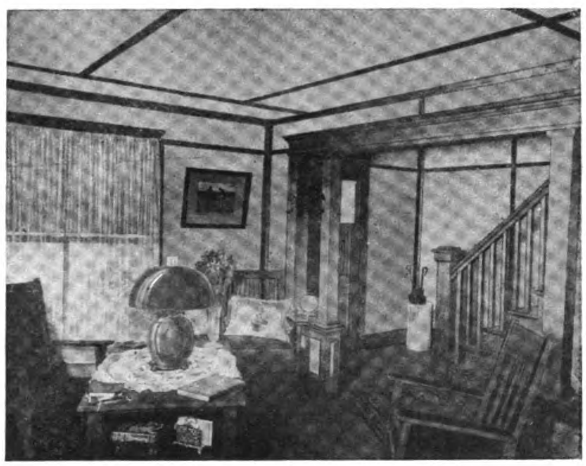
**By Owen B. Maginnis**

IN wrecking any building each story should be completely removed in proper order. No material should be placed upon the floor of any such buildings, but the bricks, timbers and other structural parts of each story should be lowered to the ground immediately upon displacement.



*Paneling effect carried partly up the side walls*

The business of demolishing, or "House Wrecking" as some term it, is a responsible and serious one, so that only builders or men of skill and experience in this line are qualified to do it successfully. In many cities, applicants for permits must prove their capability before they can obtain or proceed with the work.



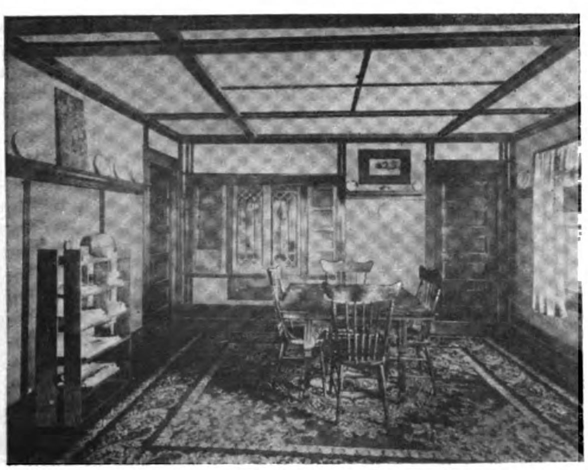
*Interesting effect where a cased opening is used*

Before commencing to pull down any building, it is necessary to cover over the sidewalk with a good shed or platform not less than 8 ft. in the clear in height so as to protect pedestrians from possible injury by falling materials or debris. All temporary shoring, needling or bracing must then be done on any wall or floor likely to collapse. Gas, water and electric connections must be shut off from the street mains, after which all valuable fixtures and breakables such as mirrors, basins, plumbing, wood and marble mantels, and window sashes may be carefully removed and carried to the street. The doors are next unhinged and the trim and woodwork cut loose and removed, all of which work should be done carefully so as to damage each detail as little as possible.

In this connection, much second hand material procured carefully in wrecking is frequently good enough to be repaired and made fit to sell or use for other purposes.

The pulling down of the shell of every building must of necessity commence at the roof. The chimney and wall stone or terra copings are first taken

(*Continued on page* 382)



*The central paneling of the ceiling is interesting*

*Beamed ceiling and paneled side walls make this dining room attractive*

# New Publications

*Lumber and Its Uses.* By R. S. Kellogg. —Much interesting data is contained in this book. It devotes quite a bit of space to the structural and physical properties of wood, giving the crushing strength, modulus of rupture, specific gravity, etc., of various woods, as well as the ratio of bending strength to weight. Tables giving the modulus of elasticity and toughness are also given, together with the relative hardness. Machines used to test timber are illustrated. Systems of gradings and how they are arrived at are explained. Standard sizes of lumber are given, which chapter is especially valuable to the contractor as it will enable him to order his material from economical sizes and also enable architects to plan houses that will permit lumber to be used with a minimum amount of waste. This subject is especially important just now in view of the necessity for elimination of waste in order that the cost of houses may be kept down as far as possible without impairing quality.

Specifications for lumber for various purposes are also given, together with working stresses for various kinds of structural timbers. A valuable chapter on wood preservation is given, showing the various methods of applying wood preservatives in order that timber may last as long as possible under unfavorable conditions.

A chapter is devoted to paints and wood finishes, telling what the condition of the wood should be in order that the painting may be successful, and how to paint exterior and interior woodwork, staining and varnishing softwoods, enameling, waxing, etc. Of interest to contractors is the chapter on hardwood flooring, in which is given the grading rules for various kinds of flooring and the manner of laying. Oil, wax and other finishes are the subject of a brief specification.

There is considerable other information of interest to those concerned with lumber in the lists of uses of lumber for various purposes, lumber manufacturing, etc.

This book has 392 pages, size 6 x 9¼ inches, is fully illustrated and indexed, and published by the U. P. C. Book Company.

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*Old New England Doorways.* By Albert G. Robinson.—One of the most successful styles of doorways is that developed by the old colonial builders. Although the early doorways were simple and unpretentious, yet they, as well as the more ornate later ones, reveal a sense of delicacy and proportion that has caused them to be widely copied by architects.

A number of the old New England doorways has been gathered together by the author and presented in this book. A number of full page plates is presented, enough of the house itself usually being included in the photograph to enable one to get an idea of the general architecture of the house, window trim, etc., so that one may see how the doorway was made to harmonize with the structure itself. Such a collection of colonial doorways should prove interesting to architects and builders interested in this kind of work.

The book is prefaced by a twenty-one page description describing the development of colonial doorways and bringing out the salient historical features.

The book is 7¼ x 10½ inches in size, is bound in cloth and is published by Charles Scribner's Sons.

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*Checking Schedule for Projected School Buildings.* By James O. Betelle.—It frequently happens that important omissions are made in plans and specifications due to the fact that items may be overlooked. In order to guard against such a danger, it is advisable to have some sort of a checking list which will reduce the omissions to a minimum. This is especially true when, as in the case of school houses, much of the information must be secured from the School Board.

As an aid to meeting such problems, the pamphlet under review will prove valuable. It is in two parts, Part 1 calling attention to the items concerning which the architect needs information before he can start upon the plans and specifications, and the second part being intended to assist the chairman of the Building Committee and superintendent in quickly checking up the finished plans and specifications. This pamphlet has thirty-two pages, size 6½ x 10 inches and is published by the Bruce Publishing Co.

---

*Progressive Steps in Architectural Drawing.* By George W. Seaman.—Builders who desire to learn how to draw their own plans and students of architectural drawing will find some decidedly interesting information in this book. Although it is of elementary character, yet it does not devote considerable space to preliminary work which many consider unnecessary. Instead the student is immediately started in the laying out of a plan, which is what all students of architectural drawing are most interested in and most desire to do immediately. A number of full page plates give the various steps in drawing a plan, the first plate showing the drawing of horizontal lines that mark the exterior walls and interior partitions, the next plate the marking of important interior points and so, plate by plate, the gradual development of the plan is shown. The text tells the proper manner of proceeding, and supplements the full page plates.

Of special interest are the pages devoted to the indication of the various kinds of windows, window frames, door frames, etc., in various kinds of buildings; indication of stairs, various types of cornices, windows, etc., which gives standard methods both of indication and construction. A page plate is also devoted to mouldings in general use.

The elevation is treated in the same way as was the floor plan, and the student is shown how to develop an elevation step by step. Plates are also devoted to progressive steps in the detailing of window frames, cornices, etc.

Rough sketches are given near the end of the book, from which the student is expected to work up finished plans and elevations.

Of no small interest is that part of the book devoted to lettering, for the architectural style rather than the engineering style so often used is given. Several full page plates are also devoted to the orders.

This book has sixty-three pages, 8 x 10 inches, is fully illustrated, bound in cloth, and is published by the Manual Arts Press.

---

*Full Length Roof Framer.* By A. F. J. Riechers.—This is a handy little book which can easily be slipped into the pocket and contains much valuable information on the subject of roof framing. It is not so much an instruction book as it is a handy reference book which will save time in getting the lengths of all rafters for any span, cuts and bevels for common hip, valley and jack rafters, purlins, and cuts and bevels for gable and cornice mouldings. The series of tables covers 48 pitches. Explanations accompany the tables. This book has 115 pages, size 3½ x 7 inches, is illustrated, bound in cloth and published by the author.

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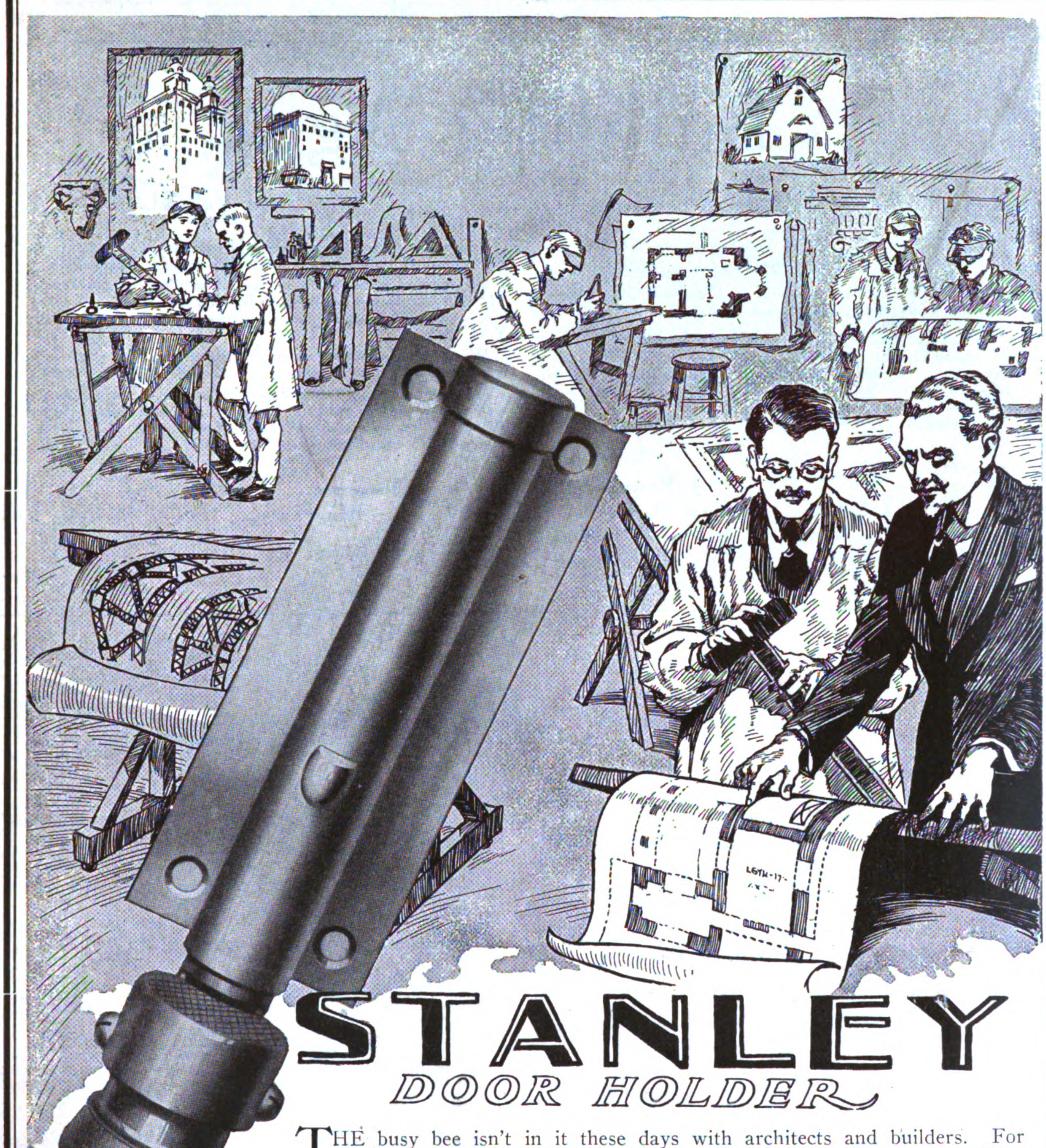
## Hints on Wrecking Buildings

(*Continued from page* 381)

off, then the parapet walls, next the roof coverings, whether of tin, gravel, slate or any other material. Also wood sheathing is taken off and then the roof beams. The topmost story walls follow and then the next uppermost flooring and floor beams, continuing on down tier by tier and story after story to the basement and foundation. All heavy stone and iron lintels and sills must be lowered with ropes or blocks and tackles, as well as steel beams and girders. Improvised derricks may readily be constructed out of the old timbers in a safe and sufficient manner.

Progress must be slow, in fact haste in demolishing buildings means danger, and every structural item must be closely watched as the work goes on. Scaffoldings and all kinds of tools should be provided, viz.: crow bars, cold chisels, axes, mauls, hatchets, ropes, planks, and so forth, without stint so that the job may be completed safely and expeditiously.



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Formerly Carpentry and Building, Founded 1879

December, 1919 Vol. XLI. No. 12

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## Contents



*Construction Questions Answered:*



*The Editor's Page:*


BUILDING IS BOOMING
At this time there is a shortage of homes of nearly a million, to which must be added the normal requirements for the balance of this year. The pressure to inaugurate and complete delayed construction is being felt: the supply of labor is adequate and the resumption of home building on a large scale is possible.
The
"Build It Now"
idea is growing. In normal times, under normal conditions, it required the building of about 600,000 homes annually. For over two years normal construction has been suspended, therefore, over 1,000,000 homes are needed. This means more building. Be prepared for more work and buy
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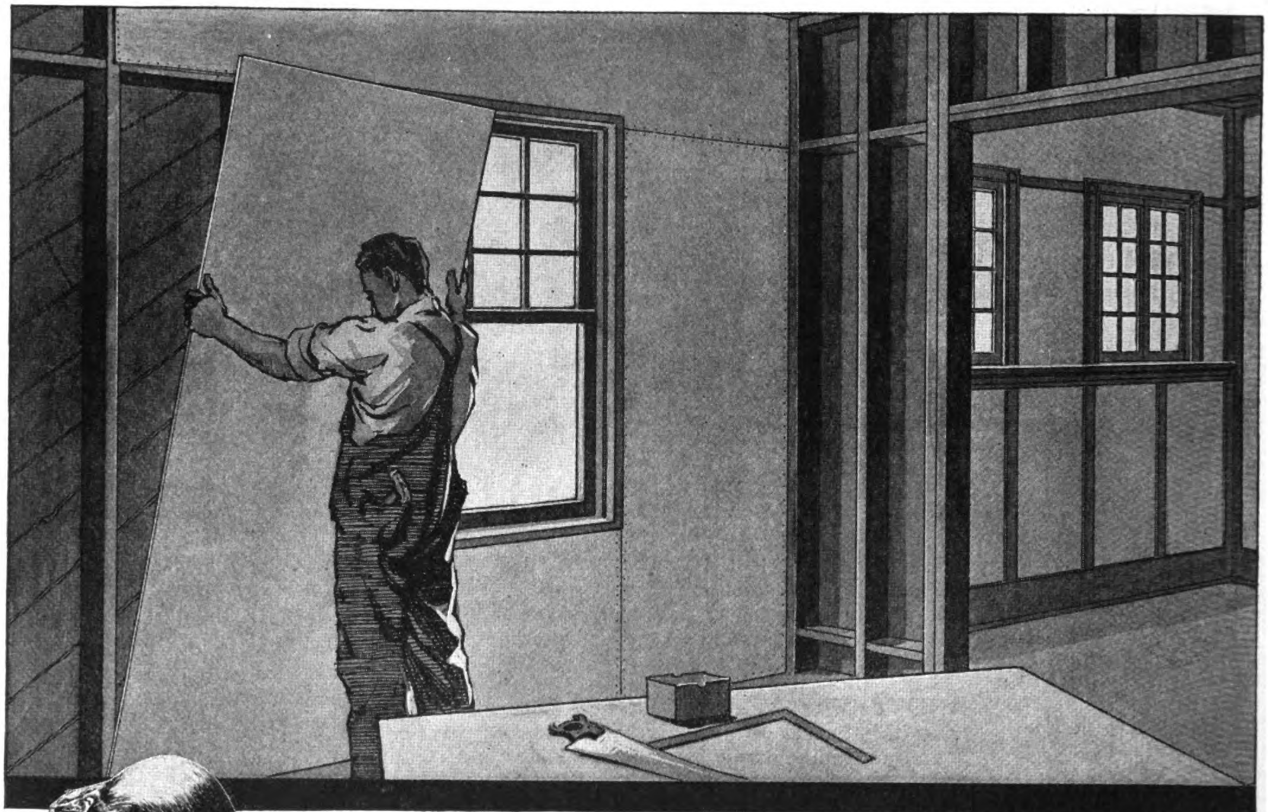

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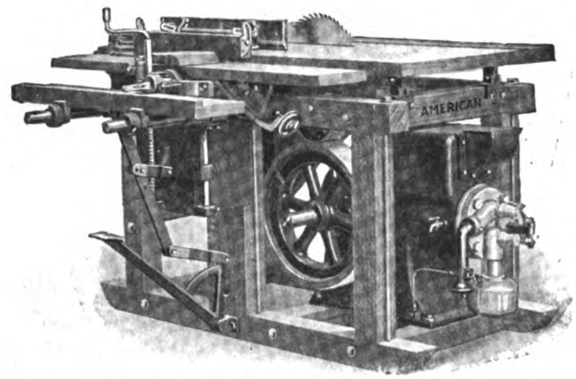


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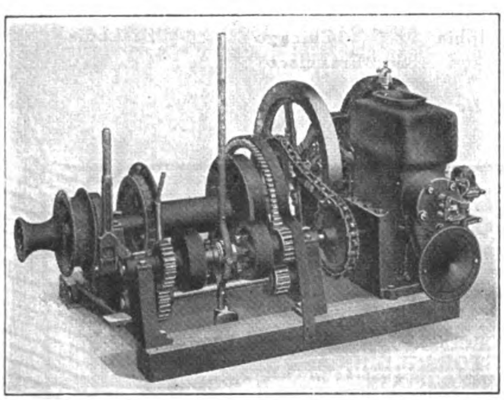

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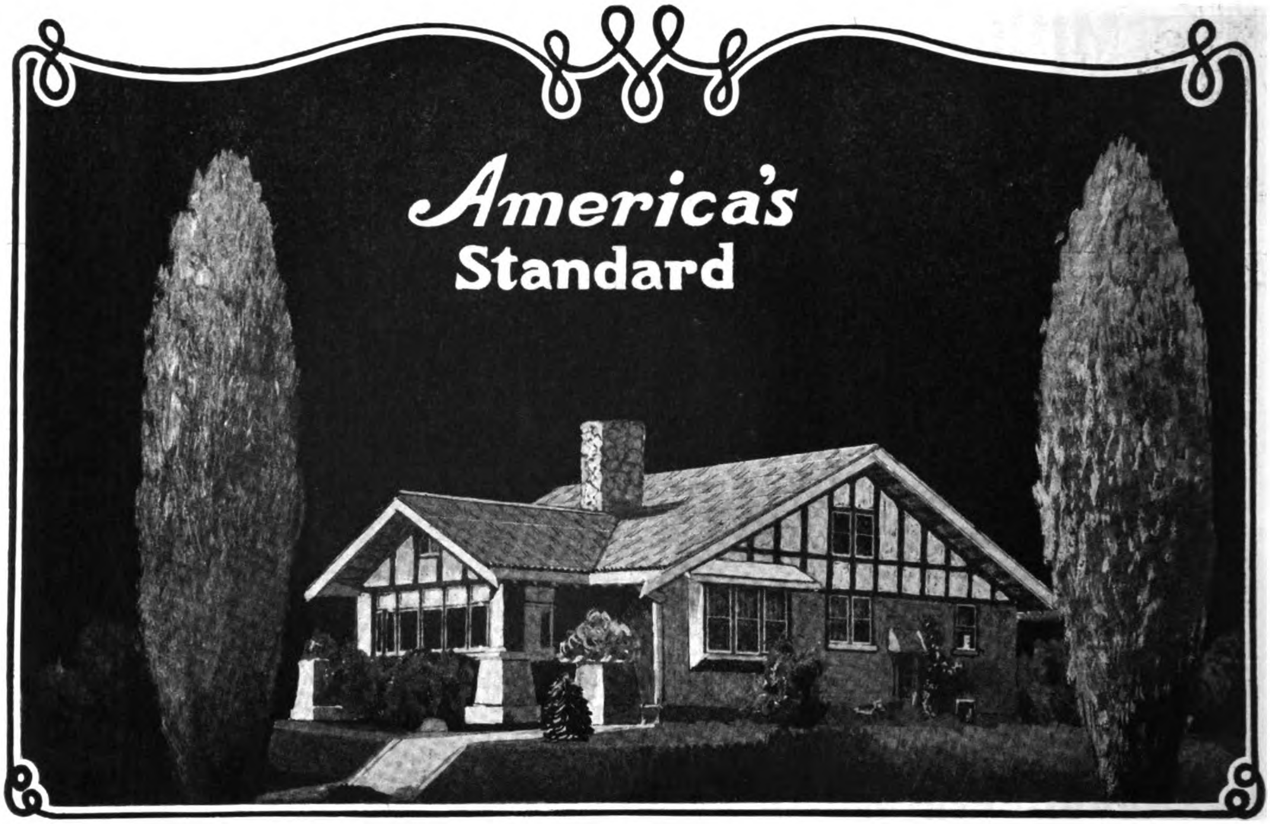


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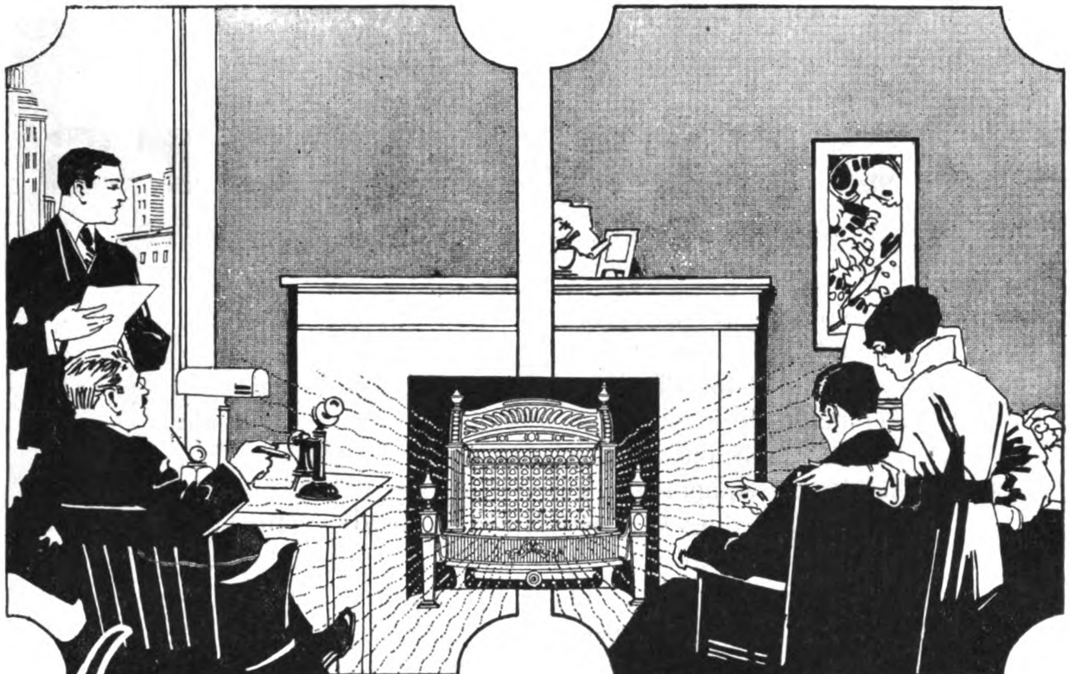

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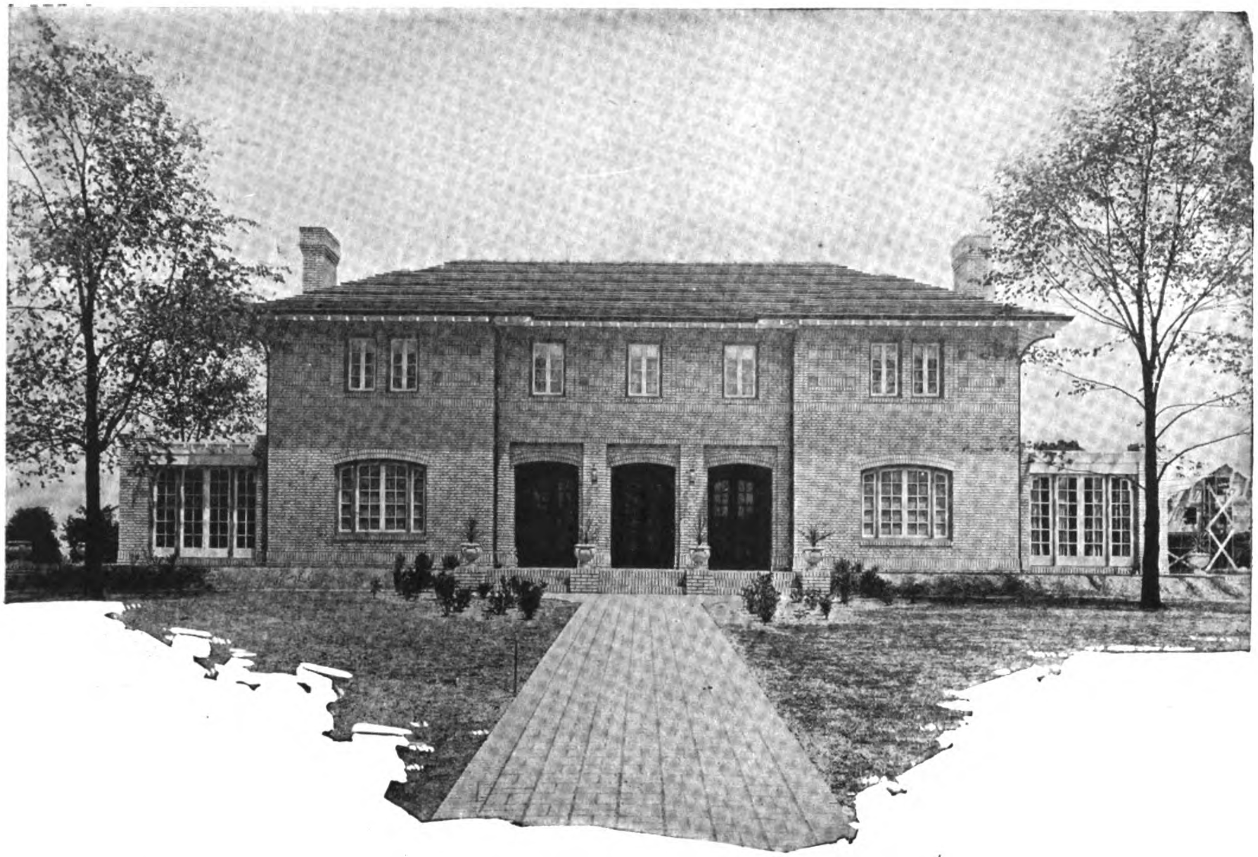

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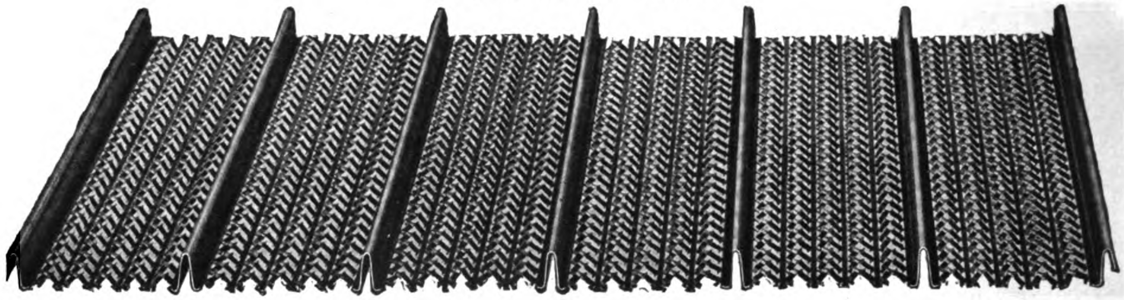

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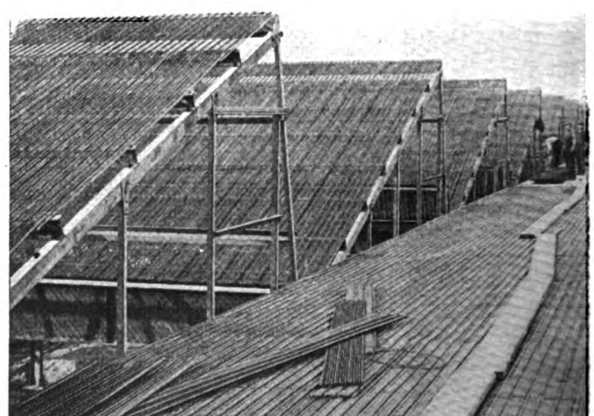

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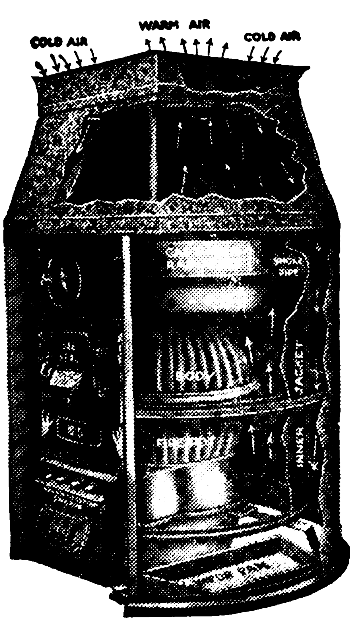


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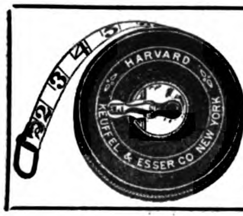


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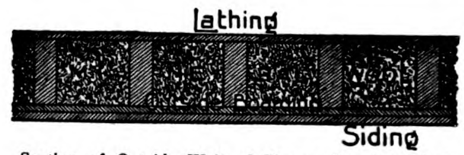


Section of Outside Wall of House, Showing Wool Between Studding.

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# BUILDING AGE

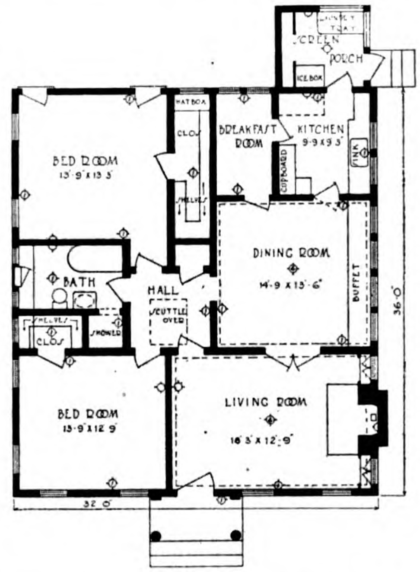
NEW YORK, DECEMBER, 1919

## A Cozy Colonial Bungalow

THE bungalow type of dwelling has made great strides in popularity since it was introduced a few years ago. In fact, in many sections of the country, any particularly cozy cottage is called a bungalow, regardless of the fact that the term properly should be confined to houses with all the rooms on one floor.

The typical bungalow is generally either small or of moderate size, it only being in warm climates that it frequently spreads over a large area. Due to its comparatively inexpensive nature, the bungalow is simply designed. The simplicity in a bungalow has quite naturally linked itself up with the simplicity that prevails in the Colonial type of architecture, and one frequently sees bungalows successfully done in this style.

The main feature of the bungalow illustrated is the central porch with its graceful columns simply moulded, and




*Attractive Planting and Simplicity of Design Make This Bungalow an Interesting One of Its Type* having a slight entasis. The lattice work at either side, with its climbing roses, adds a homelike touch that does much to make this design a success.

The Colonial spirit is carried out by the green shutters, white clapboards and weathered shingles on the roof. The fence in front is also Colonial in feeling.

One enters directly into the living room. An attractive vista is presented of an open fireplace and a wide opening through to the dining room, the feature of which is a buffet that one catches a glimpse of upon entering.

An interesting feature of the plan is a breakfast room—always a desirable thing in the small house. This is so placed that it might, if desired, be used as a pantry.

Only too often in the small bungalow is one of the bed rooms right from the living room or dining room not a desirable feature. In this dwelling, however, a small central hall provides access to all rooms.

Each one of the bed rooms has a large closet, with shelves around and a lighting fixture handily placed. The bath room is unusual in that it has a recess for a shower-bath.

This bungalow is located in Los Angeles, Cal., and was designed and built by the Briggs Company, Los Angeles Investment Building, Los Angeles, Cal.

# How to Use Metal Lath

## *Weights for Different Construction Needs—Methods of Applying*

By C. O. Powell

METAL LATH is a fabric made from sheet metal which is expanded or punched so as to form a series of metal meshes which support the plastic material used on walls or ceilings, and hold it in place until it is set. After that it provides a perfect and permanent mechanical key and reinforces the plaster against cracking or falling. It also is extensively used as a base for exterior stucco on new buildings and for "overcoating" old buildings.

It is cut from sheets of steel of standard known thickness with a determined width of strand, fabricated by machine to a determined size of mesh. It is galvanized or dipped to provide a protective coating of sufficient durability to protect it from the weather before application. After it is placed in position in a building the plastic material further protects it.

The great virtue of metal lath is its ability to lengthen the fire-retarding value of any plastic coating that may be put upon it. It holds this coating in place even after the coating has been reduced in strength by the action of extreme heat. It so reinforces plaster as to prevent cracks from developing, thereby gaining the maximum insulating value before any flame can pass.

### Size of Metal Lath Sheets

Metal lath is manufactured from sheet steel of different gauges varying from U. S. Standard No. 27 to No. 22. The sheets vary in width, according to each manufacturer's standards, from 16 inches to 24 inches, but the most popular width is 18 inches. The length of sheets is uniform, being 8 feet. This length has been adopted to avoid waste in erecting.

### Metal Lath on Frame Buildings

In erecting metal lath on the interior of frame buildings the lath is first applied to the ceiling, being fastened with 1¼ inch, 14 gauge staples or 4d nails every 4½ inches. The end of the sheet is fastened first, and when fastening to the next joist the staples are driven so as to draw up the lath taut between supports. If nails are used they are driven in at an angle so when the head is bent over the lath will be drawn up tight. The sheets of lath should be staggered so as to break joints and are locked or lapped not less than ½ inch at sides. The adjoining sheets are tied together once between supports to prevent them springing apart when the plaster is applied.

On side walls and partitions the lath is started at the top of the wall, the first sheet being bent back 6 inches onto the ceiling and securely wired to the ceiling lath. This reinforces the angle between walls and ceiling and prevents the plaster from cracking at that point. The lower edge of the sheet is not fastened until after the next sheet is lapped or locked to it, then one staple or nail holds both edges. The lower sheet is always placed over the upper so that in putting on the plaster the trowel will not catch on the edges of the upper sheets. In order to avoid joints at the corners and to prevent corner cracks the sheets are started at the first or second support from the corner and carried around the corner. Sheets should be staggered so as to break joints. The lath is carried down tight against the floor.

### Erecting Metal Lath on Steel Studding

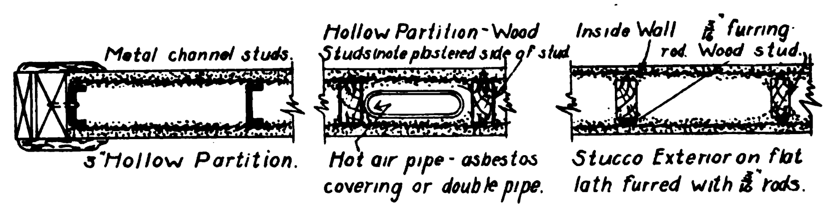
In fire resistive construction, the plastered partitions consist of steel studding and metal lath covered by any of the common plastic materials. These partitions may be 2 inches to 3 inches solid plaster or 4 inches to 6 inches hollow. The solid partitions are non-bearing and the hollow partitions may be either bearing or non-bearing.

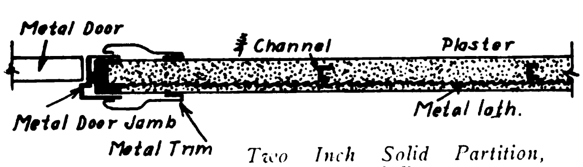
Two types of steel studs are used. One type is the usual structural steel shape of channels and the other is a pressed steel channel with or without prongs on the flanges.

The only difference in the method of erecting metal lath on steel studding from that followed with wood studding is the manner in which the lath is fastened. This is accomplished by tying with No. 16 or No. 18 gauge tie wire. Where solid partitions are used the lath is applied to only one side of the studs and the tie wire passes around the stud.

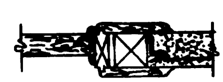
One end of the wire is bent in the shape of a long hook or V. The other end of the wire is long enough to allow the V-shaped end to be passed through the mesh alongside of the stud until the free end of the hook or V passes back of and around the stud. Then wire is pulled forward, bringing the free end of the hook back through the lath on the other side of the stud, after which the ends are given two full twists, drawing the lath up tight against the stud. The twisted end is then bent over to one side to prevent the trowel from catching when the plaster is applied. The sheets are tied at edges between supports same as on wood construction.

Some of the wider studs used for hollow partitions have slots in the flange through which the wire is passed instead of being carried around the whole stud. Another special form of pressed steel




*Two Inch Solid Partition, Metal Doors*

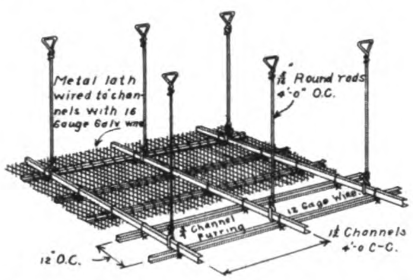


*Wood Trim and Door Used in 2" Solid Partition* studs have prongs on the flanges which pass through the mesh of the lath and fasten it to the studs by bending down.

**Erecting Metal Lath on Ceilings of Fireproof Buildings**

Ceilings in so-called "fire-proof" buildings are either attached directly to the steel or concrete floor beams or suspended by a light structural steel frame below the floor.

Where the ceilings are attached directly to the floor beams, furring is pro-

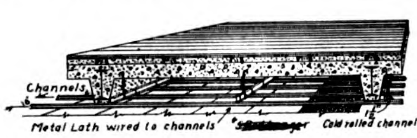



*Metal Lath Used in Construction of Hanging Ceiling*

vided to which the metal lath is attached. This furring is supported by hangers of 3/16 inch rods or heavy wire which are placed before the fire-proofing of the structural members is done and placed 4 to 5 feet apart. Various methods are shown in the sketches.

When the beams are five feet or less center to center a runner, which may be a flat or a channel, is hung below and parallel to each beam, and small ¾ inch channels 12 inches to 16 inches apart wired to this flat. The metal lath is then wired to these channels in the same manner as described for fastening to studs, and following the same methods of erection as for wood joist ceilings.

Where the beams are more than five feet apart the runners are placed at right angles to the beams and spaced 4 to 5 feet apart and the ¾ inch channels are wired to them in the same manner as described in the preceding paragraph. Additional hangers are used between beams so that the runners are supported at least every five feet.




*Wires May Be Embedded in the Concrete to which the Channels and Metal Lath are Later Fastened*

Where the ceilings are to be hung or suspended some distance below the floors, the same method is followed as outlined in last paragraph.

**Metal Lath for Stucco**

As metal lath for stucco is almost always applied to wood frame buildings the lath is erected in the same manner as that described for wood stud partitions.

Where metal lath is used as a base for stucco over old masonry walls, nailing plugs are inserted to which metal furring on 12 inch or 16 inch centers is fastened with staples and the metal lath wired to this furring in the same manner as described for attaching to steel studs.

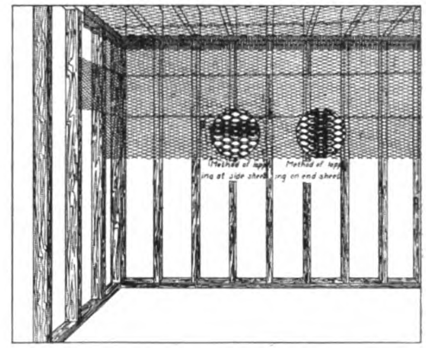
There are so many important details in connection with the proper construction of stucco houses that this subject will be covered in another article.

**Sizes of Metal Lath to Use**

For all ceilings the metal lath should weigh not less than 3.0 pounds per square yard with supports spaced 16 inches on centers.

For partitions where supports are spaced 16 inches on centers the lath should weigh not less than 2.5 pounds per square yard.

For stucco work the lath used should weigh not less than 3.4 pounds per square yard.



*Manner in Which Metal Lath is Lapped at Sides and Ends. Where Laid Horizontally, Lower Sheet is Lapped Over Upper*

# Economical Design of Plumbing Systems

## *Location of Kitchen Fixtures Should Always Have Consideration Before Building Plans Are Completed. Improved Service Results From Proper Arrangement*

By William Hutton

THE arrangement of the kitchen and laundry fixtures in a small house is seldom ideal. The importance of locating the kitchen so that it is conveniently near to the dining or serving room is never underestimated. But the actual location of the chief essentials of a kitchen—the sink and the range—too often receives little thought. The kitchen is the workshop of the home and its equipment should be as well planned as that of any industrial workshop. The cost of installing the fixtures is an important matter, but not so important as that of getting the greatest service and efficiency from them.

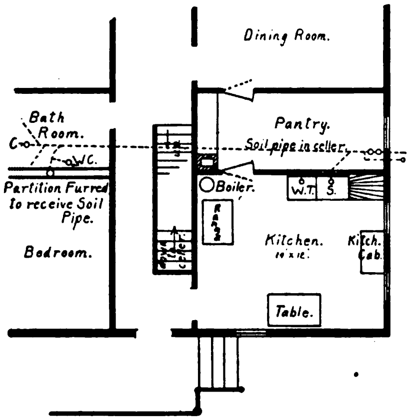
Consider how many trips between the range and the sink must be made in the cooking of a dinner. Consider the discomfort of working at a sink that is too near to a hot range. Consider these points when the plan is being laid out and before it has been decided to build the kitchen chimney, so that the chimney will also serve for the furnace or so that it also will accommodate a flue from a living room fireplace.

These points must have individual consideration. It is not possible to indicate just how far from a range the sink should stand or the relative positions in the kitchen they should occupy. But this at least might be said. There should be plenty of light at the range and if a sink can be set at a right angle to a window instead of in front of it the user will have more comfort through better lighting and the fixture can as a rule be set at a better height when there is no window sill to restrict the height at which the sink may be set. Many women find that a sink set at 36 in. from the floor makes their work easier.

The style of the fixtures selected have an important bearing on efficiency also. For instance, in a house designed for a small family there may be little need for the provision of laundry fixtures and yet a convenience may be afforded if one tub is available for occasional use. In this case the combination of one tub with a kitchen sink is a good one. Not only does it take up little room and practically cut the cost of installation to that of one fixture, but it adds greatly to the convenience of the housekeeper. The single tub may be used to receive a large number of table utensils or dishes until such time as it is desired to wash them, and the advantage of being able to submerge them completely in hot water expedites the business of cleaning when that operation is taken up.

Of course the combination need not be limited to a single tub. Two or more can just as easily be combined with the sink if desired. The space available and the demands of the family will dictate what is best suited for each case. But whatever number may be used, or whether a combination set or a separate wash trap set be used, one end of the laundry fixture should be in such a position that it is possible to attach a wringer where the clothes may drop into a basket placed to receive them.

To illustrate, Fig. 1 shows the arrangement of the kitchen fixtures in a bungalow recently constructed. This arrangement is very good, as the family occupying the house is a small one and the lady does her own kitchen work. Swinging




*Good Arrangement of Fixtures in a Bungalow*

doors in the pantry keep the cooking odors in the kitchen and yet admit easy passage to the dining room when carrying loaded trays. A table placed near to the back door entrance to the kitchen is convenient for receiving packages from the market men and a kitchen cabinet placed between the two windows in the side wall is within easy reach of the sink.

This arrangement saves a good deal of walking when baking or other cooking operations are being performed at the cabinet and the distance from the stove is not great either. The light comes from the side both to the range and to the sink and wash tray. The fixtures are set against an inside wall so that the water pipes coming to them are located where they are not likely to freeze. And as the soil pipe running to the bathroom passes almost under the fixtures the waste connection is also simplified, and it is easy to connect vent pipes to the traps with a minimum of piping. Fig. 2 shows the waste and vent piping and how few fittings are required to make the two connections.

If the sink and wash trays had been set along an outside wall as is commonly done, the water pipe would of necessity pass close to the cellar wall-head, subject to cold drafts passing between the foot plate and the wall and the waste piping would have been longer and more difficult to instal. As a matter of fact the difference in cost of installation would have amounted to about $5.00 more, the work would have been less satisfactory and the lady would have had less comfort in the use of her kitchen.

It may be well to draw attention to the matter of venting a combination like this. Where plumbing laws do not compel a system of venting this feature generally is omitted, sometimes with detriment to the job. Also, the two fixtures might have been carried through one trap, either of the pot or round pipe style.

But here is the objection. Perhaps it will be realized that the saving in first cost is too small to compensate for the disadvantages it entails. The discharge from a kitchen sink is harder to carry out into the sewer without fouling the interior surface of the house drain than that from any other fixture. The grease carried out with the water cools in the pipe and adheres to the walls. If a constant current of air is passing through the pipe this grease is dissolved to some extent by the oxidizing properties of the air. If no current of air is passing through, the grease builds up and eventually stops the passage. Also, a detrimental effect on the metal is experienced.

Anti-siphon traps may be placed so that the action of a discharge from the bathroom or other fixtures will not unseal the traps, and so the venting may be omitted so far as safety from entrance of sewer air is concerned. But the ventilation itself is the valuable feature of construction which makes it worth while carrying out and unless the cost is considered prohibitive it should be installed whether plumbing laws are in force or otherwise.

Another thing that does not always receive proper consideration is the location of the kitchen range boiler. If it is too close to the water front in the range the connection is "stiff" and leaks soon develop in the piping and fittings. If it is too long the efficiency of the circulation is lowered. If it is placed in a closet in order to save wall space in the kitchen the difficulty in making the connections is increased and also that of drawing off the water so that periodical flushing, which is of the utmost importance if the boiler is to have a normal life, is neglected until sediment has collected and noises in the system give warning that the circulating pipes are choked.

If, as in the job illustrated, the boiler is placed against the chimney, then this should be known when the chimney is built so that the tile thimble may be built in at a point high enough to allow the plumber to carry his pipes to the top of the boiler without interfering with the smoke pipe connection. And when a valve or stop is fitted, it is well to use one of the compression variety so that the owner may be able to shut it in case of emergency. Those of the ground key type turn very hard when they have been in service a few years and so seldom operated as they are on the average kitchen boiler supply.

In some localities it is the custom to instal all of the water piping so that the control valves for the various fixtures are placed on a board in the basement and labeled so that any supply line may be found and the water turned off or on with the minimum delay. This is a good idea if the cost entailed is not objected to. A central location is, of course, selected and very often it is near to the bottom of the cellar stair. The same type of stops should be used in each case and if they are expected to drain the water back from the lines it is an easy matter to connect up the waste outlets to a small pipe which will carry the water to any point in the cellar and save wetting down the whole floor.

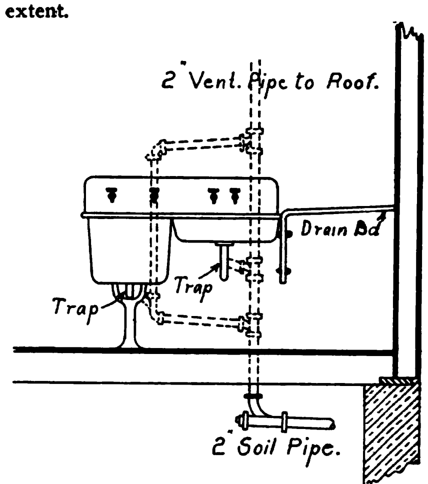
# Housing Conditions in Germany

Housing conditions in Germany are very bad. The government was forced to appeal to house owners who have more than enough room to shelter themselves to volunteer some space to those without shelter. As was to be expected, this appeal brought very few replies, and it is seriously being considered to adopt a system which was in vogue in Budapest and Munich during the soviet regimes, that is, to forcibly take over parts of certain houses where the space is more than sufficient for the owners.

A Berlin magistrate has ordered all the war companies out of their quarters in order to provide places for those who have no homes. The apparent severity of this order is mitigated by the fact that most of the war companies are either in process of dissolution or are entirely dissolved.

Gruenau, a suburb of Berlin, is considering the confiscation of the dwellings of bachelors, putting families in them. Other suburbs plan to confiscate, for the winter at least, the homes of summer guests. In fact, one suburb has already taken this step.

The government has already obtained control of about 7,000 empty stores, barracks, garrets and temporary structures in order to relieve the pressing need to some extent.




*Plumbing Required for the Kitchen Fixtures Shown in Fig. 1*

The shortage in Berlin is so serious that it is stated that some of the cells in one of the city's jails were let to homeless people.

Berlin has erected a model house of clay in order to find out if this material will prove practicable for the erection of more or less temporary houses which will relieve the present stringency. Ordinary materials make the cost of building approximately 4½ times what it was before the war, and this high cost is doing much to cause the shortage.

# Economical Design of Timber Beams

## *Direct Formulae That Take Into Account the Deflection and Horizontal Shear as Well as Extreme Fibre Stress*

By Ernest Irving Freese

The following formulæ apply only to simply-supported uniformly-loaded rectangular beams.

Let $f$ = extreme unit fiber stress, in lbs. per sq. in.
$v$ = *average* unit shear at supports, in lbs. per sq. in.
$\theta$ = unit deflection, in ins. per ft. of span.
$E$ = modulus of elasticity, in lbs. per sq. in.
$W$ = total load, in lbs.
$L$ = span in *feet*.
$b$ = breadth in ins.
$d$ = depth in ins.

Substituting $\dfrac{bd^3}{12}$ for $I$, and $\dfrac{d}{2}$ for $y$, in the fundamental flexure formula, and then equating the result to the formula for bending moment, gives

$$b = \frac{9WL}{fd^2}$$

Making the same substitution for $I$ in the deflection formula, and transposing, gives

$$b = \frac{270WL^2}{E\theta d^3}$$

Equating the above two values of $b$, and solving for $d$, gives

$$d = \frac{30Lf}{E\theta}$$

The above formula, since it gives the depth in terms of the fiber stress and deflection, will herein be called the *flexure-deflection* formula.

Now, substituting $vbd$ for $V$, in the shear formula, $W = 2V$, gives

$$b = \frac{W}{2vd}$$

The above formula gives the breadth in terms of the average horizontal or vertical shear at the supports. Equating this to the value of $b$ first derived, and solving for $d$, gives

$$d = \frac{18Lv}{f}$$

The above formula, since it gives the depth in terms of the fiber stress and horizontal shear, will therefore be termed the *flexure-shear* formula.

Now, for balanced design, the depth as given by the *flexure-deflection* formula must equal the depth as given by the *flexure-shear* formula, or

$$\frac{30Lf}{E\theta} = \frac{18Lv}{f}.$$

which, solved for $f$, gives $f = \sqrt{.6Ev\theta}$, the extreme fiber stress at mid-span of any uniformly loaded rectangular beam, in terms of the average horizontal shear at the supports and the unit deflection. The value and convenience of this formula lie in the fact that it comprises *all* the factors entering into, or affecting, the design of timber beams.

The following formulæ, then, afford a direct and economical solution of all simply-supported and uniformly-loaded rectangular beams:

$$f = \sqrt{.6Ev\theta} \quad \text{.......... No. 1}$$

$$d = \frac{30Lf}{E\theta} \quad \text{.......... No. 2}$$

$$d = \frac{18Lv}{f} \quad \text{.......... No. 3}$$

$$b = \frac{W}{2vd} \quad \text{.......... No. 4}$$

*Example:*

A long-leaf yellow pine timber is required for the support of a factory floor. What will be the most economical size girder that can be used if the following data govern the design?

$E$ = 1,500,000 pounds per sq. in.
$v$ = 100 pounds per sq. in. = ⅔ the maximum.
$\theta$ = 1/36 in. per ft. of span.
$L$ = 16.5 feet.
$W$ = 44,000 pounds.

By formula No. 1, the economical fiber stress compatible with the allowed shear and deflection is

$$f = \sqrt{.6Ev\theta} = 1581 \text{ lb. per sq. in.}$$

Since this is also a safe working stress for long-leaf yellow pine, it will be adopted as a preliminary value.

The economical depth can then be found either by formula No. 2 or formula No. 3, since the above fiber stress exactly balances the allowed maximum values of shear and deflection. By formula No. 3,

$$d = \frac{18Lv}{f} = 18.7 \text{ in.}$$

This is the economical depth required. But there is no stock timber of this exact depth. A lesser depth must therefore be adopted because a greater depth would call for a lesser breadth and thus cause the horizontal shear to exceed its maximum allowed value. Hence, a depth of 18 in. will be adopted. This reduced depth, however, also necessitates a reduction in the extreme fiber stress, since the allowed deflection must not be exceeded. The reduction formula is easily obtained by transposing the flexure-deflection formula thus:

$$f = \frac{Ed\theta}{30L} \quad \text{.......... No. 5}$$

Solving:

$f$ = 1515 lb. per sq. in., the designing fiber stress in terms of the adopted depth of 18 in. and the maximum allowed deflection of 1/36 in. per ft. of span.

Then, by transposing the flexure-shear formula, the value of the reduced average unit horizontal shear necessary to balance the design is found thus:

$$v = \frac{fd}{18L} \quad \text{.......... No. 6}$$

Solving:

$v$ = 92 lb. per sq. in., the designing horizontal shearing stress in terms of the reduced fiber stress of 1515 lb. per sq. in. and the adopted depth of 18 in.

Hence, since the designing values have been brought into exact balance, the required breadth of the timber is easily determined by formula No. 4, or

$$b = \frac{W}{2vd} = 13.2 \text{ in.}$$

Therefore a 14 in. by 18 in. girder would be the most economical stock-size timber that could be used under the given conditions. A wider and shallower timber would contain more lumber, while a narrower and deeper one would result in excessive horizontal shearing stress.

*Example:*

In the foregoing example, suppose the extreme fiber stress were limited to 1200 lb. per sq. in. and the depth were assumed at 20 in. What is the required breadth of the girder?

Transposing the flexure-deflection formula gives

$$\theta = \frac{30Lf}{Ed} \quad \text{.......... No. 7}$$

Solving:

$\theta$ = 1/50 in. per ft. of span, which is within the allowed value.

By formula No. 6,

$$v = \frac{fd}{18L} = 80 \text{ lb. per sq. in., which is}$$

also within the allowed value.

Hence, by formula No. 4,

$$b = \frac{W}{2vd} = 13.75 \text{ in.}$$

Therefore. 14 in. is the required economical breadth.

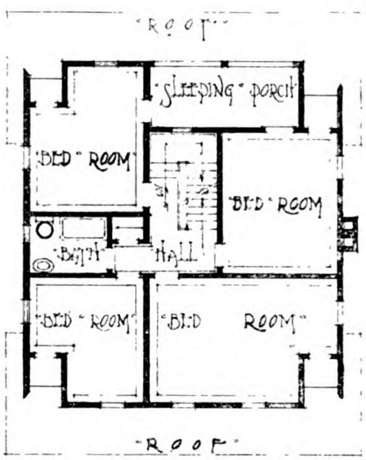
*Example:*

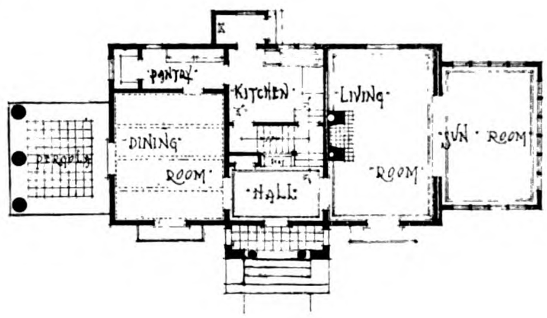
(*Concluded on page* 394)

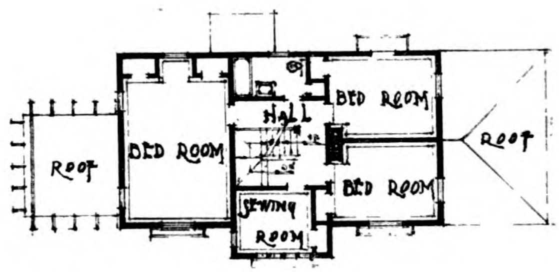
# Four Houses of Widely Varying Types Built at Maplewood, N. J.

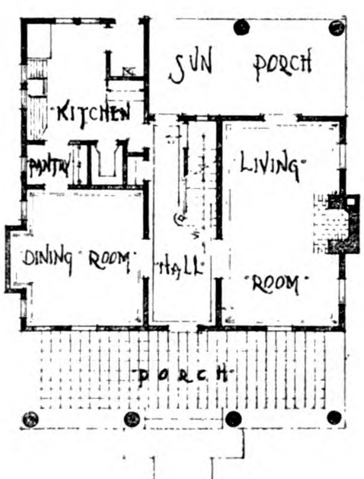
*Kenneth W. Dalzell, Architect*

*A well-designed and attractively planned Stucco House*

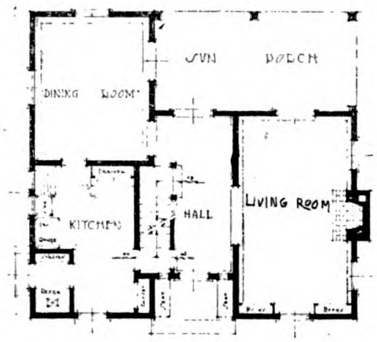


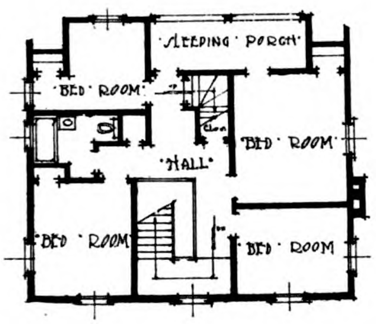



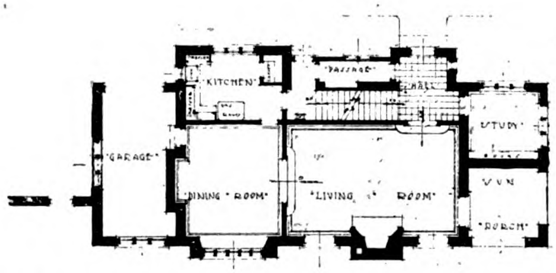



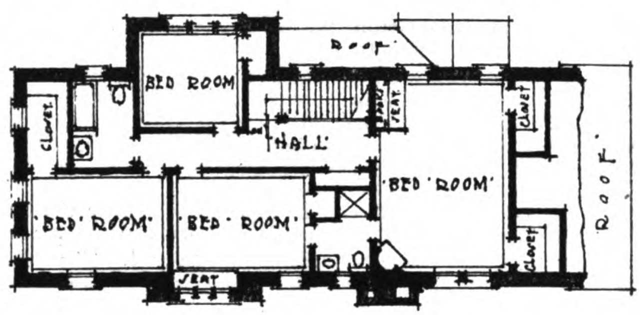

*The planting, not yet fully grown, will add an attractive feature to this well designed house in the early future*




*Attractive by reason of its excellent proportions is this simple cottage*




*When this stone house was built, the plan was turned so that what was the back is now the front.*

# A Cost System Telling What Every Contractor Wants to Know

By G. E. Holloway

BEFORE me is a letter from a prominent firm of contractors explaining their difficulty in securing a method of keeping accounts which will give them their exact status at all times. The difficulty is not one which belongs to them alone, but is one in which a great majority is concerned.

The present income tax law makes a close analysis of the contractor's business necessary in order that a correct return may be made, doing justice to the contractor as well as to the Federal Government. The importance of this phase may be understood from Article No. 36, Regulation No. 45, relating to the Income Tax and War Profits and Excess Profits Tax under the Revenue Act of 1918.

The following extract from the letter clearly explains their difficulty.

"In the past it has been our custom, upon being awarded a contract, to open an owner's account in the ledger, debiting and open a job account crediting it with the full amount of the contract. Then as the work progressed the expenditures for labor and material, as well as the full amount of the sub-contracts as soon as they were awarded, were debited to the job account and credited to the material men, payroll and sub-contractors.

"As you can see, this is not correct, as neither does the owner owe us the full amount of the contract nor do we owe the full amounts of the sub-contracts.

"What we are striving for is a system or method of recording owners' accounts which will show at all times exactly how much we have earned on the work at any given time it is necessary for us to serve percentage of the value of the work completed and paid for is a true asset and should be carried as such.

"Under the present system, to determine how we stand on the contract at any given stage, as we feel that the retake the total charges to the job, which include all sub-contracts awarded, whether completed or not, and to add to this any sub-contracts which are still to be awarded as well as the estimated cost to us to complete the contract. This total sum is then deducted from the amount of the owner's contract."

To make the matter clear the procedure used is here charted in Fig. 1, while the correct procedure is charted in Fig. 2.

Fig. 1. The errors here result from the fact that entries No. 1 and No. 4 are made at the time the contracts are awarded instead of when finished or when a delivery of the finished work is made.

It is not necessary to make an entry in the financial records when a contract is awarded, as strictly speaking it is only an order for a certain finished work which the contractor agrees to deliver and the owner agrees to accept and pay for. If the owner should advance part of the contract price before a delivery of the work is made then he becomes a creditor of the contractor and the debt is satisfied by the contractor's delivery of the work.

When the contractor advances money to the sub-contractor for work not delivered, the sub-contractor becomes a debtor and the debt is paid with a delivery of the work.

However, when the contractor desires that all awarded contracts appear on the books, contingent accounts may be set up and used to show the information as follows:

DUE FROM SUB-CONTRACT AWARDS
Debit
Sub-Contract No. 1
Contract No. 46
(on award)
Credit
Sub-Contract No. 1
Contract No. 46
(on delivery)

LIABILITY FOR PAYMENT ON SUB-CONT'S.
Debit
Sub-Contract No. 1
Contract No. 46
(on delivery)
Credit
Sub-Contract No. 1
Contract No. 46
(on award)

CONTRACT AWARDS
Debit
Contract No. 46
(on award)
Credit
Contract No. 46
(on delivery)

LIABILITY ON CONTRACT AWARDS
Debit
Contract No. 46
(on delivery)
Credit
Contract No. 46
(on award)

In order to show briefly and in concise form how a contractor may compute and take profits on uncompleted

ESTIMATE SUMMARY SHEET

FOR J.O. DICKSON ADDRESS 314 MAY ST., CITY
DESCRIPTION STORE, ETC (DETAILS)

BID SUBMITTED JULY 14. 1918
DATE AWARDED SEPT 1ST 1918
TERMS 1/4 CONT. PRICE WHEN FOUNDATION IS COMPLETE, ETC.

| BRANCH OF WORK | LABOR | MATERIAL | MISCELLANEOUS DIRECT CHARGES | OVERHEAD CENTS PER LABOR HOUR | TOTAL COST OF DOING WORK | MARGIN FOR CONTINGENCIES AND PROFIT 20% | TOTOL AMOUNTS USED TO ARRIVE AT QUOTATION | ACTUAL COST OF DOING WORK | PRICE PAID TO SUB-CONTRACTOR | FINAL NET PROFIT | DATE COMPLETED |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXCAVATING | 920 00 | 140 00 | 550 00 | 130 00 | 1740 00 | 348 00 | 2088 00 | | 1950 00 | 138 00 | 10-12-18 |
| CONCRETE | 2000 | 2550 | 300 | 650 | 5500 | 1100 | 6600 | 5405 | | 1195 | 11-31-18 |
| STONE WORK | 800 | 500 | 100 | 200 | 1600 | 320 | 1920 | 1628 | | 292 | 11-3-18 |
| BRICK WORK | 1800 | 2050 | 200 | 450 | 4500 | 900 | 5400 | 4468 | | 932 | 1-15-19 |
| CARPENTRY | 2900 | 5100 | 300 | 700 | 9000 | 1800 | 10800 | 9341 | | 1459 | 2-10-19 |
| PLUMBING & HEATING | 1200 | 1350 | 150 | 300 | 3000 | 600 | 3600 | | 3470 | 130 | 3-30-19 |
| PLASTERING | 90 | 195 | 85 | 30 | 400 | 80 | 480 | | 450 | 30 | 3-19-19 |
| ELECTRICAL WORK | 300 | 200 | 30 | 70 | 600 | 120 | 720 | | 690 | 30 | 3-28-19 |
| PAINTING | 160 | 95 | 5 | 40 | 300 | 60 | 360 | | 345 | 15 | 4-9-19 |
| INTERIOR DECORATING | 300 | 300 | 25 | 75 | 700 | 140 | 840 | | 785 | 55 | 4-6-19 |
| ETC | | | | | | | | | | | |
| " | | | | | | | | | | | |
| " | | | | | | | | | | | |
| | | | | | | | | | | | |
| TOTAL | 10470 00 | 12480 00 | 1745 00 | 2645 00 | 27340 00 | 5468 00 | 32808 00 | 20842 00 | 7690 00 | 4276 00 | |

FORM A.

COST SUMMARY

FOR J. O. DICKSON ADDRESS 314 MAY ST CITY

DESCRIPTION STORE ETC (DETAILS)

JOB NO 68 | DATE PROMISED APRIL 15, 19

DATE SEPT 1ST 1918 | CONTRACT PRICE $32808.00

COMPLETED APRIL 9 1919 | TOTAL COST $28532.00

BILLED APRIL 10, 1919 | NET PROFIT $4276.00

| BRANCH OF WORK | | WORK PERFORMED BY | BEGAN | FINISHED | DEBIT FOLIO | DEBIT AMOUNT | | CREDIT MON. | CREDIT DAY | CREDIT FOLIO | CREDIT AMOUNT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXCAVATING | X | (NAME) SUB-CONTRACTOR | 9-15-18 | 10-12-18 | J21 | 1950 | 00 | OCT. | 15 | J26 | 1950 | 00 |
| CONCRETE | + | CONTRACTOR | 11-2-18 | 11-31-18 | J5A | 5405 | | | | | (ILLUSTRATION) | |
| STONE WORK | + | " | 10-14-18 | 11-3-18 | J5B | 1628 | | | | | | |
| BRICK WORK | + | " | 11-5-18 | 1-15-19 | J5C | 4468 | | | | | | |
| CARPENTRY | + | " | 11-3-18 | 2-10-19 | J5D | 9341 | | | | | | |
| PLUMBING & HEATING | X | (NAME) SUB-CONTRACTOR | 10-12-18 | 3-30-19 | J69 | 3470 | | | | | | |
| PLASTERING | X | " " | 3-1-19 | 3-19-19 | J60 | 450 | | | | | | |
| ELECTRICAL WORK | X | " " | 2-2-19 | 3-28-19 | J66 | 690 | | | | | | |
| PAINTING | X | " " | 4-4-19 | 4-9-19 | J74 | 345 | | | | | | |
| INTERIOR DECORATING | X | " " | 3-15-19 | 4-6-19 | J72 | 785 | | | | | | |
| ETC. | | | | | | | | | | | | |
| " | | | | | | | | | | | | |
| " | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| TOTAL | | | | | | 28,532 | 00 | APR. | 10 | J75 | 28532 | 00 |

FORM B

*X—These are the debit entries made to the job account when each sub-contract is completed and the work accepted by the contractor. These amounts are at the same time credited to the sub-contractors.*

*+—These are the totals shown on the four separate sheets (Forms No. 1, page No. 271, August issue, one for each part of the work done by the contractor himself. The total of charges shown on these separate sheets plus the amounts for completed sub-contracts, shown on this summary sheet, will give the total cost to date at any time. The four work sheets and summary sheet constitute one job account, which is an asset until the work is completed and charged to the owner.*

contracts, the following example will be used:

Mr. James Howard, contractor, prepared estimates in July, 1918, and submitted a bid of $32,808.00 for the erection of a building. In making up the estimates Mr. Howard used forms No. 1 as shown on page 271 of the August issue of the "Building Age." The miscellaneous charges include such items as hauling, interest, etc., which could be identified with the work. The overhead charges were based on a certain number of cents for each labor-hour required for the work. The rate was secured from his overhead distribution sheet, explained on page 332 of the October issue of the "Building Age."

Mr. Howard then made a summary of his estimate sheets on the "Estimate Summary Sheet" shown here as form A.

The contract was awarded to Mr. Howard September 1, 1918, and he decided to handle the concrete, stonework, brickwork and carpentry himself and to give the other parts of the work to sub-contractors.

On December 31 Mr. Howard wanted to close his books and show the profit earned to date on this contract, which will be called "Job 68." He also wished to have the Job Account remain undisturbed so that the final result would be shown in the accounts when the work was completed.

Now, taking the estimate summary sheet it will be readily seen that on December 31 the excavating, concrete, and stonework were complete and a profit of $138.00, $1,195.00, and $292.00 respectively realized.

The brickwork was three-fourths done at a cost of $3,300.00, while the carpentry was half finished at a cost of $4,560.00, as shown on the separate sheets in "Job Account No. 68."

PROCEDURE:

| | | |
|---|---|---|
| Quotation Price for Brickwork ........ | $5,400.00 | |
| Three-fourths Quotation Price ......... | 4,050.00 | |
| Cost of Doing Work | 3,300.00 | |
| Net Profit to date | | $750.00 |
| Quotation Price for Carpentry ........ | $10,800.00 | |
| One-half Quotation Price ............ | 5,400.00 | |
| Cost of Doing Work | 4,560.00 | |
| Net Profit to date | | 840.00 |
| Profit on Excavating (completed) ...... | | 138.00 |
| Profit on Concrete (completed) ...... | | 1,195.00 |
| Profit on Stonework (completed) ...... | | 292.00 |
| Net Profit Earned on Job 68 to Date ... | | $3,215.00 |

The sub-contractor had the plumbing work well under way but no profit should be taken on sub-contracts until the work is delivered and accepted, as bankruptcy, death of sub-contractor, or other cause may require the second awarding of the uncompleted part at a greatly increased price.

The following entry is now made:

Dec. 31, 1918.—Debit: Earned profits on uncompleted contracts acct., $3,215.00. Credit: Net profits on contracts acct., $3,215.00; "Job 68" showed on Dec. 31 actual cost at $16,843.00; "earned profits on uncompleted cont's acct." showed $3,215.00. The total (both accounts being assets) showed $20,058.00, representing the actual value of the work completed Dec. 31, 1918.

The "Net Profits on Contracts Ac-

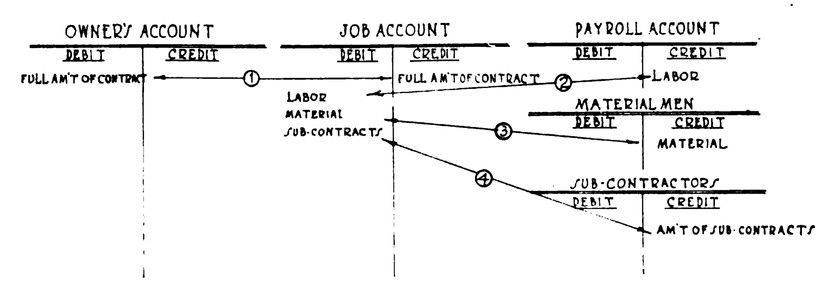



FIG. 1

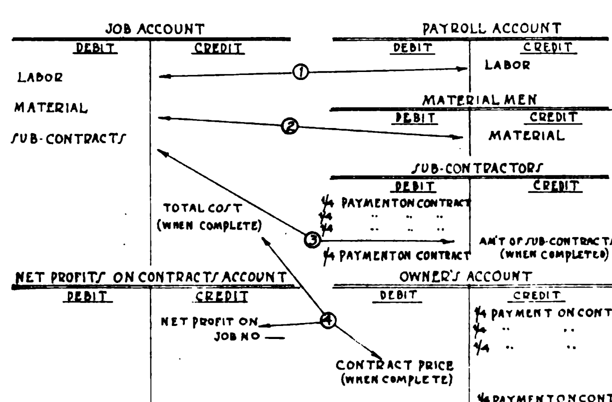



FIG. 2

count" is closed into "Profit and Loss Account."

The completed building was turned over to the owner April 10, 1919, and the following entries made:

**April 10, 1919**

**Debit:**

Owner's Acct. (Cont. Price, see Est. Sheet, Form A) ..$32,808.00

**Credit:**

Job 68 (Actual Cost, see Form B) ................. 28,532.00

Net Profits on Contracts (difference) ...............$ 4,276.00

**April 10, 1919**

**Debit:**

Net Profits on Con't (profit taken Dec. 31) ...........$ 3,215.00

**Credit:**

Earned Profits on Uncom. Cont's (Job 68) ..........$ 3,215.00

The final settlement then made by the owner with the contractor and by the contractor with the sub-contractors and material men closed the transactions with respect to Job No. 68, leaving the final result represented in the "Net Profits on Contracts Acct." as follows:

NET PROFITS ON CONTRACTS ACCOUNT

| Debit | | Credit | |
|---|---|---|---|
| Dec. 31 to P. & L. ........... | $3,215 | Dec. 31 Job 68 to date ......... | $3,215 |
| | $3,215 | | $3,215 |
| Apr. 10 Profits on Job 68 taken Dec. 31, 1918. | $3,215 | Apr. 10 Total Net Profit on Job 68 ........... | $4,276 |

This shows the earned profits in 1918 as $3,215.00. The total profit earned $4,276.00 and the profit earned in 1919, $1,061.00 ($4 276.00 credit, less $3,215.00 debit).

Another method can be used.

If the contractor prefers he may charge each part of the work to the owner as it is completed and accepted. He will then make entries such as the following:

**October 15, 1918**

**Debit:**

Owner's Acct. (part of quotation applying to excavating. See Form A) ..............$2,088.00

**Credit:**

Job 68 (actual cost, see Form B) .......................... 1,950.00

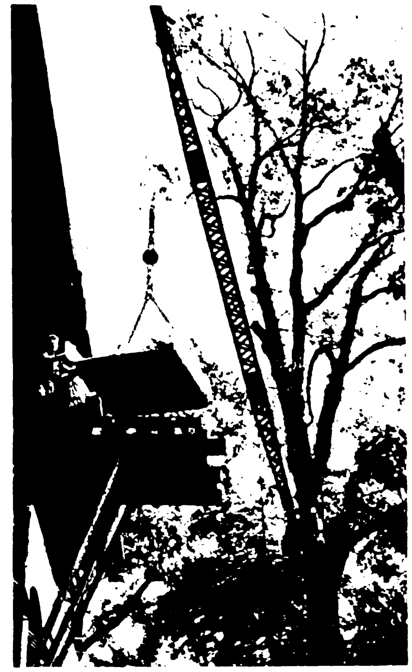
Net Profits on Cont's (difference) .....................$ 138.00

This latter plan may be followed throughout or for only the more important parts of the work. In case it used throughout, the Job Account will become closed when the entry is made for the last work completed. If only the more important items are charged to the owner when completed, then the entry made on completion of the entire contract will include all those not taken care of separately.

By adopting a system along the lines of the ont just explained, the contractor should experience little difficulty in making a correct Income Tax return on whichever basis he chooses to report.

# Trees Used as Mast For Derrick

YANKEE ingenuity is one way of describing the resourcefulness of a job superintendent in the employ of the Aberthaw Construction Company, of Boston, Mass. During the erection of a cotton mill for the Nashua Manufacturing Company, of Nashua, N. H., it was frequently necessary to erect derricks to hoist materials to the upper stories of the structure. The new mill stands in the midst of an oak grove, and in clearing the site many of the trees had been left standing close to the building. Using their trunks as part of the derrick saved the time and expense ordinarily required to erect a mast and, as the majority of the trees had to come out anyway, for the sake of light, no actual damage was done the grove.



# Economical Design of Timber Beams

*(Concluded from page 389)*

**Required, the economical spacing of 4 x 12 Oregon pine joists to support a live and dead load, exclusive of weight of joists, of 200 lb. per sq. ft. of supported area. The following designing data are given:**

$E = 1,440,000$ **lb. per sq. in.**
$v = 100$ **lb. per sq. in.**
$\theta = 1/30$ **in. per ft. of span.**
$f = 1500$ **lb. per sq. in.**
$L = 16$ **ft.**

**Weight of timber = 36 lb. per cu. ft.**

**Since the depth and limiting deflection are specified, these values must govern the design. Hence, the extreme fiber stress compatible with this depth and deflection will be, by formula No. 5,**

$$f = \frac{Ed\theta}{30L} = 1200 \text{ lb. per sq. in.}$$

**And the horizontal shear will be, by formula No. 6,**

$$v = \frac{fd}{18L} = 50 \text{ lb. per sq. in.}$$

**Both of these values are within the specified maximum values.**

**Hence:**

$W = 2vbd = 2 \times 50 \times 4 \times 12 = 4800$ **lb., the total load the beam can carry without exceeding the allowable deflection.**

**The weight of the beam = 192 lb.**

**The net safe load = 4608 lb.**

**The load for a spacing of 1 ft. is** $200 \times 16 = 3200$ **lb.**

**Hence:**

$$\frac{4608}{3200} = 1.44 \text{ ft., or } 17.28 \text{ in., the required}$$

**economical spacing of the joists, center to center.**

## France Wants No Building Material

WILLIAM G. SHARP of Elyria, American ambassador to France during the greater part of the war, declared before the Cleveland Chamber of Industry recently that not nine-tenths of the building material the casual reader thinks will go from America to rebuild the devastated regions of France will be required or purchased because it would not pay to ship it and France does not want it.

"We are not going to supply—nor is any other nation going to supply—the material for rebuilding those ruined towns because they have the raw materials they use, lathe and plaster, literally, in their back yards," said the ex-ambassador. "They won't have outside material."

This statement by the ex-ambassador will probably come as a surprise to many who had anticipated a large foreign demand for all kinds of building materials and, in view of the tremendous activity expected in the building trades in this country, the real condition in France, as stated by Mr. Sharp, may be a blessing in disguise.

# How to Lay Stone—II

## *Work Done by the Best Architects, Old and New*

By Victor D. Abel, Architect

HAVING given, it is trusted, a fairly accurate though general description of the problems to be met and their solution on the practical side of stone work, the balance of this series will be devoted to illustrations and detailed description of the actual results obtained in the completed building. To properly do this, it is necessary to show first of all from whence the inspiration comes, before taking up the modern work.

Nearly everyone is familiar with the historical significance of the Chew House, Washington's Headquarters at Valley Forge, Mt.

*Fig. 7. The Chew House, a good example of coursed work.*

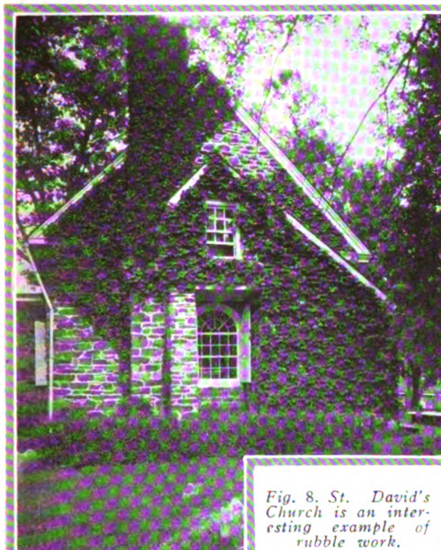


*Fig. 8. St. David's Church is an interesting example of rubble work.*

*Figure 9. Coursed stone of different heights makes an interesting surface.*

*Fig. 10. Washington's headquarters at Valley Forge, with courses of different heights.*

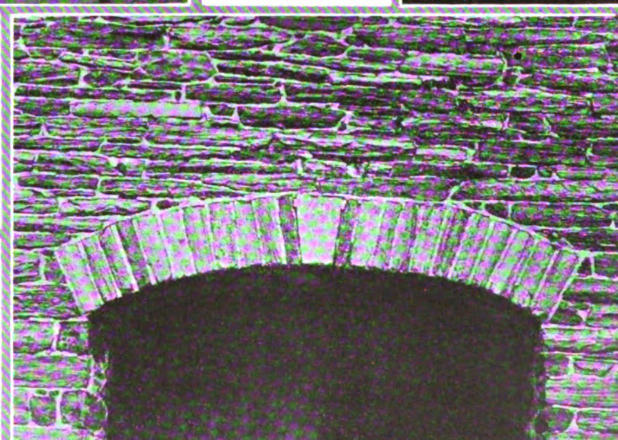


*Fig. 11. Detail of wall showing texture of stone.*

*Fig. 12. A typical colonial treatment. D. Knickerbacher Boyd, architect.*

Pleasant, Old St. David's Church and kindred buildings of Colonial days. But they not only loom large in history, but also in the history of architecture as paving the way for so much of our present work.

Modern methods have changed greatly in their requirements affecting not only the materials used in laying the stone, but also to a certain extent the character of stone laid. Speed in completion is now a most important factor and no longer has the expert mason the time to fit his stone as in the better finished mansions of our forebears. Likewise the use of cement in the pointing is apt to give the face work a hard finish as it does not weather the same as straight

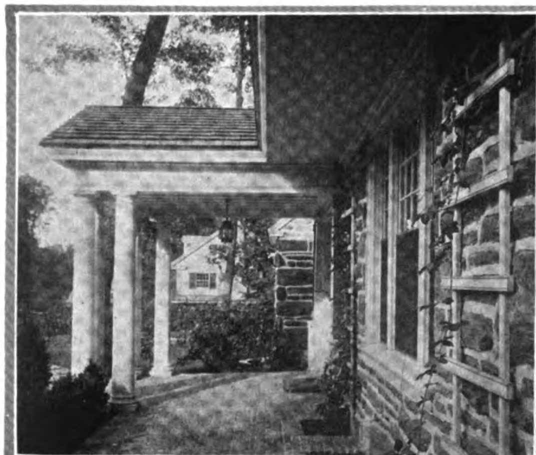


Fig. 13. Good proportion is evidenced here in the stonework. C. A. Ziegler, architect.

Fig. 14. Long thin stones allow horizontal lines to dominate.

wood cornice and doorway. The side walls are different, being plastered over rough stone. The pointing was originally evidently ridged and ruled, but has weathered to a considerable extent.

The stonework of Fig. 10, Washington's headquarters at Valley Forge, is of the same general type although the wood trim is much simpler. The stonework also is not so carefully coursed as in the other, being of varying heights. Note in the rear, which shows in the photograph, that the courses are quite irregular, there being no attempt to keep them level. The pointing is ridged and rather thin, ruled to exactly follow the joints.

Quite the opposite of the above is the stonework in Old St. David's Church, Fig. 8, which is the natural stone as it comes from the quarry laid up as "rubble," but with a fine selection of large and small stones with a resulting interesting surface. The pointing is rough, the mortar evidently being put in the joints to fill them and then the trowel scraped across to cut off any

Fig. 15. Example of stones well proportioned to the mass. C. A. Ziegler, architect.

Fig. 16. Variety in the size and shape of this stone makes an effect that is unusually attractive. D. Knickerbacher Boyd, architect.

Fig. 17. Here the stone work is secondary to the wood treatment. D. Knickerbacher Boyd, architect.

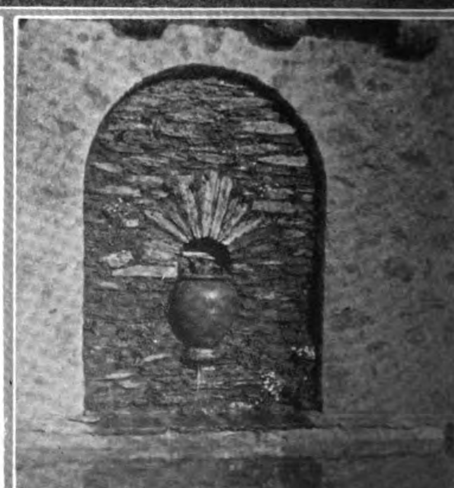


Fig. 18. Dry wall and cement wall in a garden and pool combination.

lime mortar, the latter resulting in the interesting effects so noticeable in all of the old illustrations, unless, as shown by some of the modern work, the pointing is especially so treated.

The formal effect striven for in the early days, although often carried out in the front only at the expense of the side and rear walls, is quite out of fashion now.

This is quite noticeable in the Chew House, Fig. 7, a quite pretentious mansion. The front wall is entirely of coursed work. The courses are about ten inches high, and the surface of the stone is dressed and tooled with a chisel. All beds and ends are cut square, although the stone is not laid with too close a joint. Window sills and heads are of cut stone work, carefully jointed and built to the wall, carrying out the effect of the rather ornate excess mortar. This is one of the early examples which acts as a model for the most of the modern work and is worthy of especial mention on that account.

The doorway of an old Germantown house in Fig. 9 is also worthy of study. The stone may possibly be from the same quarry as that in the Chew House and differ merely in the manner of laying. The long thin stones are all laid on their beds, including the higher ones now and then inserted as bonding stones or to add interest. The pointing is white, the same as in the previous example except that it was more carefully done and the mortar smoothed off more with the trowel. It is, however, all done freehand. The stones seem to average between four and ten inches in height. Neither the beds or ends are in any way trimmed, being left as they came from the quarry.

Fig. 11 is a section of wall in the same Germantown district. It is interesting as being of the same type as the two previous examples and indicating the general use of this type of stone work in which the entire result is obtained without changing the natural materials, and by the disposition of the stones combined with the pointing. The arch could be improved upon.

These examples of the old work are merely sufficient to indicate in a general way the concrete examples before us in the later development of our recent work. Entirely aside from the almost prohibitive expense in these days of high prices of attempting to follow the type of stone shown in the Chew House, no one, on seeing the two kinds could fail to appreciate the possibilities of the natural stone, laid without artificial embellishment. The use of the informal type is so general that the writer has made no attempt to get illustrations other than those showing the wide variety of texture and effect to be obtained from the natural stone. He has been fortunate in securing the cooperation of several of the most successful of Philadelphia's architects whose permission to use the photographs of some of their representative work, together with that of his own firm, will give a fairly comprehensive library of stone. Figs. 12 and 13 are close-up views of the front walls of two exceptionally interesting treatments of Colonial elevations. Fig. 13 is the most true to type in the detail of the woodwork, particularly of the mouldings, while the other indicates to what resources modern practice must go in order to give all of the appearance and proportion of good precedent without the expense of the mouldings. In both cases the stones are well laid with a good proportion and distribution of small stones to give the necessary scale to the wall. The color in each instance is a warm gray with sufficient rust showing in the individual stone to give character. The use of large corner stones, which is quite usual in this type of work, strengthens the corners and openings. Note the prevalence of the stone, as the same result is obtained although the houses are in two entirely different sections of the country surrounding Philadelphia. The pointing in both cases is flat ridged pointing, with the bottom cut off to a fairly level line, all freehand. The color is white.

Fig. 14, although not a Colonial House, belongs to this description because of the method of laying stone, to which the first of the specifications given in Part 1 particularly applies. With few exceptions the stones are all long and thin with a goodly number of small stones. Even the use of the usual large high cornerstones has been abandoned in favor of brick. Here the pointing, while white, is not as dead white as in previous illustrations. It is, however, fully as broad as any of the others and by reason of the thinness of the stone appears broader. This view is especially interesting as it tends to show the variety in color of stone.

Fig. 15 shows the full view along the long elevation of a house, being a good example of the proportions of a wall and opening surface in a Colonial house.

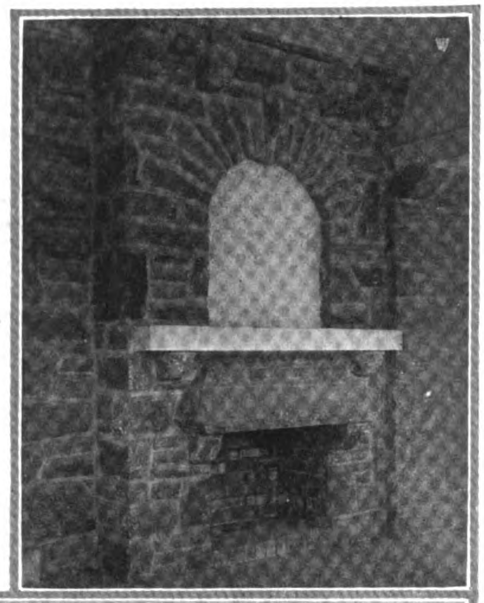


*Fig. 19. How stone can be used as a mantel facing.*

*Fig. 20. Contrast between the whitewashed walls and the green of the grass gives an interesting effect. D. Knickerbacher Boyd, architect.*

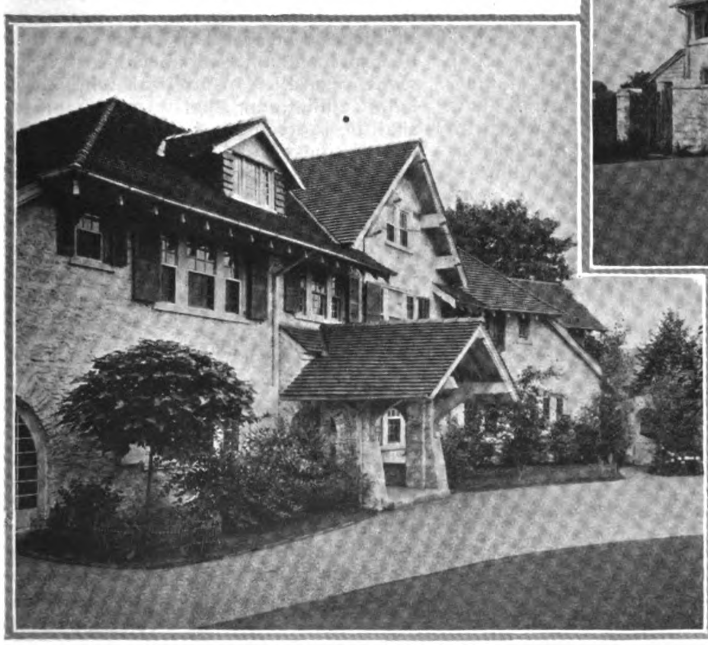


*Fig. 21. A different treatment of the same style walls shown in Fig. 20. D. Knickerbacher Boyd, architect.*

The stones here are not so thin, but by laying on their natural bed the effect was kept and added to by the interest in the pointing. Pure white in color, it has been most carefully studied in proportion to the sizes of the stones, and any realization of the height of the stones being above the average is entirely lost. This and the following figures are well worthy of study for that reason.

Fig. 17 indicates a design wherein the stone work is secondary to the wood treatment. The latter is kept heavy, giving the appearance of strength and solidity which goes well with the stone wall, and yet there is nothing lost in the laying of the stones. The pointing is somewhat thinner than in Fig. 15, but is also pure white. Note particularly the use of the large stones over the heads of the openings, except where they are obviously too wide, when the usual arches are built. The bright sunlight on the front of the house gives a very good idea of the texture of the individual stones and the wall as a whole. It can be seen here how the pointing is quite flush with the face of the stones, no attempt being made to either have it recessed or projecting.

Fig 16 is another example of the same condition to be met. Here, by reason of a considerable saving in the cost of the stone itself, it was decided to use that from a quarry which, while it has the full range of color, from blue gray to rust, breaks up into a shape which prevents the laying of long thin stones. This is a particularly good piece of wall from this stone and is not unlike some of the old original types, where the formal dressed stone was not used. The careful selection and building in of small stones to enable the mason to fill in the spaces between the larger stones without too much breaking up or hammer work at the site results in a most interesting scale to the entire building. In order to hold this result the pointing was carefully considered, and finally nothing but white sand and white cement was used and the pointing made rather wider than usual.

Fig. 17 is chiefly interesting as showing the result obtained by using a stone somewhat different from the usual, in that large stones are quite prevalent. By using these in corners and at openings and by the careful distribution of small stones in the wall itself a most interesting result is obtained which fits well with the modified colonial type of architecture used in the house. The pointing is white, rather broad so as to contrast properly the varied colors of the stone.

This wall should be particularly interesting as the stone is probably nearer to what would be secured in other districts and shows that a good result can be obtained by the proper use of the material at hand.

Fig. 18 is a combination of dry wall and cement wall in a garden and pool combination. It is rather interesting as showing what can be done to gain interest and effect. Since the photograph was taken, however, vines have grown in the interstices between the stones, adding to its appearance.

The next figure, 19, shows what can be done with the stone in a mantel facing, combined with both plaster panel and brick hearth, back and jambs. It is particularly interesting in the laying of the stone arch, showing how the stones of the arch and of the wall are tied together. They are so fitted in that when the pointing is done and the work finished there is no evidence of any difference in texture of surface. The mantel head and the corbels are all of the same stone, being merely selected from among those at the site and crudely worked into shape by the mason with hammer and chisel.

The presentation of Colonial stonework would not be complete unless some space were devoted to whitewashed stone. Whether it was first used to conceal what was thought to be poor workmanship we do not know, but it has resulted in late years in its use in a new development of house. The third of the specifications given in Part 1 has general directions for laying the stone. In the whitewashed house, the wall, on completion, should be given one heavy coat of whitewash, preferably the lighthouse formula of the Government. This, while it takes slightly longer to weather to give the desired effect, lasts much longer and does away with the practical objection to its use in a permanent house because of having to refinish the exterior so often.

What could be more cheerful than the contrast of white walls with the green of the grass and the blue of the blinds than the result shown in Fig. 20. Here the entire design and proportion of the house and its wood trimmings have been kept Colonial and adapted to the whitewashed wall. Both single stones and arches have been used over openings, and brick and stone courses all are covered with whitewash.

Fig. 21 shows the same wall in a somewhat different type of exterior, showing its adaptability to both fine and heavy moldings and woodwork. Note the texture of the walls. While the pointing was done as the wall was built care was taken not to fill the joints and to allow the stones to be almost fully exposed so as to show their texture. When the whitewash had properly weathered the effect is considerably improved as the exposed color of the stones adds to the interest of the surface. This is another type of wall which could well be used in other sections not so rich in natural material, and where the owner desires to keep to the Colonial design. That it goes well with almost any roof covering is indicated by the fact that the first house has a purple and green slate roof, while that on the latter is of red tile.

(To be continued)

# Seattle Declares the Open Shop

## By F. R. Singleton

SEATTLE is breaking the domination over her industries of the radical element of organized labor which has held amost absolute sway in that city for the past three years, and has so restricted production and increased production costs that her ship yards, lumber mills and many lesser industries have been finding it hard to compete with those in which the labor situation was less acute; that she was beginning to lose commerce to other Pacific ports where the labor cost of handling cargoes was less; that she was losing new industries seeking location on the Coast, which avoided Seattle because of industrial conditions.

Seeing her opportunity of becoming the greatest city on the Pacific Coast and one of the great ports of the world slipping away from her, Seattle has risen in the might of an American city, and is breaking the tightening bonds which were beginning to strangle her industries and commerce. Seattle is rapidly going "open shop," Seatte has declared her independence of organized labor rule and is refusing even to deal with the radicals in control of organized labor in the city, whose course since the signing of the Armistice has proven them to be no better in their actions, sentiments and purposes than the I. W. W.

They do not call it "open shop" in Seattle. They call it the "American Plan of Employment" which, as defined by the "Associated Industries of Seattle," the organization leading the movement to success, means that every man shall be protected in his inalienable right to work, regardless of political, religious or labor affiliations; that every employer shall be protected in his right to run his own business and to hire employes without having to gain the permission of an autocrat of labor.

The open shop is being established in Seattle by the breaking of a series of strikes, designed by the radicals in the labor movement as a substitute for the general strike, by which they planned to bring about the paralysis of industry in Seattle and so discourage employers that they would be able to take over industry themselves under a soviet system. The open shop is being established by the force of public opinion as the result of an intensive publicity campaign in the Seattle dailies, conducted by the Associated Industries. Pages on pages of advertising informed the Seattle public that the industries and commerce of Seattle were being attacked by the radicals of organized labor and that, if their domination over organized labor and the industries and commerce of Seattle were not broken, the population, industry, commerce and prosperity of the city would decline.

The response was prompt. The Chamber of Commerce, the Rotary Club, the Kiwanis Club and all other civic and commercial organizations of the city took action demanding the end of radicalism and sabotage in Seattle, and endorsing the open shop in industry. These declarations were published in page advertisements, and at the end of ten days of this intensive advertising the public sentiment in Seattle was overwhelmingly in favor of Americanism in industry, and the power of the radicals was broken. Where, a year ago, the closed shop was strongly supported by public opinion in Seattle, to-day the public is demanding open shop, and any employer who signs a closed shop agreement with any labor union will be exceedingly unpopular.

The movement in Seattle is not against unionism, but against the domination of unionism and industry by un-American radicals. The Associated Industries, in its publicity, has repeatedly recognized the right of workers, as well as employers, to organize; has endorsed the principle of collective bargaining; has declared that there shall be no discrimination against union men under the American Plan, and has urged employers not to take advantage of unemployment to cut wages. The Associated Industries has been consistently American and so has won the confidence of the public and of the conservatives of union labor.

Seattle is winning industrial independence by the power of organization. While the individual employer, with a few exceptions, in the past has been unable to withstand the radicals who ruled Seattle labor and has bowed to their dictates, the employers of Seattle collectively, banded together along with many other citizens in the Associated Industries, have been able to defy the radicals and to establish open shop in every Seattle industry in which a strike has occurred or a contract broken by the unions, during the past three months. In rapid succession, the building industry, the job printing industry, the merchant tailors, the dyers and cleaners, the jewelers, the shoe repair shops and the master pile drivers have declared and established their independence of radical domination, meaning that the unions have lost control of industries in which thousands of men and women are employed.

Seattle would progress on the open shop road much more rapidly, under the stimulus of public opinion, if it were not for the fact that the Associated Industries has taken a strong stand against the breaking of existing contracts with labor unions. One of the cardinal principles of the organization is that employers must keep faith with each other and with employes, and so the open shop movement progresses as strikes occur, unions break contracts and existing contracts expire.

The Associated Industries was formed in Seattle as a result of the general strike of last February. The revolutionary character of that attempt was recognized by the public and the necessity of cleaning the radicals out of organized labor was brought home. There was much open shop sentiment as a result of the general strike but, as a large percentage of union labor in Seattle is loyal American, the majority of employers favored giving the unions a chance to clean house of the radicals before taking any drastic steps. The Associated Industries, led by Frank Waterhouse, a leading citizen of Seattle, with large shipping and industrial interests, was organized to band all employers together in an effort to bridge the chasm between the employers and employes by giving the employes such a square deal that the revolutionary appeals of the radicals would fall upon deaf ears, and that labor would throw the I. W. W. and other radicals out of control of Seattle unions. During last spring and summer, the Associated Industries grew rapidly in membership and influence, and endeavored consistently to cultivate better relations between employers and labor, and to promote a square deal for the employe, the employer and the public in general in Seattle—but the unions failed to clean house.

The final declaration for the open shop in Seattle came when Mr. Waterhouse became convinced that the radicals, still in complete domination of the unions, were attempting, by a series of strikes, to paralyze the industries of Seattle and take them over. Advance information of this plan was verified by events. On September 2 the carpenters and some of the other unions in the building trades struck to enforce impossible wage demands, in spite of the vital public need of more homes and other buildings and the willingness of the employers to arbitrate. They arrogantly stated that their demands, involving $10 a day wage for carpenters and other exorbitant increases, must be granted first, and then they would talk arbitration. The job printers, the tailors, the dyers and cleaners and pile drivers followed in rapid succession and the air was full of talk of strikes in other industries.

On October 14 Seattle contractors, backed by the Associated Industries of Seattle, declared open shop in the building industry, after six weeks of fruitless negotiations with the unions to bring the strike to a settlement on terms which would not make it impossible for new buildings to be undertaken. Their action, announced in page advertisements in the daily newspapers, was applauded by the public. On October 31 the Building Trades Council voted to call the strike off. The strikers returned at their old wages and under open shop conditions.

It took only one seven-column, fifteen inch advertisement in the Seattle dailies, announcing open shop and inviting men to work under the American Plan, to establish the piledriving industry on the open shop basis. The fight has been harder with the job printers, the tailors and the dyers and cleaners, but the employers in each of these three industries declared unequivocally for the open shop and are making it stick. The employing printers have been drawing men from all over the United States to take the place of those strikers who refuse to return to work, and are gradually building their forces up to normal. The tailors have been greatly helped by the fact that all the associations of employing tailors in the cities of the Pacific Coast, as far south as San Diego, California, have followed the example of Seattle and have declared open shop. The dyers and cleaners have gotten back many of their old employes and are back to normal in their operations. To have granted the demands made in any of these lines would have amounted practically to turning over the business to the employes.

The declaration of open shop by the building contractors was a body blow to union labor radicals and disarranged their plans to bring about industrial paralysis by involving one industry after another in strikes. A sentiment against strikes developed in the unions, and no more strikes were called.

Once decided for the open shop, the Associated Industries conducted an intensive publicity campaign in the three loyal daily newspapers of Seattle. In a series of ten page advertisements, beginning October 29, the Associated Industries aroused the community to the danger of radical domination and demanded that the industries of Seattle be run on the American Plan. The campaign was assisted greatly by the newspapers themselves in strong editorial and news publicity.

At the end of ten days public sentiment was strongly in favor of the open shop.

Then came the murder of four former soldiers by the I. W. W. during the Armistice celebration parade at Centralia, Washington, a few miles from Seattle and the suppression by the government of the disloyal Union Record, the organ of the radicals, to crystallize sentiment in Seattle against the reds in control of labor. The sentiment grew so strong that the elimination of the radical alone can save unionism in Seattle.

The movement for the American Plan, the open shop, has spread from Seattle to the other cities of the Pacific Coast, and the Pacific Coast expects to see it sweep the country until the right of all Americans to work without being subjected to coercion and intimidation is established. San Francisco, Portland, Spokane and Tacoma have organized "Associated Industries" on the Seattle plan. The Pacific Coast is making a new declaration of independence for America.

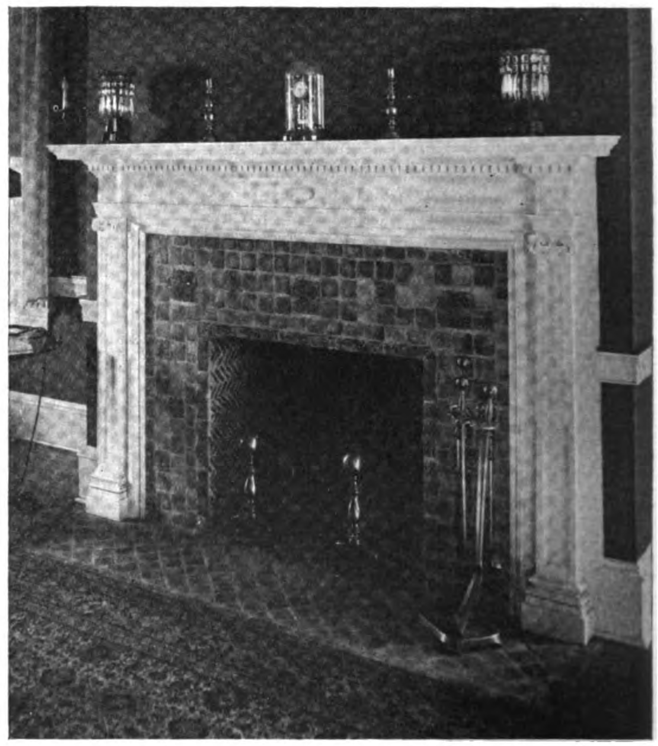
# Stucco and Clapboards Form Interesting Combination

## *Good Balance of Different Size Windows on First Story—Three Bathrooms*

THE gambrel roof forms one of the most popular types for country houses, since it serves the twofold purpose of making a good appearing yet economical roof, and affords ample space for rooms in the upper story. In order to obtain the maximum amount of space, a dormer is usually added along the front of the house, as illustrated.

The upper portion of the gambrel roof is generally carried down over the dormer as in the house illustrated. Where a third story is present, the roof surface may be broken either by separate dormers or by an eyebrow window, which latter usually serves the purpose of breaking up the roof line rather than that of admitting light or ventilation to the interior.

It should be noted that the eyebrow window in this design has practically the same curve as the hood over the doorway. The window itself forms a semi-circle.

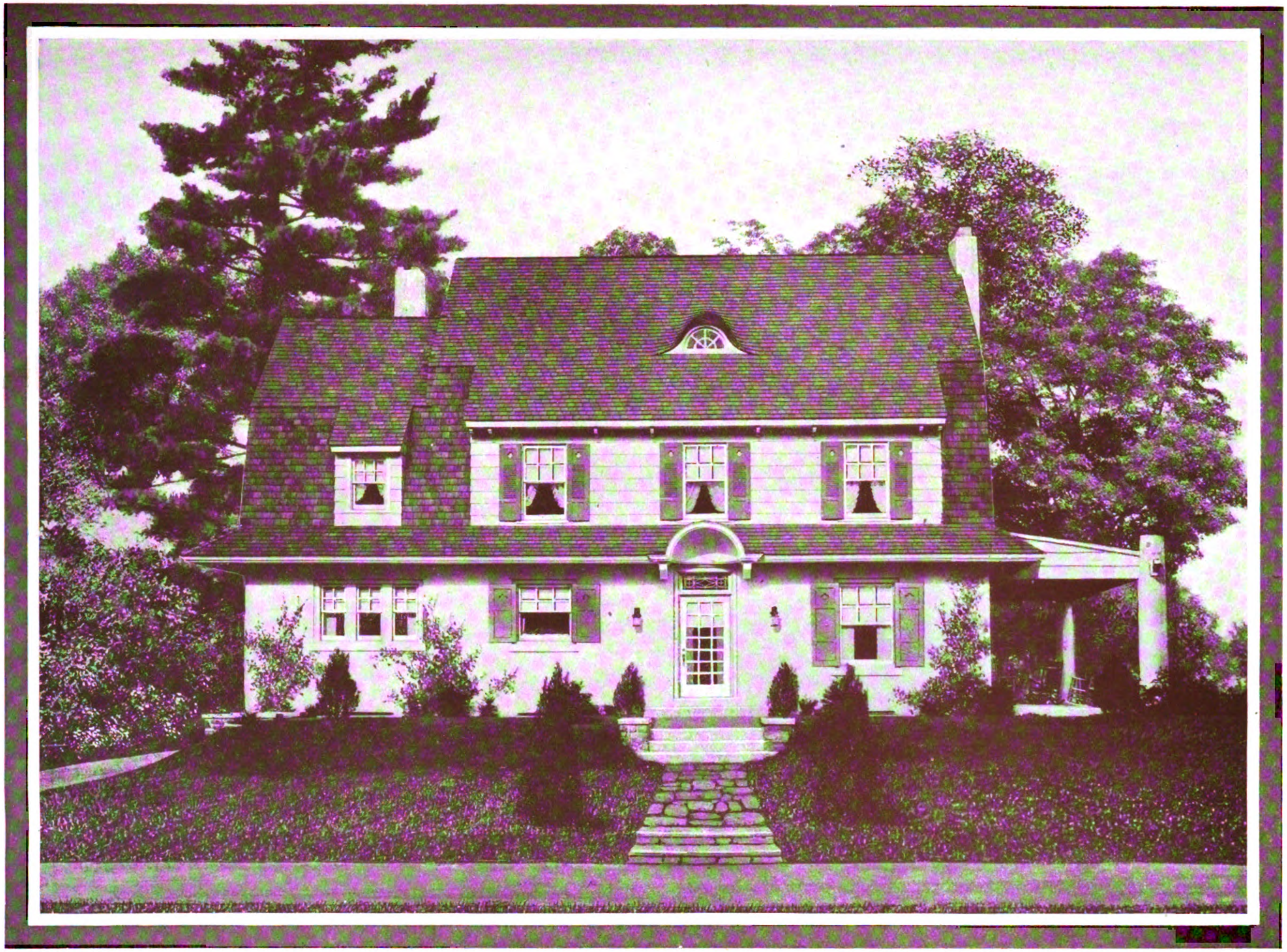


*Fireplace in the Living Room*

*A View from the Living Room of the Hall and Stairs*

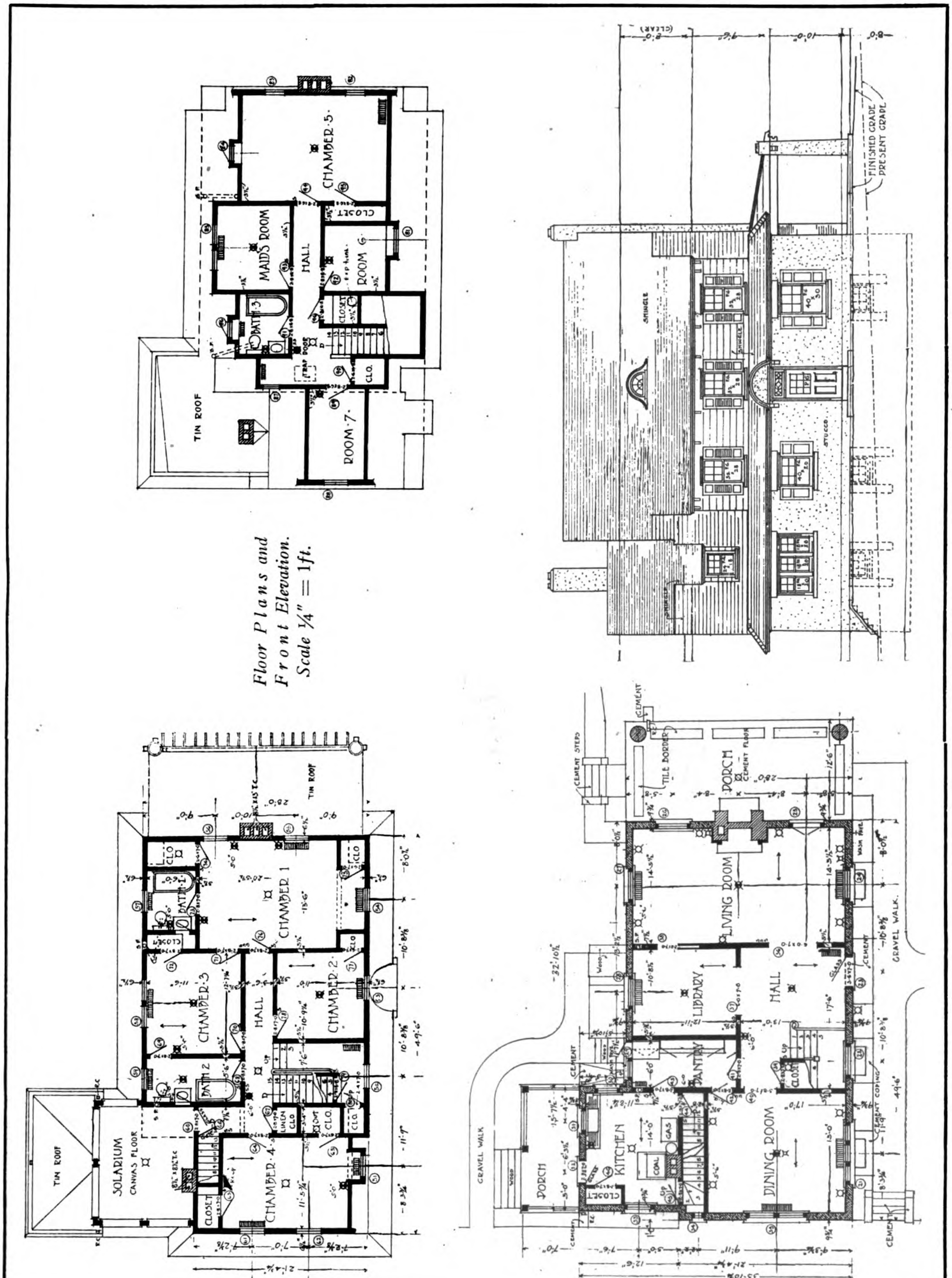
The spirit of balance of the design is kept by the subordination of the wing at the left, which although a part of the main house is yet brought down in scale so as to be given a subordinate effect. This effect is helped by the separate dormer, which, it will be noted, is lower than the dormer on the main portion of the house, and the window itself is smaller. The porch at the extreme right gives the sense of balance which this treatment renders necessary.

The fenestration is, it will be noted, rather unusual in that the two main windows on the first story are of different heights. The triple window to the left of the smaller first story window keeps the balance between this part of the design and that on the right-hand side. A careful examination

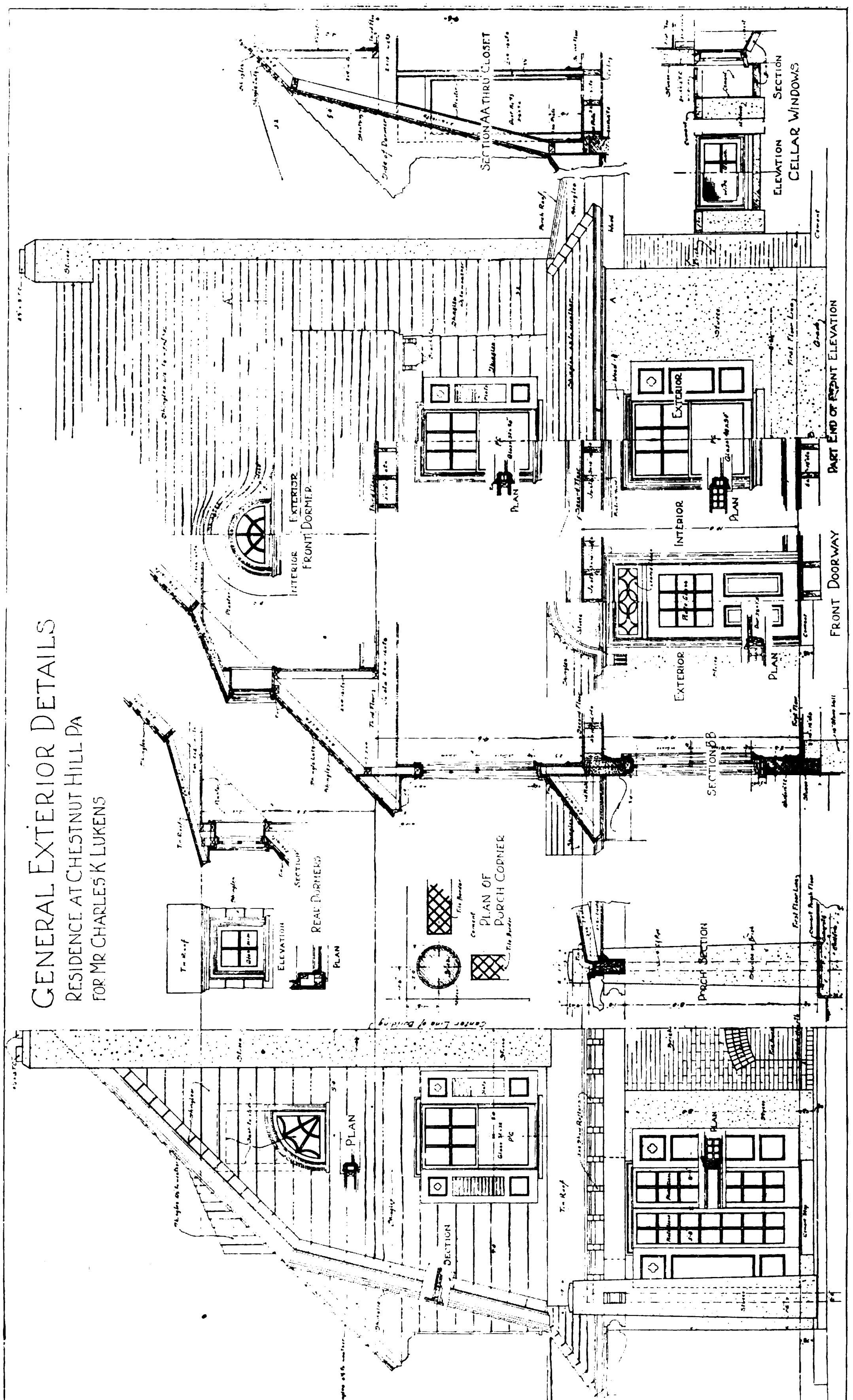


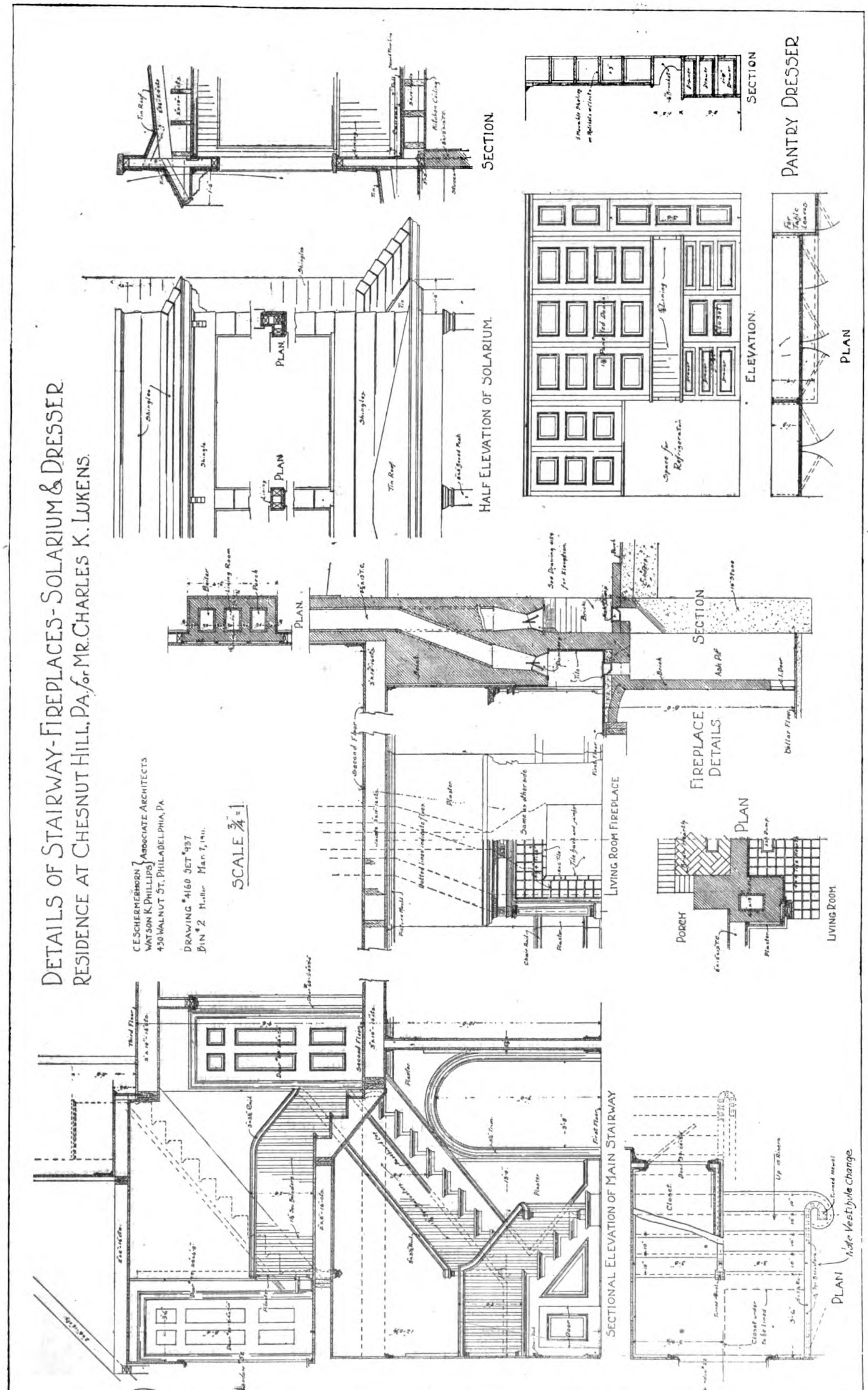


House at Chestnut Hill, Pa. C. E. Schermerhorn, Architect




*Floor Plans and Front Elevation. Scale ¼" = 1ft.*


GENERAL EXTERIOR DETAILS
RESIDENCE AT CHESTNUT HILL PA
FOR MR CHARLES K LUKENS
SECTION A A THRU CLOSET
ELEVATION
SECTION
CELLAR WINDOWS
PART END OF FRONT ELEVATION
EXTERIOR
INTERIOR
PLAN
FRONT DOORWAY
INTERIOR
EXTERIOR
FRONT DORMER
SECTION BB
PLAN OF
PORCH CORNER
PORCH SECTION
SECTION
REAR DORMERS
ELEVATION
PLAN
SECTION


DETAILS OF STAIRWAY-FIREPLACES-SOLARIUM & DRESSER
RESIDENCE AT CHESNUT HILL, PA. for MR. CHARLES K. LUKENS.
C.E. SCHERMERHORN
WATSON K. PHILLIPS
ASSOCIATE ARCHITECTS
430 WALNUT ST. PHILADELPHIA, PA.
SCALE 3/4" = 1'
SECTION
HALF ELEVATION OF SOLARIUM
PLAN
FIREPLACE DETAILS
LIVING ROOM FIREPLACE
PORCH
LIVING ROOM
SECTIONAL ELEVATION OF MAIN STAIRWAY
ELEVATION
PANTRY DRESSER

*Side and Rear Elevations. Scale ¼" = 1 ft.*

of the photographs and front elevation will show just how this unsymmetrical yet balanced effect is obtained.

An original touch may be seen in the treatment of the porch columns, which are stucco-covered and have the porch beam extending through the column in an attractive bracket-shaped form.

Entrance is had into a central hall, at the left of which is the stairway. A sense of spaciousness is lent to the hall by the vista through the library and through the living room.

The feature of the living room is an attractively designed fireplace well in keeping with the Colonial spirit of the house.

The service portion is well separated from the main part of the house, communication between the kitchen and dining room being through a pantry so placed that the doors are in the same partition, thus making it impossible for one to see from the dining room into the kitchen, always a desirable thing. The kitchen has plenty of light and ventilation provided from three windows. The drain board is so placed as to receive light from two windows, one at the side and one just over the drain board itself. The other window is so placed as to throw its light upon the range in such a way that the housewife can work there without throwing a shadow on the range.

Perhaps one of the most interesting features of the first floor plan is the fireplace placed on the porch, a stunt sometimes seen in California, but seldom indeed found in the Eastern states.

The second story contains a large master's bed room, with a private bath, and two large closets. There are three other bed rooms on this floor, all provided with ample closet space, and a bath room. The feature of this floor is the solarium, which some might perhaps desire to use as a sleeping porch.

The third floor has three rooms and a bath.

This house is located at Chestnut Hill, Pa., and was erected in accordance with plans and specifications prepared by C. E. Schermerhorn and Watson K. Phillips, associate architects, 430 Walnut Street, Philadelphia, Pa.

## Houses Sold by Department Store

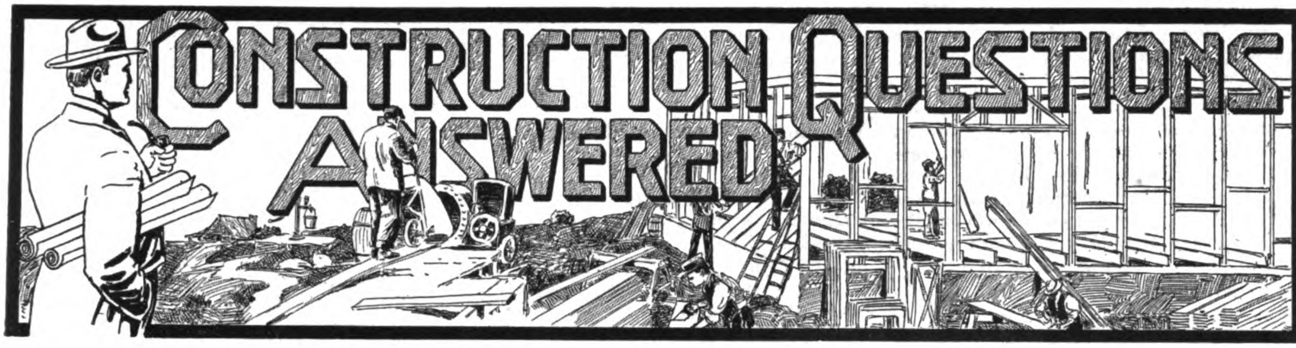
Houses sold by a department store from plans and perspective sketches is the latest development towards relieving the housing stringency. Gimbel Brothers, New York, inaugurated this plan September 28th, carrying a full page advertisement in several papers.

The houses sold range from $2,310 to $2,820, having from four to six rooms. They are erected by the Minter system, which provides for the fabrication of the houses in units, bolted together at the site. Plumbing, heating, hardware, etc., are furnished with the house.

The frame of the house is erected in sections and the siding or stucco is applied after the parts are assembled. Interior plastering and finished floor are also applied after erection. Hardware comes already set. The cost of erecting one of these houses is placed at from $900 to $1200.

The price quoted for houses like this is very attractive to people in need of a home, but when one realizes that the price of the lot and erection will take the cost of these houses up to a comparatively large sum, it does not seem as much of a bargain as it did at first. It is no exaggeration to say that in many localities a man can invest his money in a house to better advantage, for there are plenty of well built moderate cost houses that can be picked up for around the completed cost of these homes, $4,000 to $5,000.

It is very possible that if ideas like this spread, union carpenters may do what they have already done in some cities concerning outside mill work. Outside mill work in such cities is not permitted to be used in competition with a local product, even when manufactured by union labor. Certainly the erection of such houses means less work for local carpenters and it is quite possible that the unions will refuse to erect them. The houses, however, are easily erected by two men and it may be possible that an owner and a friend will be able to do the work themselves.




### Is This Construction Good?

**From T. B., Va.—I am planning a two-story dwelling, 26 x 49 ft., which I will build this way: On a solid flush 12-in. brick foundation I will erect a frame of 2 x 4 studs, spaced 16-in. centers, with joist ribbon 12-in. deep. The bottom and top corners of this frame will be braced with plank 1 x 12-in. diagonal-like sketch, not full sheathed. These braces will be bolted to the studs and sill with bolts and washers, making a rigid frame. Then, 1 in. away from this frame, I will build on the foundation a 4-in. brick wall —brick laid in strong cement mortar— and tied every W ft. apart and every four courses with Morse galvanized wall ties stapled to the frame work. Stone sills will be used. Over windows I will use an angle iron with arch formed of brick laid soldier fashion. The bottom floor and middle and top joist will be bolted to the studding. Subfloors will be used on all floors, laid diagonal.**

**For inside walls I will use beaver board nailed direct to the studding and headers.**

**Three-tighth-inch oak floor will be used over the subfloor. The plan of the building is old colonial. A 10-ft. hall through middle of house. A living room 24 x 15 ft. with open fireplace. Fireplace 4 ft. with coiled pipe back generating hot water for heating rooms over head.**

**Brick are red common, laid with ½-in. concave tooled joint, roof of black slate gabled with a gable front.**

**If you will express your opinion of this construction point out the defects, if any. I will be under many obligations to you.**

**Answer.—The construction you propose to use is safe enough and it will make a fairly good house, but the question is, will it make a house that you can heat?**

**What I would recommend is that you sheath the entire outside of the house in full and on the sheathing place a layer of good waterproof building paper then apply the brick work, this construction will give you a house that can be kept warm in winter, which is one of the most important items to be taken into consideration when erection of any all-the-year-round house is contemplated.**

**Would also suggest that you use ⅞-in. flooring instead of ⅝-in. flooring, as it lays better and makes a much better job.**

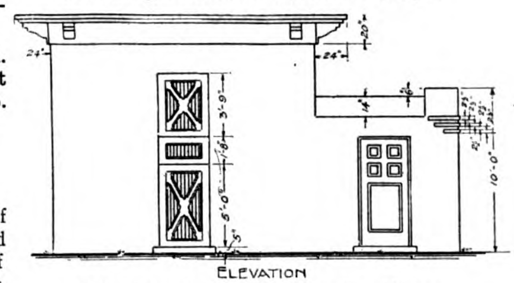
**W. G.**

### How to Build a Concrete Ice House

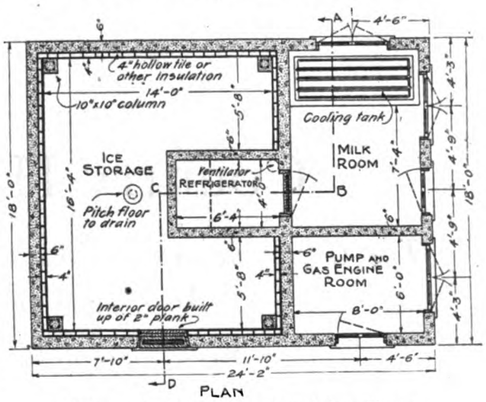
**From A. S., Pa.**—"I am having one of my customers that would like to build an icehouse holding about 100 tons of ice, built of concrete throughout walls and roof, and would also like to have a room in same for refrigerating purposes. The building would be built on the slope of a hill facing towards his main buildings so that he would like to use the roof for a pavilion. If I am not asking too much of you, should like to have your opinion as to how the refrigerating room should be built in the icehouse. How should it be ventilated, and also, should the main icehouse have ventilators and how arranged? He suggested size of building about 16x25. However, the building could be made high. Any sketches or information you could let me have would be highly appreciated. If I am not asking too much, should like to hear from you by letter, as I should get things in working shape as quickly as possible."

**Answer.**—Accompanying plans suggest a design for an icehouse that probably will give you the essential details of a structure such as you have in mind. This structure will not, however, provide storage for the quantity of ice specified. However, the essentials of construction are shown, but if the exact capacity of 100 tons must be provided for, then details of reinforcing must be worked out for the larger structure necessary.

The design shows a concrete refrigerator compartment, cooling of which is secured by piling ice around and over the compartment. Entrance to this compartment is by the usual type of insulated ice-box door opening into a milkroom

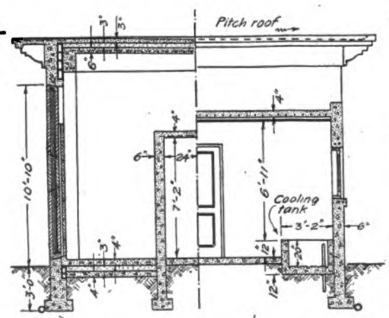



*Side Elevation of Concrete Ice House*

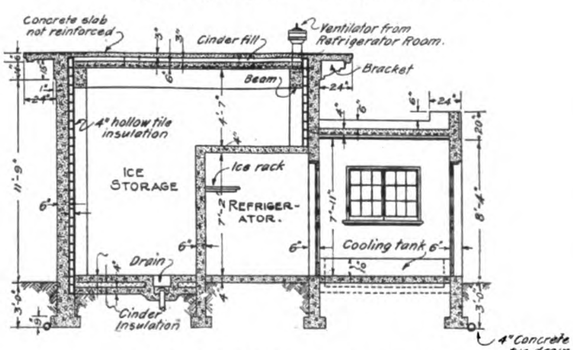



*Plan of a Well Arranged Ice House*

*Front Elevation of Ice House*




*Section on Lines A-B and C-D*




*Longitudinal Section of Ice House*

containing cooling tank, the structure having been primarily designed for an icehouse and dairy building adapted to dairy farm requirements.

Construction in the sketches are shown as monolithic concrete although this can readily be adapted to hollow concrete block if so desired, the hollow block then largely if not entirely taking the place of the hollow tile insulation on the inside of the monolithic structure and providing insulation in the wall itself.

The floor is insulated from possible changes in soil temperature by being of double construction, with a layer of cinders between the two courses to provide a dead air space. Similar construction is used for the roof for the same reason. Ventilators are placed where shown.

It is very easy to enlarge this structure without change of design in any particular respect, by merely duplicating the present unit indefinitely until the required storage capacity is secured. Also, the refrigerator compartment may be readily moved to another portion of the ice storage room so that another entrance-way can be provided and the one shown closed up, thus making it possible to omit the milkroom and pump and gas engine room shown, if these are not needed as a part of the structure proposed.

The floor drain in the ice storage room should be trapped to prevent entrance of warm air that would cause rapid melting of ice during mild weather. The ventilators should be so dampered that they also can be controlled to prevent entrance of warm air.

Various sketches show details of two elevations and two sections of the structure as well as a general plan. H. C. C.

### Question on Design of Concrete Beams and Girders

**From J. V. T., Pa.**—In your September number you speak of AG having a compression of 3650 pounds, and an unsupported length of 96". May I ask you how you get the unsupported length? Page 298, Scissors Truss.

**Answer.**—To obtain the stresses in the members of a truss, the center lines of the various members are assumed to meet or intersect at the panel points and the lengths between the panel points are used for the analytical or graphical computation of the stresses. The length between joints 1 and 2 was found to be 9'-3".

In designing the details of the member AG, the use of the theoretical panel length of 9'-3" would have made the member unnecessarily large and the unsupported length, between the tie beam and strust, as scaled from the drawing, was taken at 96".

In the present case, as the sheathing is nailed directly to the rafters, the sheathing will give it some lateral support, so that considering it as a column with direct compression, the least dimension could have been taken as 6" instead of 2". This would make the 2" x 6" rafter safe, but in the writer's opinion the braces shown dotted at A and B should still be used to prevent any tendency of the truss to sag. L. Goodman.

# Country House Details

## *The Construction of Cellar Windows and Methods of Making Them Water-tight*

### By A. Benton Greenberg, Architect

In this plate are shown approved details of cellar windows for frame and masonry buildings. Cellar windows are comparatively simple in design and construction. They are long and narrow and are fitted, almost invariably, with a single sash hung in a rabbeted frame. Although they may be hung at the side to swing in or out, they are more often hinged at the top or bottom to swing in.

Fig. 1 represents the plan, section and part elevation of a cellar window in a frame dwelling, the foundation wall of which is made of stone. An isometric drawing showing the relation of the various members is also given. The head of the opening is spanned by a 6 x 8 inch sill, which is of sufficient strength to carry any load that may be imposed upon it. In this connection it might be well to state that the sill should always be so designed as to come directly over the cellar window opening and form its head. The frame of the window is composed of a head, jamb and sill, each of which is made of 1½ inch or 1¾ inch stock, all of them being rabbeted on the inner edge to receive the sash. The latter is usually made 1½ inches thick.

The width of the outside reveal varies with the thickness of the wall and the position of the frame, which may be set forward or backward, or be made narrower or wider, according to the taste of the designer. Whatever is done, there should always be a moulding, called a "staff head," to hide the joint between the outside edge of the wood frame and the masonry wall. The interior of the frame may be left perfectly plain since the walls and ceiling of a cellar are not infrequently left unfinished, the walls either being whitewashed or smoothed up with one or two coats of plaster.

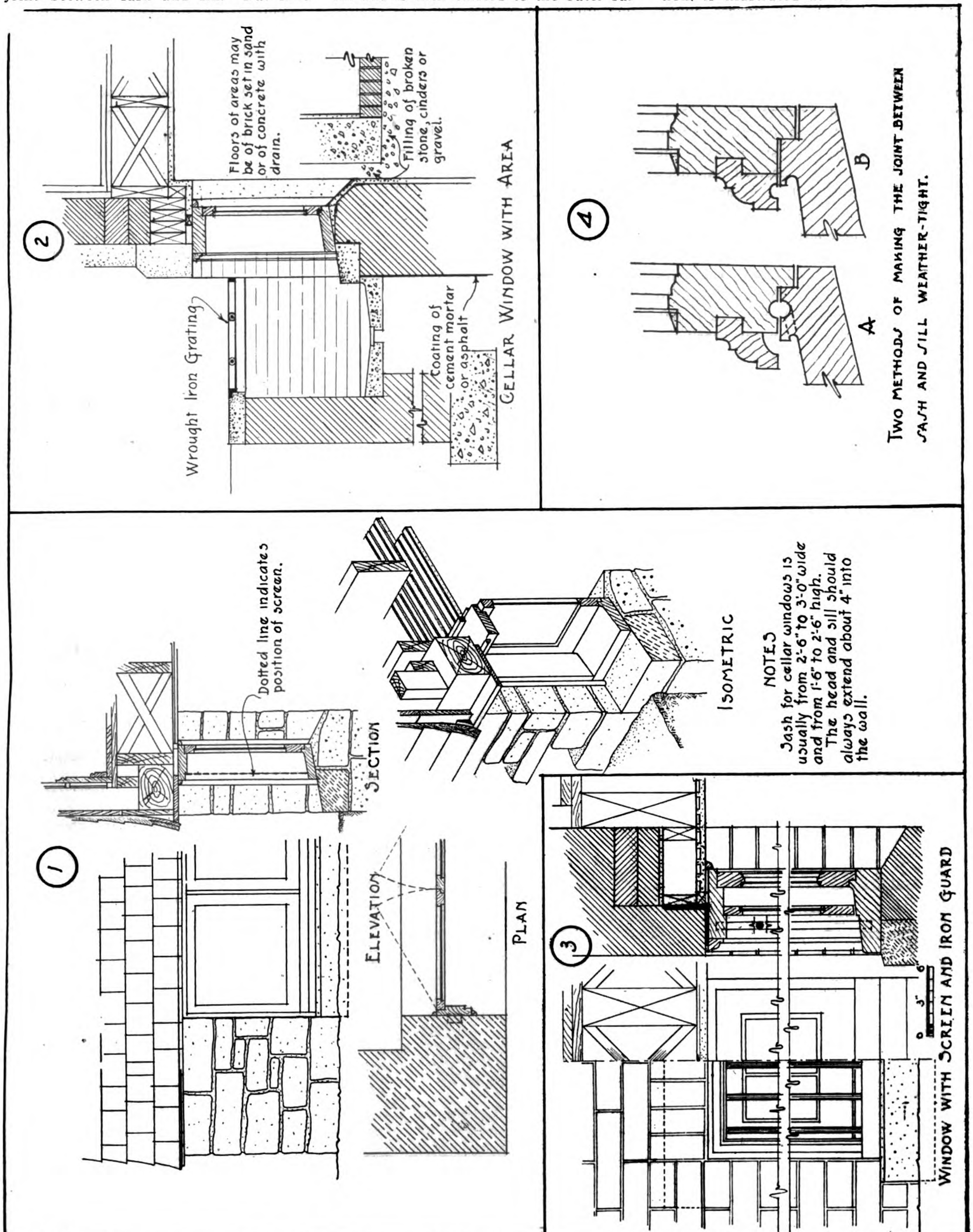
Note that the window shown in Fig. 1 has two leaves, which are hinged at the sides and swing in. Underneath the wood sill is a stone sill which is about 5 inches thick and extends 2 inches below grade. It is customary to make these stone sille simply "slip sills." The water is shed off these sills either by cutting a wash on its upper surface, as shown, or by tilting the entire sill slightly downward.

To hold the sill and head securely in place, it is necessary to leave lugs at the ends of these two members, building them into the wall say about 4 inches. Similar provision should be made to keep the jamb from springing away from the masonry. This is accomplished by building a small strip of wood into the wall, one on either side of the opening, and nailing the jambs to them. Sometimes wrought iron straps or anchors are used for this purpose. The inclined masonry stool on the interior of the wall prevents the accumulation of dust.

Fig. 2 shows a cellar window with an areaway. Where the lowest story of a building is used for living purposes, a double-hung window is usually substituted for a single sash cellar window. In any event, the head of the window is built as shown, with a wood lintel and a relieving arch above. There is no change in the construction of the window itself. The area which is built for light and ventilation is surrounded by walls extending 4 feet below the area floor. In cheap work, footings for these walls are omitted, a practice that should be condemned. The top of the area walls is finished off with bluestone or granite coping. A coping which is dovetailed or notched at the corners, gives evidence of good workmanship. The area should be guarded on top with grating or railing. The bottom of the area must be so built as to permit it to be drained. Either one of the methods shown may be employed with equal effectiveness. If a concrete floor, fitted with a drain is used, provision should be made to connect the latter with the drainage system of the house.

The cellar window shown in Fig. 3 offers nothing that is radically different in construction from that shown in the other examples considered. The difference lies only in the construction of the masonry surrounding the frame and in the extra number of accessories on the exterior of the window. The 3½x3½x¼ inch angle iron supports a "soldier" course of brick, which forms an attractive lintel, as can be seen from the elevation. The two rowlock, brick relieving arch in back of this angle is supported on a permanent wood center. The stone sill extends beyond the sides of the opening and has a wash cut on its upper surface. Outside of the sash is a mosquito screen and in front of that is a series of round, vertical, iron bars, ¾ inches in diameter, let into the head and sill, and set about 4 inches apart, as a protection against burglars.

The joint between the sill and the bottom rail of the sash is a particularly difficult one to make water-tight. Although expensive, the two methods shown in Fig. 4 are most effective in accomplishing this end. They are highly recommended for all kinds of casement windows. The rebates in the sash and sill, as well as the drip mould which is let in and joined in white lead to the bottom rail, are features common to both methods. Under ordinary conditions they would prevent water from entering the joint between sash and sill. But in a driving rainstorm some of the water will percolate through. This water is caught by the semi-circular groove cut in the bottom of the sash, as shown at A, drops into the corresponding groove in the sill and is then carried to the outer surface of the sill by means of holes reamed at intervals of about one foot, as indicated by the dotted lines. A less expensive method, though similar in principle yet not quite so effective in operation, is illustrated at B.



# Lump Sum or Percentage?

By Frank N. Goble

FEW architects and owners appreciate the burden put upon contractors by estimating in competition on their work. The number of contracts received by contractors when estimating in competition does not average over one in ten, and frequently the average is much less. During the last six months the number of contracts received has been very much less than the average.

To estimate a job costing about $100,000 will cost the contractor at least $100. Besides this there is the expense of the sub-contractors who also estimate with him, which will bring the total cost to make up such an estimate to at least $200. If five contractors bid on this work the cost of this estimate will be at least $1,000. This cost goes into the builders' overhead and it is charged up against the one job in ten or fifteen that is secured.

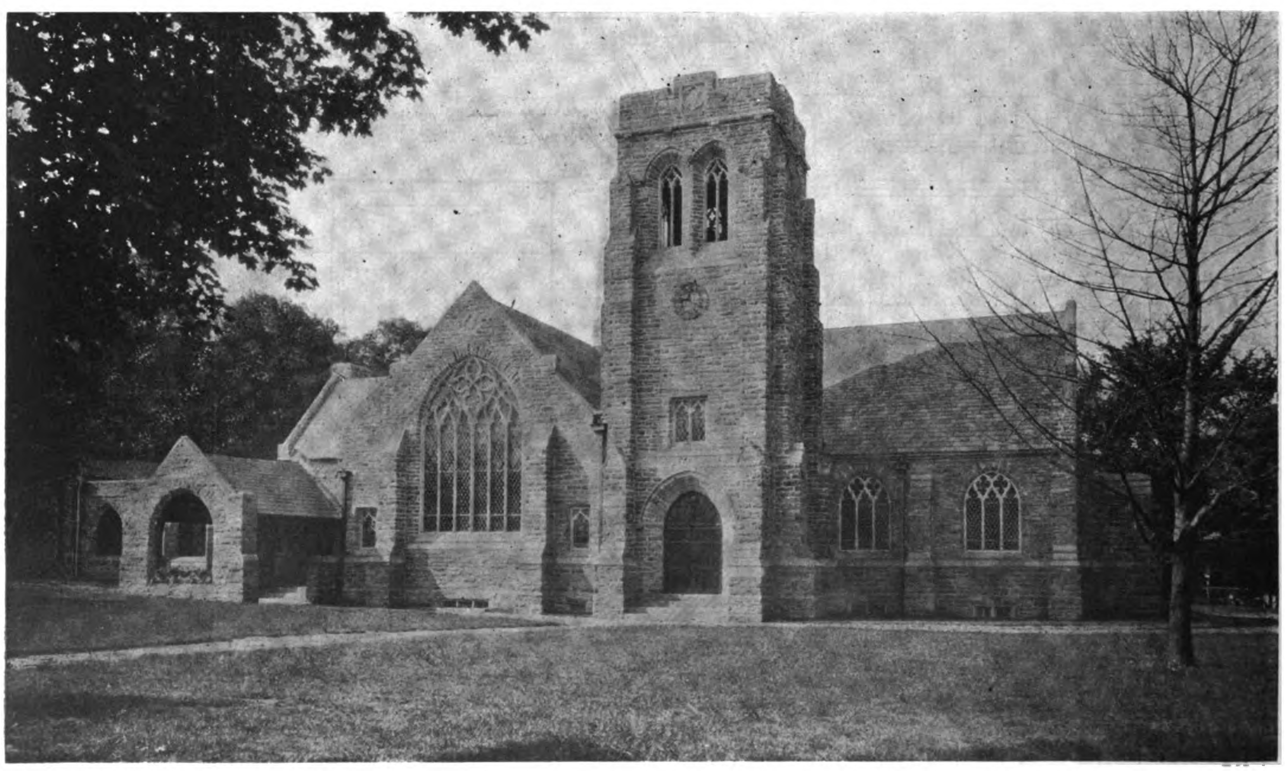
The contractor who does little competing is able to do his work at a lower percentage of porfit because his overhead cost is reduced. In competitive estimating, to be fair, only such contractors should be invited or allowed to estimate as the owner and the architect are perfectly willing to have the contract, and then the low man should get the job.

To get work on this basis contractors must use the lowest sub-contractors' estimates that he gets; he must assume all risks of labor conditions and material market. Under present labor and market conditions it is practically impossible for any contractor to make an estimate which will be the actual cost of the work. Therefore he will figure high. Conditions have changed so in the last two or three years, and in fact are changing so rapidly now, that former cost date is almost useless.

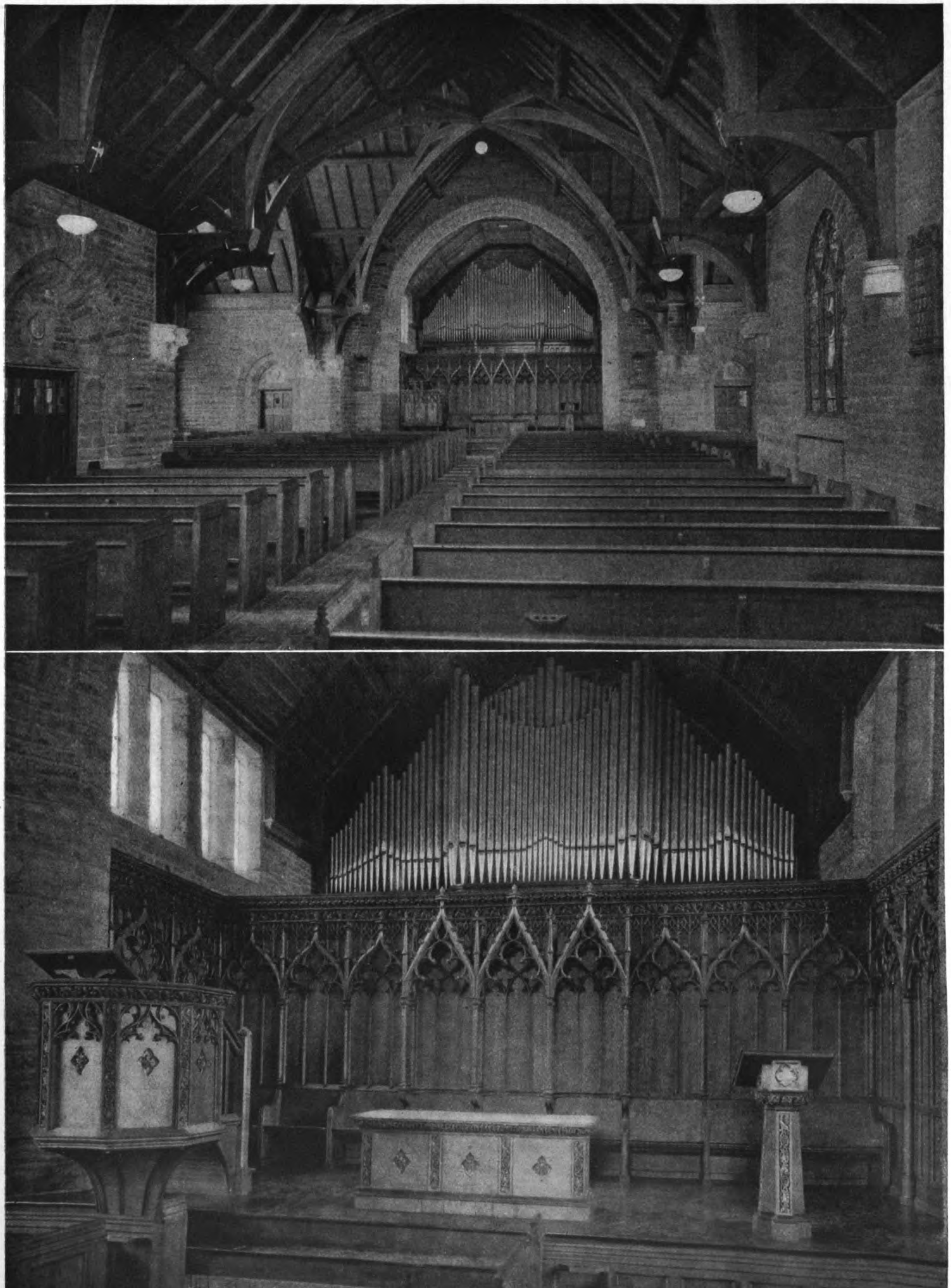
The owner is the person who gets the benefit from the completed building. Why is it not a much better economical and business proposition to select a reliable contractor and pay him a profit over and above the cost of the building, which profit may be determined either by a percentage of the cost or by naming a definite lump sum, which the builder is willing to accept as his pay for his work in connection with the construction? The reduced cost of building would be reflected all along the line, from the material man, who loses whenever the contractor fails to the mechanic, who is able to live for a small wage because of the changed production in unnecessary expense and contracting is then taken out of the gambling field and put into the professional class, where the good contractors rightfully belong.

# A Church For the Moderate-Size Congregation

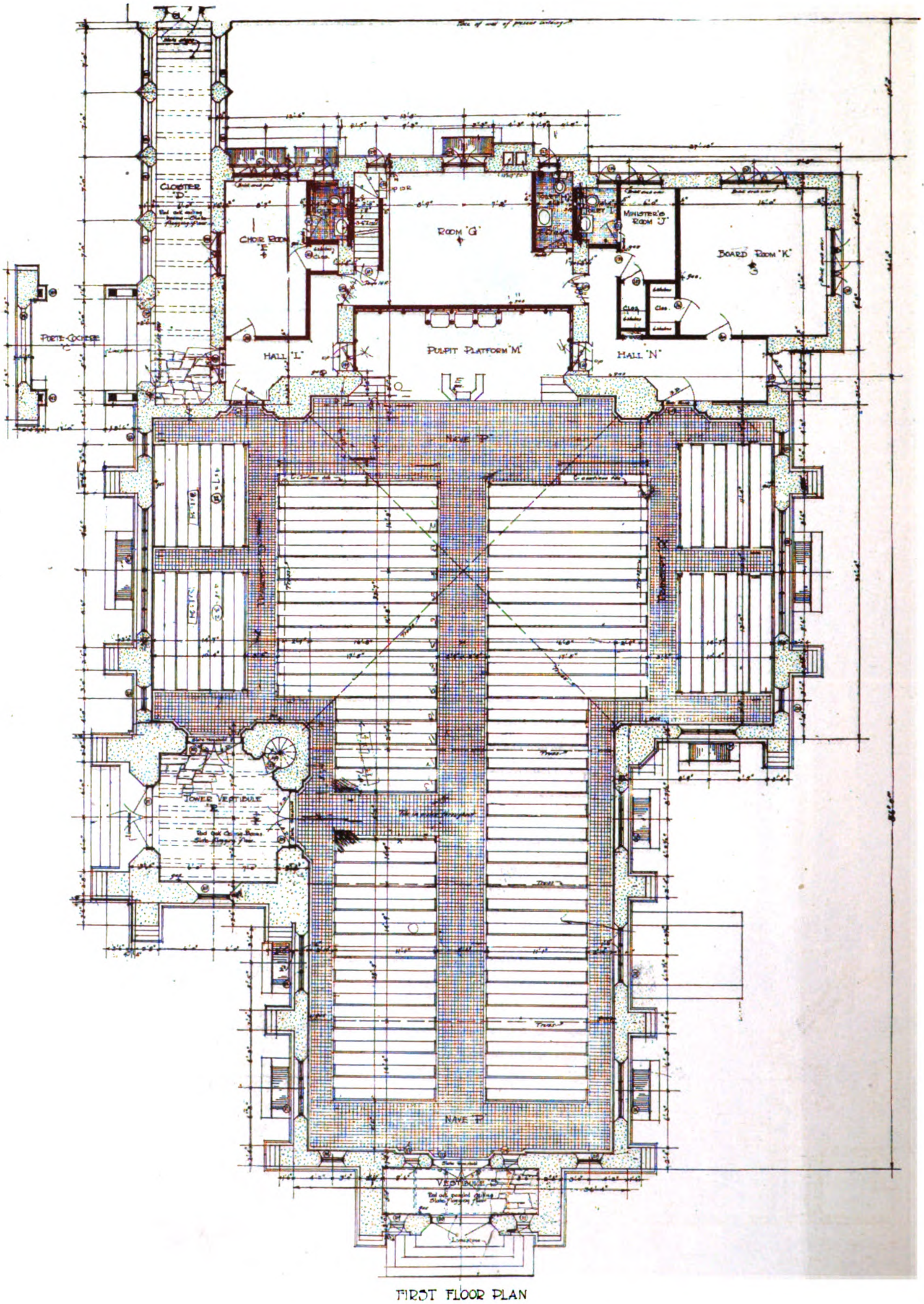
IT WAS in England that there first developed what is generally recognized as the most attractive type of architecture for churches—the Gothic. In many of these old towns the wealth of monasteries and labor during scores of years went towards the erection of the wonderfully beautiful structures that were finely adapted to worship and



*Presbyterian Church at Lansdowne, Pa. Druckenmiller & Williams, Architects*

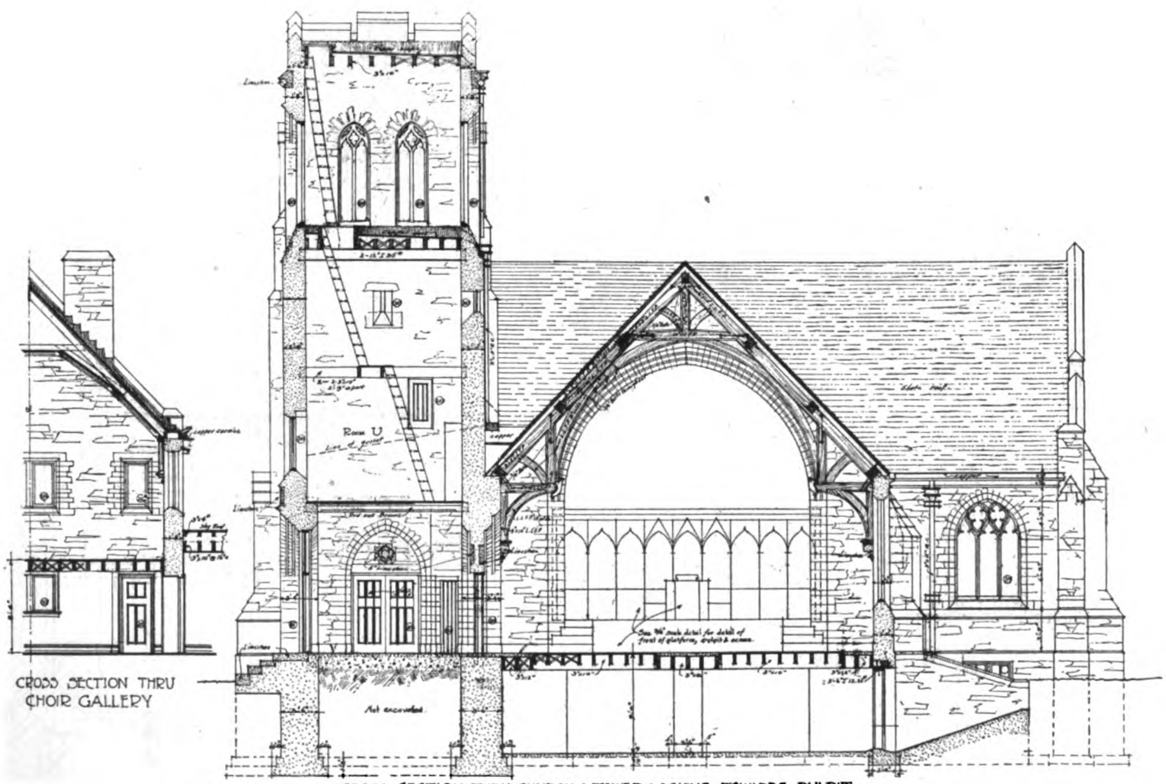


*Two Interior Views of the Lansdowne* ***Presbyterian Church*** *Druckenmiller & Williams, Architects*




*Presbyterian Church, Lansdowne, Pa.,*
*Druckenmiller & Williams, Architects*

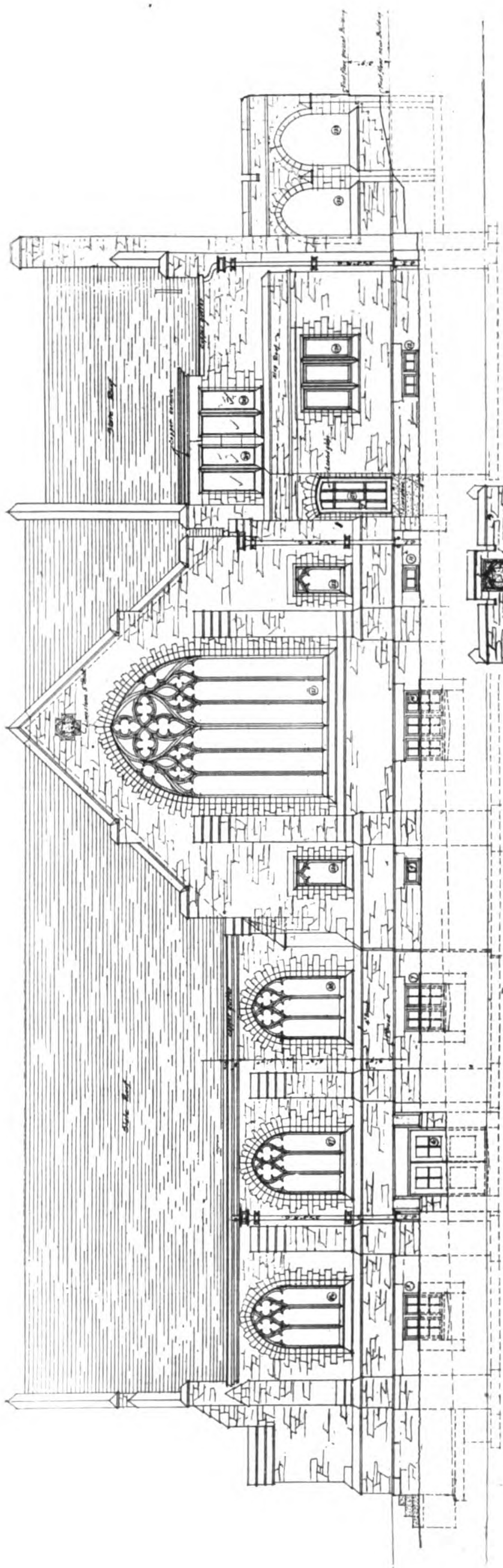
GREENWOOD AVENUE ELEVATION



CROSS SECTION THRU CHOIR GALLERY

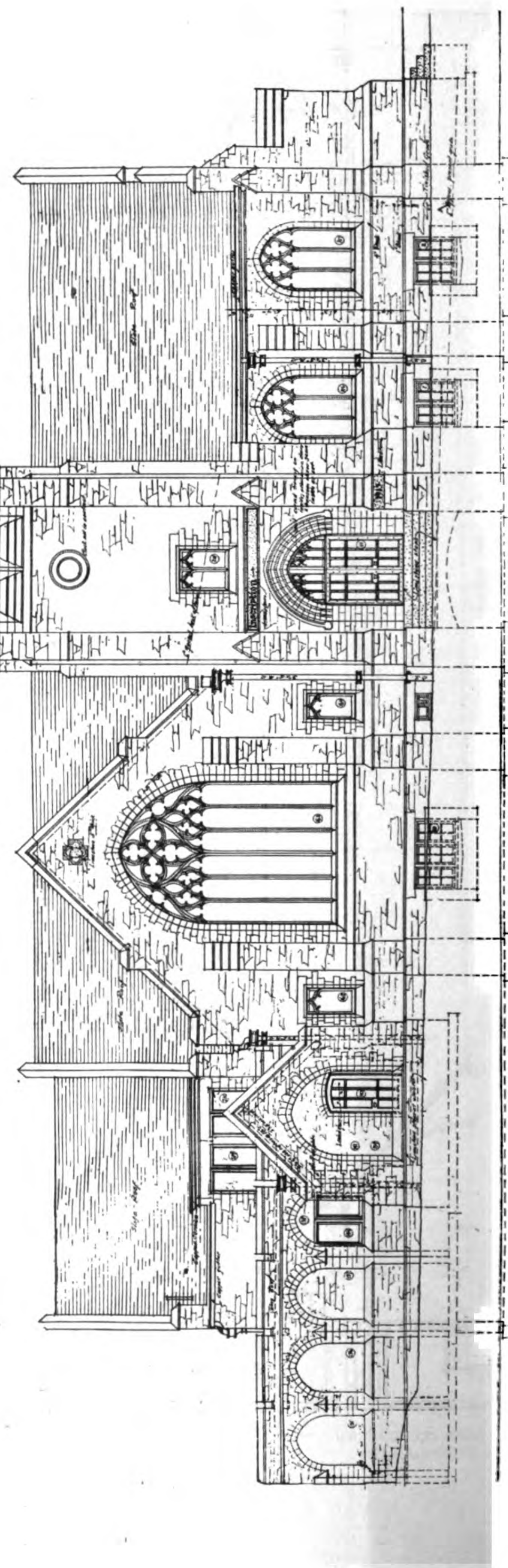
CROSS SECTION THRU CHURCH & TOWER LOOKING TOWARDS PULPIT

*Presbyterian Church, Lansdowne, Pa., Druckenmiller & Williams, Architects*

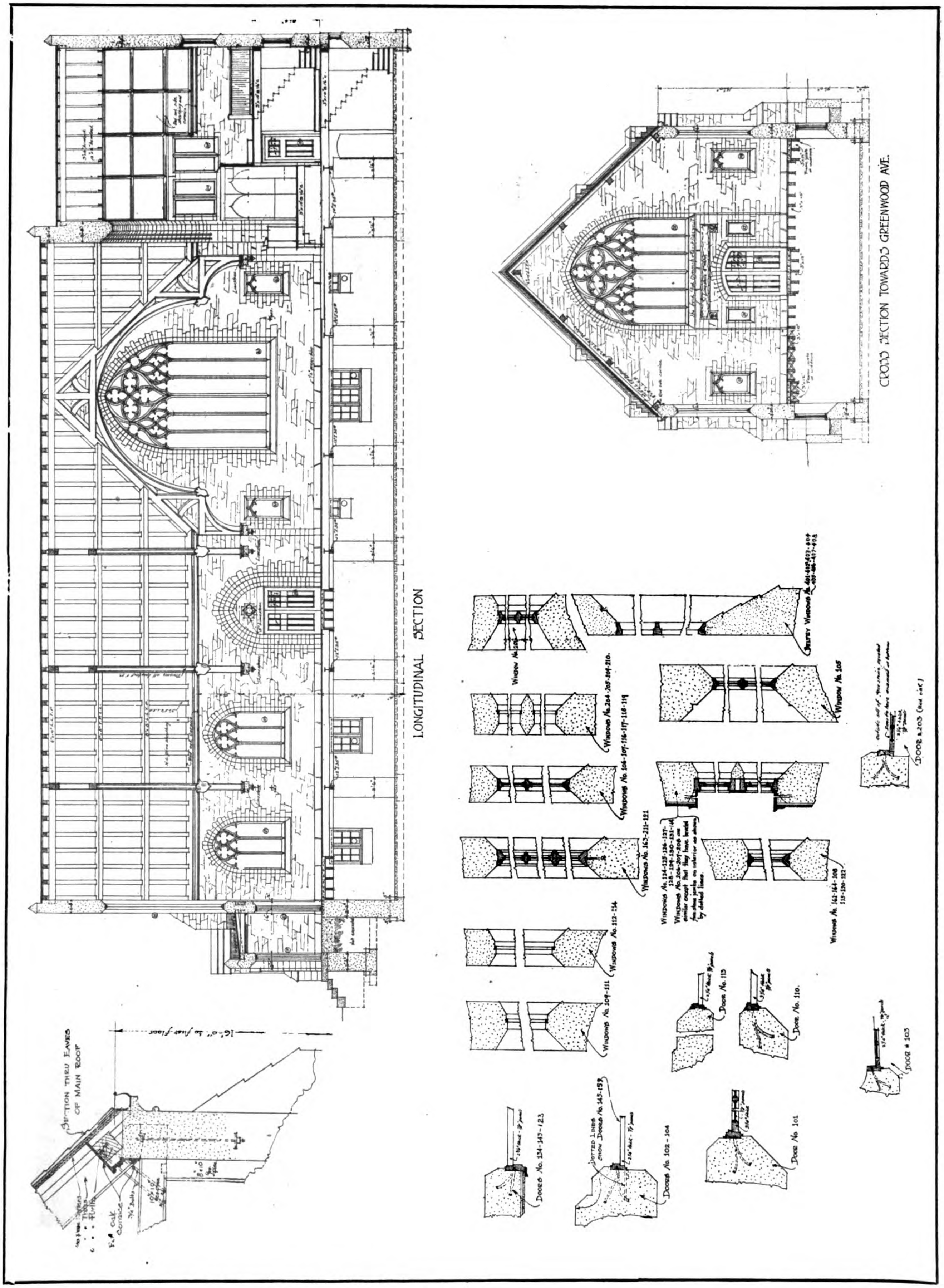


SIDE ELEVATION

*Presbyterian Church, Lansdowne, Pa., Druckenmiller & Williams, Architects*



LANSDOWNE AVENUE ELEVATION


LONGITUDINAL SECTION
CROSS SECTION TOWARDS GREENWOOD AVE.
SECTION THRU EAVES OF MAIN ROOF

REAR ELEVATION

have placed a stamp upon church architecture that has lasted down to the present day.

In modern times there is a tendency to modify the Gothic in various ways in order that it may bear the imprint of American individuality. When this is well done, as in the present example, the result is pleasing and thoroughly successful.

The characteristic feature of Gothic architecture is the pointed arch and this treatment is carried out in all the main openings of the church, as can be seen by a glance at the church.

The main feature of the design is the tower and the large window which lights the transept. It is more usual to place the main entrance of the church at the end opposite to the choir, as the long, lofty view down the nave lends a majestic appearance to the interior that does much to cultivate the proper spirit among the worshipers. The arrangement in the church illustrated, however, has its advantage in the fact that it is more centrally located and the church can be emptied more quickly than if the entrance were at the far end. The buttresses, which take up the thrust of the hammer beam roof trusses inside, are also decorative in that they serve to further break up the wall surface attractively and throw shadows that contrast pleasingly with the sunlit portion.

From the tower entrance may be had either to the nave or to one arm of the transept. The church is crucial in plan, which is the usual Gothic arrangement.

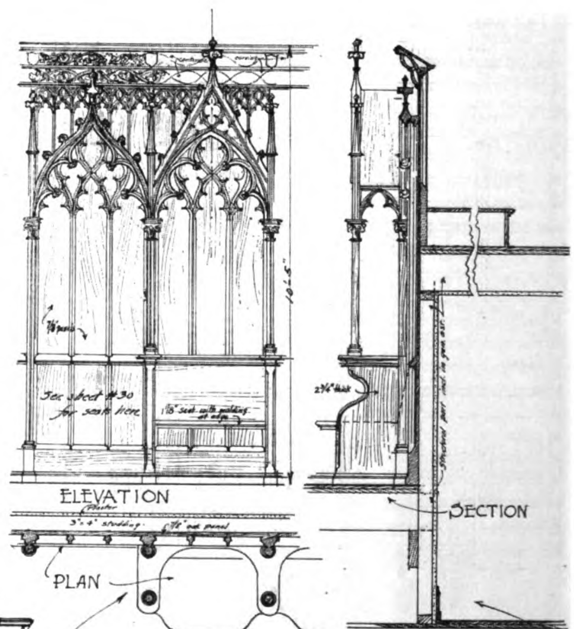
The walls with their stone laid up attractively form perhaps one of the most interesting finishes that one could have in this style of church.

The reredos or organ screen, with its arches and tracery forming a back to the choir stalls, is interesting in its handling. The paneling of the altar, pulpit and reading table is just enough to give the proper element of decoration and is not overdone so as to be ostentatious.

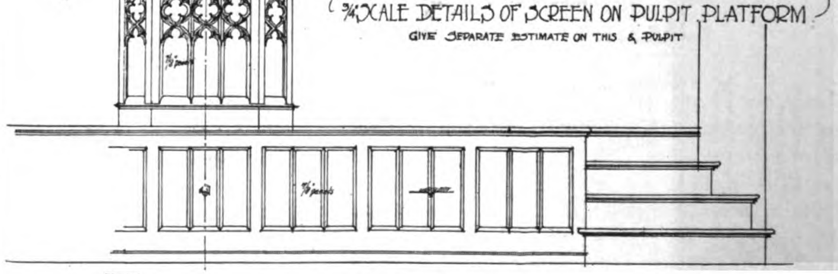
In the rear of the church there are the usual provisions for the minister, trustees, choir, etc.

At the extreme rear of the church and to one side is a cloister leading to the parsonage.

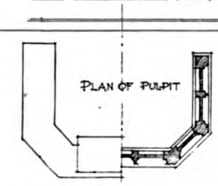
This church is located at Lansdowne, Pa., and was designed for the Presbyterian church by Druckenmiller and Williams, architects, 1537 Chestnut Street, Philadelphia, Pa.




¾ SCALE DETAILS OF SCREEN ON PULPIT PLATFORM
GIVE SEPARATE ESTIMATE ON THIS & PULPIT



PANELING ON FRONT OF PULPIT PLATFORM & STEPS
INCLUDED IN GENERAL ESTIMATE



# THE EDITOR'S PAGE

## Taxation and Prices

THERE is not, perhaps, a general realization of the fact that present living costs are a direct outcome of the war. Fought and won, it must be paid for, both principal and interest. The necessary moneys must be raised by taxation, resulting in a corresponding increase in the price of commodities on which the tax must be levied.

This Federal tax, including the running expenses of the Government, amounts next year to $190 per family, 15.8 per cent of the income of the average household, according to figures compiled by a writer in the Washington Star. This is exclusive of State taxes. High taxation is one of the causes for present high prices, and it is a cause that will not soon be removed. The only way in which taxes can be lowered is by rigid economy in Government operation.

There seems but little doubt that the year 1920 will witness a higher price level, not only in the cost of living, but in building materials as well. When the railroads are returned to private ownership there is reason to believe that freight rates will be increased, resulting in increased transportation cost of raw materials and finished products. The coal miners' strike, which resulted in an increased wage, will quite probably force a corresponding increase in prices—an increase that will certainly result in an upward trend of those commodities in which coal enters largely into the process of manufacture.

Present indications offer no relief until late summer, perhaps not then. Whether or not the price level will recede after the peak is reached is a mooted question just now. In the building field, where the demand is enormous, there is no real expectation of any early drop in prices. The level of wages will certainly not soon recede and there seems to be little likelihood of material prices finding lower levels. In fact, there is at the present writing a very strong upward tendency all along the line.

## Trade Unions Should Be Incorporated

WITHIN the past year the trade union has made definite steps toward occupying the unenviable position left vacant by capital of a generation ago—wide-spread public disapproval. Capital during the last century was often selfishly aggressive, frequently forming combinations which had for their sole purpose restraint of trade in order that greater profits might be had. The greed of many of the great trusts is still so recent that there is a vivid memory of the undoubted disfavor they evoked, a disfavor that caused the passing of the Inter-State Commerce Law of 1887 and the Sherman Anti-Trust Law of 1891.

More than one branch of organized labor during the past few months has shown that it does not hesitate to follow the same policy that caused the power of the trusts to be curtailed. Certain branches of organized labor again and again have shown that they are ready to take every advantage of the public, and the recent coal strike is not the least sign of the respect with which the rights of the public are regarded. Labor often claims for itself the prerogative of breaking contracts at will, holding that its organizations are above the law.

Labor organizations must be made responsible. Their contracts must be made inviolable under the law, their treasury subject to awards for damages which may be awarded by the courts, and they must not conspire to restrain trade or to limit production, especially in those industries on which public welfare is dependent.

In order that this may be accomplished it becomes necessary for trade unions to be incorporated. They will then become responsible corporate bodies subject to the same laws and regulations which have drawn the fangs of the trusts.

And by incorporation the labor unions will have gained something that they have sought for many years—the right of collective bargaining and social and official recognition.

The public is now protected against the encroachments of capital; it should likewise be protected against the encroachments of labor, and incorporation of trade unions will establish the responsibility of the second of the two parties serving the needs of the public.

Legislation, of course, will not make men virtuous, but it will cause them to see the wisdom of fair dealing and inculcate due respect for the rights of others.

# Building Activity During October

AN increase of 349 per cent is shown in the value of building permits granted for October, 1919, compared with October, 1918, according to reports received direct from city building departments by Building Age. Out of 190 cities reporting, 179 show increases. The amount of construction for which permits were granted during October, 1919, totals $165,525,316, and for October, 1918, $36,835,322.

The percentage of increase in the number of permits granted is 117 per cent, this giving a more conservative view of the greater activity this year owing to the increased cost of building. The average value of the permits granted during October, 1919, was $3,653, compared with $1,766 for October, 1918, when the Government regulations were in full force.

Eastern cities show a gain of 280 per cent, 69 out of 73 cities reporting increases; Middle States cities report a gain of 719 per cent, 53 out of 55 cities show an increase of 599 per cent, 37 out of 38 cities reporting increases, and Western cities show an increase of 121 per cent, 20 out of 24 cities reporting increases.

Future months will in all probability see increased costs of material and labor, it being likely that the cost of building next year will be at least 10 per cent greater than at present. A growing shortage of both material and labor is more than probable. Many material dealers are stocking up as far as possible in order to meet a growing acute situation. Figures in detail follow:

CITIES IN EASTERN STATES

| | 1919 | | | | 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | Value | Repairs | Value | New Work | Value | Repairs | Value |
| *Albany, N. Y.... | 50 | $192,825 | 130 | $129,375 | 11 | $6,950 | 85 | $47,355 |
| *Allentown, Pa.... | 41 | 692,450 | 12 | 24,975 | 5 | 30,725 | 8 | 3,960 |
| *Altoona, Pa...... | 17 | 59,590 | 70 | 26,130 | 8 | 4,175 | 32 | 5,985 |
| *Atlantic City, N.J. | 24 | 267,390 | 120 | 58,778 | 2 | 2,200 | 51 | 13,504 |
| *Auburn, N. Y.... | 16 | 93,100 | 4 | 6,450 | 7 | 15,325 | 6 | 5,150 |
| *Bayonne, N. J.... | 21 | 244,800 | 22 | 17,035 | 1 | 5,500 | 7 | 4,260 |
| *Binghamton, N.Y. | 86 | 74,586 | 147 | 65,009 | 41 | 15,004 | 61 | 7,291 |
| *Boston, Mass.... | 135 | 1,479,488 | 512 | 737,533 | 30 | 227,575 | 246 | 220,873 |
| *Bridgeport, Conn. | 132 | 565,855 | ..... | ......... | 80 | 92,444 | ..... | ......... |
| *Brockton, Mass... | 38 | 204,155 | 22 | 88,050 | 6 | 11,170 | 6 | 5,700 |
| *Buffalo, N. Y.... | 427 | 1,311,600 | 115 | 317,400 | 216 | 328,000 | ..... | ......... |
| *Cambridge, Mass. | 110 | 505,602 | ..... | ......... | 30 | 24,932 | ..... | ......... |
| Camden, N. J.... | 104 | 299,790 | ..... | ......... | 33 | 2,643,445 | ..... | ......... |
| *Chelsea, Mass.... | 8 | 29,150 | 20 | 25,772 | .... | ......... | 10 | 7,935 |
| *Chicopee, Mass... | 30 | 176,900 | 6 | 9,600 | 3 | 3,000 | 4 | 2,350 |
| *Danbury, Conn... | 33 | 165,000 | ..... | ......... | 17 | 51,00 | ..... | ......... |
| *East Orange, N.J. | 43 | 120,955 | 33 | 250,518 | 8 | ......... | 17 | 30,634 |
| *Elizabeth, N. J... | 114 | 563,832 | 11 | 36,412 | 11 | 32,994 | 6 | 13,925 |
| *Erie, Pa......... | 111 | 237,325 | 38 | 47,675 | 57 | 139,720 | 32 | 23,020 |
| *Everett, Mass.... | 15 | 55,000 | 14 | 28,000 | 10 | 13,000 | 9 | 7,000 |
| Fall River, Mass.. | 43 | 106,700 | 31 | 65,105 | 4 | 167,900 | 13 | 12,550 |
| *Fitchburg, Mass.. | 13 | 19,655 | 7 | 32,900 | 12 | 42,470 | 3 | 3,500 |
| *Harrisburg, Pa... | 57 | 488,400 | ..... | ......... | 15 | 7,100 | ..... | ......... |
| *Hartford, Conn... | 74 | 300,801 | 72 | 65,391 | 9 | 17,965 | 20 | 9,865 |
| *Haverhill, Mass.. | 58 | 196,750 | ..... | ......... | 9 | 9,125 | ..... | ......... |
| *Hoboken, N. J... | 17 | 280,900 | 12 | 22,257 | 3 | 7,990 | 15 | 11,050 |
| *Holyoke, Mass... | 21 | 170,000 | 8 | 22,300 | .... | ......... | 8 | 4,460 |
| *Jersey City, N.J.. | 53 | 642,630 | 64 | 287,550 | 18 | 28,675 | 44 | 227,501 |
| *Lancaster, Pa.... | 24 | 206,050 | 11 | 6,275 | .... | ......... | 8 | 3,730 |
| *Lawrence, Mass.. | 42 | 108,850 | 13 | 84,350 | .... | ......... | 9 | 6,575 |
| *Lowell, Mass..... | 55 | 121,590 | 47 | 28,925 | 20 | 38,865 | 25 | 6,925 |
| *Lynn, Mass...... | 66 | 111,760 | 34 | 43,285 | 7 | 1,410 | 8 | 7,525 |
| *Malden, Mass.... | 23 | 164,050 | 21 | 29,572 | 3 | 6,300 | 7 | 5,120 |
| *Manchester, N.H. | 40 | 528,235 | 44 | 69,147 | 7 | 1,100 | 38 | 7,373 |
| *McKeesport, Pa.. | 29 | 215,700 | ..... | ......... | 4 | 1,565 | ..... | ......... |
| *Medford, Mass... | 43 | 129,090 | ..... | ......... | 6 | 1,525 | ..... | ......... |
| *Montclair, N. J... | 36 | 293,822 | 5 | 4,975 | 5 | 12,285 | 1 | 150 |
| *Mt. Vernon, N.Y. | 31 | 170,011 | 14 | 39,800 | 8 | 4,850 | 5 | 900 |
| *Newark, N. J.... | 329 | 1,144,917 | ..... | ......... | 136 | 248,517 | ..... | ......... |
| *New Bedford, Mass. | 84 | 522,640 | ..... | ......... | 22 | 37,800 | 7 | 5,120 |
| *Newburgh, N. Y.. | 11 | 61,700 | 8 | 10,000 | 6 | 33,960 | 5 | 3,000 |
| *New Haven, Conn. | 138 | 2,872,575 | ..... | ......... | 140 | 79,407 | ..... | ......... |
| *New Rochelle, N.Y. | 35 | 518,040 | 25 | 108,750 | 5 | 2,050 | 100 | 8,205 |
| New York: | | | | | | | | |
| *Manhattan.... | 27 | 4,621,100 | 289 | 3,400,400 | 10 | 78,500 | 176 | 378,850 |
| *Bronx........ | 95 | 2,606,975 | 267 | 179,157 | 3 | 150,000 | 94 | 57,495 |
| *Brooklyn..... | 851 | 7,775,050 | 698 | 778,268 | 186 | 2,129,150 | 505 | 407,066 |
| Richmond.... | 202 | 452,667 | 67 | 48,680 | 47 | 535,448 | 47 | 20,035 |
| *Niagar Falls, N.Y. | 62 | 235,585 | 11 | 8,900 | 34 | 154,860 | ..... | ......... |
| *Orange, N. J..... | 6 | 29,492 | 31 | 23,847 | 1 | 5,000 | 20 | 5,876 |
| *Passaic, N. J..... | 29 | 117,050 | 7 | 29,800 | 3 | 7,550 | 1 | 1,200 |
| *Paterson, N. J.... | 169 | 745,920 | ..... | ......... | 74 | 113,014 | ..... | ......... |
| *Philadelphia, Pa.. | 1,190 | 4,840,005 | ..... | ......... | 333 | 843,520 | ..... | ......... |
| *Plainfield, N. J... | 225 | 796,639 | ..... | ......... | 110 | 596,612 | ..... | ......... |
| *Pittsburgh, Pa.... | 452 | 1,675,686 | ..... | ......... | 108 | 317,483 | ..... | ......... |
| *Portland, Me..... | 45 | 400,886 | 38 | 37,860 | 15 | 27,235 | 15 | 26,937 |
| Quincy, Mass.... | 106 | 405,726 | ..... | ......... | 289 | 2,801,432 | ..... | ......... |
| *Reading, Pa...... | 45 | 262,145 | 207 | 57,400 | 13 | 1,775 | 140 | 15,625 |
| *Revere, Mass.... | 17 | 19,225 | 18 | 36,235 | 7 | 8,175 | 9 | 3,705 |
| *Rochester, N. Y.. | 279 | 1,166,289 | 118 | 2[illegible]1,156 | 31 | 121,603 | 57 | 68,730 |
| *Salem, Mass..... | 81 | 102,905 | ..... | ......... | 57 | 8,963 | ..... | ......... |
| *Schenectady, N.Y. | 64 | 197,170 | 29 | 27,680 | 34 | 112,475 | 25 | 4,147 |
| *Scranton, Pa..... | 56 | 100,438 | ..... | ......... | 12 | 10,420 | ..... | ......... |
| *Somerville, Mass.. | 35 | 47,625 | 17 | 12,165 | 3 | 1,200 | 7 | 6,525 |
| *Springfield, Mass. | 98 | 360,270 | 42 | 71,885 | 18 | 5,400 | 31 | 60,599 |
| *Syracuse, N. Y... | 164 | 1,061,275 | 66 | 171,050 | 23 | 9,185 | 37 | 12,805 |
| *Trenton, N. J.... | 101 | 511,670 | ..... | ......... | 20 | 18,230 | ..... | ......... |
| *Troy, N. Y...... | 1 | 5,000 | 24 | 11,100 | 19 | 4,327 | ..... | ......... |
| *Utica, N. Y...... | 36 | 487,075 | 12 | 31,400 | 13 | 39,325 | 8 | 6,550 |
| *W. Hoboken, N. J. | 5 | 40,125 | 16 | 33,000 | 1 | 3,000 | 5 | 4,000 |
| *Wilkes Barre, Pa.. | 53 | 57,391 | ..... | ......... | 49 | 12,232 | ..... | ......... |
| *Worcester, Mass.. | 149 | 796,262 | 78 | 127,340 | 40 | 12,977 | [illegible] | 141,605 |
| *Yonkers, N. Y... | 79 | 333,700 | ..... | ......... | 9 | 6,000 | ..... | ......... |
| *York, Pa........ | 9 | 8,400 | 22 | 8,800 | .... | ......... | 33 | 7,580 |

CITIES IN WESTERN STATES

| | 1919 | | | | 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | Value | Repairs | Value | New Work | Value | Repairs | Value |
| Alameda, Cal.... | 10 | $28,650 | 50 | $21,191 | 6 | $180,480 | 29 | $14,668 |
| *Berkeley, Cal.... | 37 | 421,305 | 80 | 28,836 | 8 | 173,128 | 44 | 9,210 |
| Butte, Mont..... | 26 | 41,000 | 31 | 13,000 | 41 | 71,000 | 46 | 8,500 |
| *Boise, Idaho..... | 7 | 19,600 | 55 | 22,635 | 0 | 0 | 26 | 10,845 |
| *Colorado, Spgs, Col. | 27 | 12,618 | 28 | 49,165 | 2 | 1,700 | 9 | 3,520 |
| *Denver, Colo..... | 210 | 703,050 | 99 | 51,400 | 10 | 26,000 | 19 | 58,100 |
| Eureka, Cal...... | 7 | 7,200 | 6 | 3,000 | 6 | 23,000 | 2 | 2,200 |
| *Fresno, Cal...... | 140 | 298,782 | 68 | 78,532 | 24 | 15,645 | 51 | 11,910 |
| *Long Beach, Cal.. | 392 | 850,248 | ..... | ......... | 84 | 16,214 | ..... | ......... |
| *Los Angeles, Cal.. | 1,150 | 3,789,752 | 422 | 335,944 | 51 | 35,447 | 292 | 137,977 |
| *Oakland, Cal..... | 340 | 519,294 | 121 | 66,802 | 227 | 357,432 | 96 | 24,891 |
| *Ogden, Utah..... | 225 | 1,285,479 | 46 | 54,642 | 108 | [illegible]46,035 | 65 | 12,565 |
| *Pasadena, Cal.... | 74 | 208,309 | 100 | 79,371 | 9 | 665 | ..... | ......... |
| *Phoenix, Ariz.... | 60 | 147,917 | 59 | 40,223 | [illegible] | 6,150 | 18 | 5,365 |
| *Portland, Ore.... | 883 | 1,422,005 | ..... | ......... | [illegible] | 380,658 | ..... | ......... |
| *Pueblo, Colo..... | 31 | 37,802 | ..... | ......... | 42 | 13,400 | ..... | ......... |
| *Salt Lake City, Utah........ | 57 | 281,210 | 47 | 57,150 | 24 | 138,875 | 21 | 12,800 |
| *Sacramento, Cal.. | 32 | 333,365 | 138 | 66,629 | 3 | 6,890 | 52 | 10,183 |
| *San Diego, Cal... | 69 | 91,190 | 87 | 788,40 | 19 | 39,820 | 90 | 28,148 |
| *San Francisco, Cal. | 1,119 | 10,199,788 | 3,357 | 2,052,718 | 609 | 6,008,853 | 3,079 | 1,915,466 |
| *San Jose, Cal..... | 36 | 68,871 | 37 | 36,367 | 9 | 8,830 | 5 | 4,925 |
| *Seattle, Wash.... | 722 | 1,211,620 | 468 | 222,820 | 906 | 1,143,400 | 415 | 129,990 |
| *Spokane, Wash... | 116 | , 89,309 | 67 | 28,034 | 48 | 2,080 | 51 | 13,475 |
| *Stockton, Cal.... | 45 | 132,160 | 24 | 33,170 | 44 | 12,931 | ..... | ......... |
| Tacoma, Wash... | 154 | 92,349 | 158 | 49,059 | 228 | 319,299 | 107 | 30,014 |
| | 5,909 | $22,144,956 | 5,489 | $3,429,305 | 3,180 | $9,122,632 | 4,599 | $2,439,387 |

CITIES IN MIDDLE STATES

| | 1919 | | | | 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | Value | Repairs | Value | New Work | Value | Repairs | Value |
| *Akron, Ohio...... | 565 | $3,184,277 | 118 | $49,640 | 53 | $60,140 | 50 | $98,070 |
| *Aurora, Ill....... | 10 | 22,695 | 7 | 8,930 | 8 | 6,510 | 11 | 12,056 |
| *Battle Creek, Mich | 128 | 140,000 | 24 | 16,000 | 39 | 90,000 | 11 | 8,000 |
| *Bay City, Mich... | 61 | 338,450 | ..... | ......... | 13 | 21,065 | ..... | ......... |
| *Canton, Ohio..... | 165 | 653,748 | 57 | 39,025 | 34 | 84,125 | 27 | 9,155 |
| *Cedar Rapids, Ia. | 58 | 149,000 | 25 | 25,000 | 2 | 7,000 | 12 | 11,000 |
| *Chicago, Ill...... | 758 | 16,948,040 | ..... | ......... | 119 | 1,312,200 | ..... | ......... |
| *Cincinnati, O..... | 1,032 | 946,670 | ..... | ......... | 804 | 331,775 | ..... | ......... |
| Cleveland, O...... | 324 | 5,223,400 | 1,158 | 457,785 | 31 | 721,200 | 517 | 186,880 |
| *Columbus, O..... | 263 | 619,090 | 102 | 127,155 | 71 | 160,175 | 81 | 56,680 |
| *Danville, Ill...... | 7 | 25,400 | ..... | ......... | 1 | 3,400 | ..... | ......... |
| Davenport, Ia..... | 95 | 751,915 | ..... | ......... | 19 | 16,950 | ..... | ......... |
| *Dayton, Ohio.... | 223 | 934,637 | 44 | 97,110 | 91 | 252,452 | 19 | 16,519 |
| *Decatur, Ill...... | 69 | 297,450 | 17 | 21,200 | 14 | 58,500 | 3 | 375 |
| *Des Moines, Ia... | 126 | 559,960 | ..... | ......... | 38 | 127,600 | ..... | ......... |
| *Detroit, Mich.... | 2,132 | 8,285,155 | 429 | 1,163,430 | 234 | 1,042,010 | 275 | 389,070 |
| *Dubuque, Ia..... | 19 | 45,009 | ..... | ......... | .... | ......... | ..... | ......... |
| *Duluth, Minn..... | 218 | 273,678 | ..... | ......... | 88 | 81,915 | ..... | ......... |
| *E. St. Louis, Ill.. | 46 | 76,410 | ..... | ......... | 18 | 16,535 | ..... | ......... |
| Fargo, N. Dak... | 41 | 157,000 | 12 | 29,400 | .... | 4,200 | ..... | ......... |
| *Ft. Wayne, Ind... | 61 | 320,542 | 15 | 9,500 | 11 | 37,750 | 23 | 20,900 |
| *Grand Rapids, Mich......... | 179 | 425,082 | ..... | ......... | 69 | 28,374 | ..... | ......... |
| Hamilton, Ohio.... | 19 | 115,996 | 12 | 10,523 | 10 | 152,400 | 10 | 5,474 |
| *Indianapolis, Ind. | 339 | 1,380,284 | 372 | 196,606 | 96 | 113,375 | 299 | 78,527 |
| *Jackson, Mich.... | 80 | 150,565 | 24 | 44,065 | 4 | 1,920 | 28 | 16,478 |
| *Joplin, Mo....... | 11 | 40,425 | 4 | 1,125 | 6 | 6,735 | 7 | 1,420 |
| *Kansas City, Kan. | 17 | 64,500 | 35 | 17,680 | 20 | 117,761 | ..... | ......... |
| Kansas City, Mo.. | 451 | 2,432,780 | ..... | ......... | 193 | 299,875 | ..... | ......... |
| *Lansing, Mich.... | 194 | 376,185 | 23 | 20,350 | 15 | 6,110 | 4 | 1,525 |
| *Lincoln, Nebr... | 70 | 222,425 | ..... | ......... | 18 | 5,925 | ..... | ......... |
| *Madison, Wis.... | 49 | 228,440 | ..... | ......... | 4 | 4,500 | ..... | ......... |
| *Milwaukee, Wis.. | 340 | 2,602,180 | 139 | 278,366 | 23 | 23,225 | 83 | 25,853 |
| *Minneapolis, Minn. | 703 | 2,052,295 | ..... | ......... | 206 | 99,095 | ..... | ......... |
| *Omaha, Nebr.... | 197 | 1,608,125 | ..... | ......... | 89 | 600,037 | ..... | ......... |
| *Peoria, Ill........ | 69 | 498,220 | 42 | 21,525 | 25 | 40,970 | 22 | 14,225 |
| *Quincy, Ill....... | 5 | 27,200 | ..... | ......... | 1 | 3,500 | ..... | ......... |
| *Richmond, Ind... | 25 | 84,700 | ..... | ......... | 18 | 60,000 | ..... | ......... |
| *Saginaw, Mich... | 217 | 859,649 | 64 | 321,565 | 35 | 31,470 | 42 | 7,298 |
| *St. Joseph, Mo... | 21 | 221,200 | 30 | 8,745 | 13 | 5,020 | 6 | 550 |
| *St. Louis, Mo.... | 409 | 1,647,455 | 352 | 338,705 | 114 | 163,803 | 290 | 142,242 |
| *St. Paul, Minn... | 331 | 1,311,491 | ..... | ......... | 55 | 100,747 | ..... | ......... |
| *Sandusky, O..... | 31 | 352,109 | ..... | ......... | 9 | 12,275 | ..... | ......... |
| *Sheboygan, Wis.. | 94 | 125,295 | 65 | 19,491 | 43 | 4,125 | 9 | 15,805 |
| *Sioux City, Ia.... | 173 | 409,250 | ..... | ......... | 8 | 25,900 | ..... | ......... |
| *South Bend, Ind.. | 285 | 507,281 | ..... | ......... | 80 | 23,126 | ..... | ......... |
| *Springfield, Ill.... | 29 | 645,875 | 39 | 27,175 | 3 | 600 | 17 | 5,140 |
| *Springfield, Mo... | 16 | 59,225 | 29 | 28,575 | 8 | 3,600 | 13 | 8,200 |
| *Springfield, Ohio.. | 42 | 138,675 | 15 | 59,400 | 4 | 750 | 5 | 6,800 |
| *Superior, Wis.... | 46 | 70,000 | 56 | 73,350 | .... | ......... | 54 | 10,174 |
| *Terre Haute, Ind. | 29 | 123,165 | 39 | 26,450 | 31 | 18,065 | 28 | 8,775 |
| *Toledo, Ohio..... | 267 | 856,062 | 123 | 92,956 | 24 | 55,072 | 67 | 26,953 |
| *Topeka, Kans.... | 38 | 34,005 | 16 | 25,150 | 8 | 7,405 | 6 | 10,180 |
| *Wichita, Kans.... | 143 | 424,970 | ..... | ......... | 35 | 36,710 | ..... | ......... |
| *Youngstown, O... | 169 | 475,175 | 31 | 36,950 | 51 | 136,425 | 34 | 19,465 |
| *Zanesville, Ohio.. | 10 | 12,125 | 1 | 700 | 8 | 3,240 | ..... | ......... |
| | 11,488 | $60,494,520 | 3,515 | $3,692,502 | 3,008 | $6,620,902 | 2,046 | $1,212,819 |

CITIES IN SOUTHERN STATES

| | 1919 | | | | 1918 | | | |
|---|---|---|---|---|---|---|---|---|
| | New Work | Value | Repairs | Value | New Work | Value | Repairs | Value |
| *Atlanta, Ga...... | 142 | $705,104 | 113 | $100,709 | 69 | $54,846 | 92 | $35,253 |
| *Augusta, Ga..... | 29 | 100,300 | 158 | 42,187 | 4 | 5,050 | 89 | 31,567 |
| *Baltimore, Md... | 567 | 1,498,325 | 888 | 268,200 | 30 | 538,580 | 309 | 61,800 |
| *Birmingham, Ala. | 126 | 406,122 | 313 | 87,898 | 54 | 32,980 | 216 | 49,591 |
| *Charleston, S. C.. | 24 | 53,600 | 19 | 8,790 | 10 | 14,125 | 5 | 13,823 |
| *Charlotte, N. C... | 19 | 135,000 | ..... | ......... | 15 | 75,427 | ..... | ......... |
| *Chattanooga, Tenn. | 203 | 75,588 | ..... | ......... | 115 | 14,932 | ..... | ......... |
| *Covington, Ky... | 17 | 26,625 | 10 | 5,300 | 1 | 8,000 | 2 | 1,850 |
| *Dallas, Tex...... | 162 | 1,846,988 | ..... | ......... | 23 | 14,550 | ..... | ......... |
| *El Paso, Texas... | 146 | 317,784 | ..... | ......... | 75 | 16,369 | ..... | ......... |
| *Ft. Smith, Ark... | 11 | 34,100 | 6 | 5,830 | .... | ......... | 2 | 225 |
| *Ft. Worth, Texas. | 134 | 1,990,720 | 62 | 120,345 | 11 | 7,285 | 18 | 15,318 |
| *Galveston, Texas. | 514 | 47,755 | ..... | ......... | 373 | 21,072 | ..... | ......... |
| *Houston, Texas... | 428 | 1,257,324 | ..... | ......... | 136 | 40,412 | ..... | ......... |
| *Huntington, W. Va. | 81 | 243,966 | ..... | ......... | 18 | 64,030 | ..... | ......... |
| *Jacksonville, Fla.. | 57 | 366,330 | ..... | ......... | 35 | 115,275 | ..... | ......... |
| *Knoxville, Tenn.. | 24 | 121,938 | 75 | 17,595 | .... | ......... | 80 | 30,612 |
| *Lexington, Ky.... | 20 | 92,000 | 27 | 13,000 | 10 | 4,870 | 28 | 3,500 |
| *Little Rock, Ark. | 105 | 110,658 | ..... | ......... | 46 | 20,745 | ..... | ......... |
| *Louisville, Ky.... | 71 | 672,950 | 133 | 82,795 | 4 | 28,100 | 81 | 68,558 |
| *Memphis, Tenn... | 151 | 411,080 | ..... | ......... | 40 | 73,365 | ..... | ......... |
| *Miami, Fla....... | 99 | 268,250 | ..... | ......... | 19 | 14,450 | ..... | ......... |
| *Muscogee, Okla... | 21 | 76,020 | ..... | ......... | 2 | 925 | ..... | ......... |
| *Nashville, Tenn.. | 48 | 211,535 | 252 | 39,679 | 1 | 4,500 | 289 | 26,139 |
| *New Orleans, La.. | 47 | 400,925 | 78 | 68,530 | 19 | 21,100 | 21 | 64,145 |
| *Norfolk, Va...... | 92 | 580,496 | 28 | 80,844 | 24 | 48,200 | 2 | 1,850 |
| *Oklahoma City, Okla.......... | 72 | 1,160,200 | 94 | 58,904 | 3 | 4,665 | 15 | 13,600 |
| *Pensacola, Fla... | 12 | 39,660 | 102 | 28,500 | 7 | 3,150 | 95 | 1,058 |
| *Portsmouth, Va.. | 29 | 116,340 | 28 | 45,525 | 14 | 7,375 | 6 | 21,886 |
| *Richmond, Va.... | 86 | 638,030 | 89 | 85,525 | 10 | 8,535 | 45 | 36,358 |
| *Roanoke, Va..... | 83 | 72,695 | ..... | ......... | 18 | 4,887 | ..... | ......... |
| *San Antonio, Tex. | 188 | 477,170 | ..... | ......... | 227 | 329,938 | ..... | ......... |
| *Savannah, Ga.... | 68 | 689,000 | 21 | 9,325 | 18 | 12,535 | 6 | 3,750 |
| *Shreveport, La.... | 74 | 333,815 | 72 | 37,690 | 9 | 1,715 | 34 | 8,305 |
| *Tampa, Florida... | 25 | 141,925 | 85 | 37,155 | 2 | 1,025 | 31 | 5,300 |
| *Washington, D.C. | 253 | 2,898,255 | 484 | 328,347 | 66 | 124,120 | 220 | 141,715 |
| *Wheeling, W. Va.. | 35 | 59,511 | 20 | 4,199 | 7 | 1,845 | 27 | 11,017 |
| Wilmington, Del.. | 128 | 439,655 | ..... | ......... | 72 | 573,683 | ..... | ......... |
| | 3,877 | $19,069,984 | 3 671 | $1,624,627 | 1,214 | $ 2.291,589 | 2,086 | $ 668,292 |

* Indicates an increase over last year.

# Read these Facts

# They SLIDE SWING FOLD

This is positively the easiest working Garage Door Set—a simple push and the doors are open; a slight pull and they are closed. There is absolutely no binding or friction. Garage doors hung with this Set will work as freely and easily as any house door.

## NATIONAL GARAGE DOOR SETS

**Nos. 805 or 806**

Equipped with this Set, doors swing into the jamb against stops, the same as in high-class house construction.

Doors are absolutely weather-tight. Snow and ice cannot in any way interfere with opening and closing of doors hung with this new Set.

Free and easy access to garage at all times may be had because one door is so hung that it will open without disturbing the other two doors. Doors are adjustable in case of swelling or raising of cement floor.

*Write for booklet, National Garage Hardware, and give dealer's name.*

**NATIONAL MFG CO. Sterling, Illinois**

# New Catalogs of Interest to the Trade

**242. Du Pont Magazine.** E. I. Du Pont De Nemours & Co., Wilmington, Del.—House organ giving interesting information on products of the Du Pont Company. October issue contains an article on "Cypress and Its Possibilities," the fourth of a series on woods and wood finishing.

**243. Are There Leaks in Your Business?** General Fireproofing Co., Youngstown, Ohio.—Illustrated folder describing application of mastic cement for use on flat roofs, around window heads, flashings, skylights, etc.

**244. Concrete Block Garages.** Portland Cement Association, 111 West Washington Street, Chicago, Ill.—Illustrated booklet showing various types of concrete garages and how to build them.

**245. Light Where You Want It.** General Electric Co., Schenectady, N. Y.—Illustrated booklet describing the Dupexalite, which has a curved metal deflector at the top and a flat glass diffusing disc giving indirect illumination. Illustrations show plans of houses properly lighted and pictures of interiors. Various types of fixtures and their prices also given.

**246. California Redwood for the Engineer.** California Redwood Association, San Francisco, Cal.—Describes redwood, its durability and uses for various kinds of buildings, interiors, etc.

**247. Concrete in Architecture and Engineering.** Portland Cement Association, 111 West Washington Street, Chicago, Ill.—November issue contains articles on essential design for reinforced concrete apartment buildings, sliding forms for monolithic concrete construction, and other information of interest to contractors, architects and engineers.

**248. Redwood Lattice Trusses.** California Redwood Association, San Francisco, Cal.—Folder illustrating construction of redwood lattice trusses.

**249. Waterproof and Wearproof for Permanence.** Advance Waterproof Cement Co., 175 W. Jackson Blvd., Chicago, Ill.—Booklet describing product for the integral method of waterproofing concrete, stucco, plaster, etc.

**250. Photographs of Watertown Housing Project.** Creo-Dipt Co., Inc., North Tonawanda, N. Y.—A number of photographic reproductions of this development done by the United States Department of Labor.

**251. The Interior of Your Home.**—Southern Pine Association, New Orleans, La.—Attractively illustrated booklet showing many interiors of houses; also 'eriors in which Southern pine was used. Gives directions for finishing Southern pine and contains panels showing the grain of the wood.

**252. California Redwood Homes.** California Redwood Association, Exposition Building, San Francisco, Cal.—Booklet showing attractive homes built of redwood, also interiors. Gives interesting data about this wood.

**253. Standard Samson Semi-Trailer Stake Body and Others.** Samson Trailer Corporation, Grand Rapids, Mich.—Leaflets describing various kinds of trailer bodies suitable for contractors' use.

**254. The Heart of the Home.** Holland Furnace Company, Holland, Mich.—Booklet illustrating and describing Holland furnaces; also pipeless furnaces. Specifications are given.

*These catalogs may be secured direct from the manufacturer. If you prefer, write the date of this issue and the number of any catalogs on a postal and mail it to* BUILDING AGE, *243 West 39th Street, New York City. The catalogs will be sent you without charge or obligation.*

**255. Furnace Regulator.** Sahlin Mfg. Company, 41 Ottawa Avenue, N. W., Grand Rapids, Mich.—Booklet describing this device which opens a damper and closes the check at any time desired, thus enabling one to have the house warm upon arising.

**256. Windustite.** American Weather Strip Company, Grand Rapids, Mich.—Blue-printed booklet giving details which show how weather stripping is used on pulley windows, casement windows, French doors, metal windows, etc.

**257. "White-Steel" Sanitary Furniture.** "White-Steel" Sanitary Furniture Company, Grand Rapids, Mich.—Booklet illustrating and describing various kinds of bathroom equipment, medicine cabinets, fittings, mirrors, towel brackets, etc.

**258. Atkins Advertising Service.** E. C. Atkins & Company, Inc., Indianapolis, Ind.—Booklet giving numerous ads furnished by this company to dealers.

**259. Cree-Dipt Stained Shingle Homes.** Cree-Dipt Company, Inc., North Tonawanda, N. Y.—Numerous photographs of attractive houses on which Creo-Dipt shingles have been used.

**260. Micaspar—How to Use It.** Crown Point Spar Company, Crown Point, N. Y.—Booklet describing how micaspar is used as a facing aggregate and effects that may be gained.

**261. Holland One-half Ton Trailer.** Holland Trailer Co., 289 First Street, Detroit, Mich.—Folder illustrating and describing this trailer, with brief specifications.

**262. Making the Store Pay Bigger Dividends.** Holophane Glass Company, Inc., 340 Madison Avenue, New York City.—Booklet describing Holophane system of lighting for show windows, etc.

**263. Beavertone.** The Beaver Board Companies, Buffalo, N. Y.—Wall and ceiling finish for use over Beaver board. Sizing unnecessary. Can be used over new plastered walls, radiator steam pipes, etc. Folder gives colors in which Beavertone comes. Directions for applying are given.

**264. How to Finish California Redwood.** California Redwood Association, Exposition Building, San Francisco, Cal.—Booklet telling how to stain Redwood various colors, using acid stain, oil stains, paint, etc.

**265. Kawneer Store Fronts.** Kawneer Mfg. Company, Niles, Mich.—Booklet illustrating and describing the construction of these store fronts. Many details are given. Details of mouldings are furnished for assistance in selecting the proper mouldings.

**266. Book of Designs.** Kawneer Mfg. Company, Niles, Mich.—Gives many examples of Kawneer window fronts as actually installed.

**267. Contractors' Pumps.** The American Well Works, Aurora, Ill.—Booklet illustrating and describing various types of pumps used by contractors.

**268. Thatch Roofs.** Creo-Dipt Company, Inc., North Tonawanda, N. Y.—Booklet showing homes on which Creo-Dipt shingles have been used to obtain the thatched shingle effect. Some of the houses are illustrated in colors.

**269. Scientific Industrial Illumination.** Booklet No. 163. Holophane Glass Company, 340 Madison Avenue, New York City.—Illustrated booklet describing how shadows may be avoided and better lighting secured by Holophane system of illumination. Table of metric system and legal equivalents given, also table of conduit sizes for different size wires, etc.

**270. Cresmer's Orificed Reinforced Concrete Construction.** J. H. Cresmer, 1615 Park Avenue, Riverside, Cal.—Booklet describing the manner in which this system of concrete construction is done, various steps being illustrated by photographic reproductions.

**271. "Lightning" Loader Skip.** The Heltzel Steel Form & Iron Company, Warren, Ohio.—Leaflet describing this device which enables trucks to be loaded up more quickly.

# REAL HELPS *for* ARCHITECTS

## This EIGHTY PAGE BOOK

LOOK FOR THIS TRADE MARK ON EVERY SHEET.

Packed full of interesting illustrations and information.

It contains over sixty pictures of Dwellings, Hotels, Churches, Libraries, Schools, Clubs, Garages, Office Buildings, Railway Stations, Ferry Houses, Docks, Piers, Court Houses, Prisons, Armories and other Public and Private Buildings successfully roofed with Tin.

Other illustrations and text tell how Tin Roofing should be laid, accompanied by tables for estimating and other useful information.

The carefully prepared illustrations and text, dealing with the value of Tin Roofing as a *protection against the spread of fire,* are exceptionally interesting and convincing to the man who is about to build. Your client should have a duplicate of your copy *which we shall be glad to send him on request.*

This book coupled with the "SERVICE SHEETS" shown on the opposite page form the most complete and useful information ever published on the subject of *Tin Roofing,* and will be sent free on request while the Edition lasts.

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Give large sized *details* of the construction and application of Tin Roofing to Decks, Domes, Dormers, Ridge, Mansard and other types of roofs, with many specialties of hip, valley and gutter construction.

Also shows the method of making flat and standing seams and various types of ribs over battens. All accompanied with *sample specifications* and *tables of covering capacities.*


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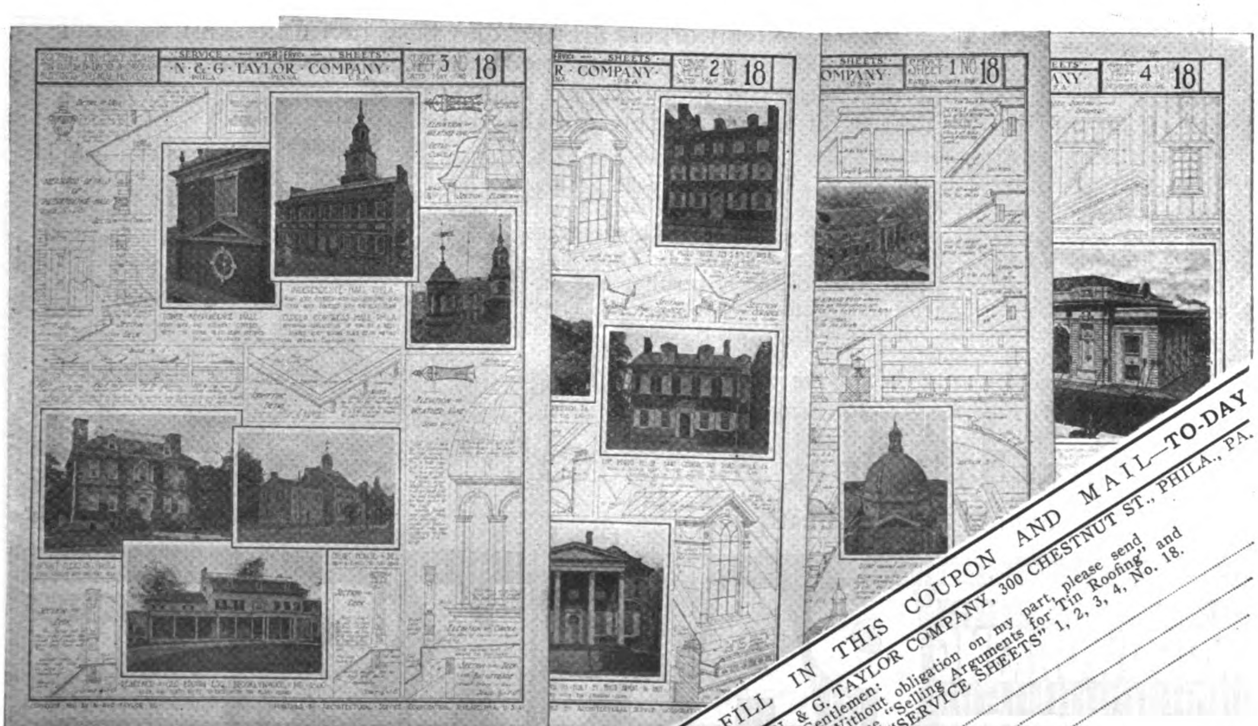
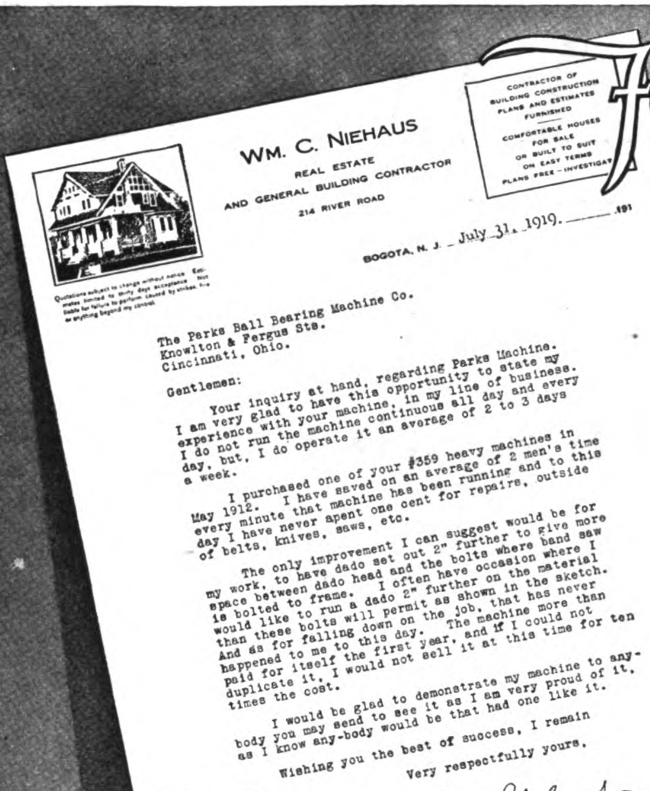



FILL IN THIS COUPON AND MAIL—TO-DAY

N. & G. TAYLOR COMPANY, 300 CHESTNUT ST., PHILA., PA.

Gentlemen:
Without obligation on my part, please send me "Selling Arguments for Tin Roofing" and "SERVICE SHEETS" 1, 2, 3, 4, No. 18.



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REAL ESTATE
AND GENERAL BUILDING CONTRACTOR
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CONTRACTOR OF BUILDING CONSTRUCTION
PLANS AND ESTIMATES FURNISHED
COMFORTABLE HOUSES FOR SALE OR BUILT TO SUIT ON EASY TERMS
PLANS FREE—INVESTIGAT

BOGOTA, N. J. July 31, 1919. 191

The Parks Ball Bearing Machine Co.
Knowlton & Fergus Sts.
Cincinnati, Ohio.

Gentlemen:

Your inquiry at hand, regarding Parks Machine. I am very glad to have this opportunity to state my experience with your machine, in my line of business. I do not run the machine continuous all day and every day, but, I do operate it an average of 2 to 3 days a week.

I purchased one of your #359 heavy machines in May 1912. I have saved on an average of 2 men's time every minute that machine has been running and to this day I have never spent one cent for repairs, outside of belts, knives, saws, etc.

The only improvement I can suggest would be for my work, to have dado set out 2" further to give more space between dado head and the bolts where band saw is bolted to frame. I often have occasion where I would like to run a dado 2" further on the material than these bolts will permit as shown in the sketch. And as for falling down on the job, that has never happened to me to this day. The machine more than paid for itself the first year, and if I could not duplicate it, I would not sell it at this time for ten times the cost.

I would be glad to demonstrate my machine to any-body you may send to see it as I am very proud of it, as I know any-body would be that had one like it.

Wishing you the best of success, I remain

Very respectfully yours,

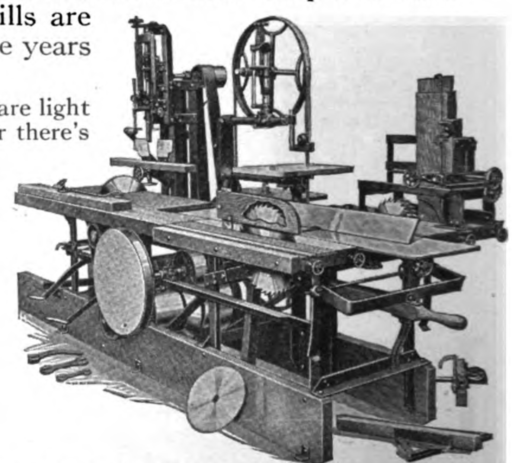
Wm C Niehaus

# For 7 Years he has saved 2 men's time every minute the machine has run —

*ILLUSTRATED below is the Planing Mill Special which is 8 machines in one. It combines Double Table Rip and Cross-cut Saw, Swing Cut-Off Saw, 12-inch Jointer, Tenoner, Upright Hollow Chisel Mortiser and Borer, Reversible Spindle Shaper and Sanding Machine. 550 r.p.m. 4-5 h.p.*

TWO MEN'S wages for seven years amount to—how much? Figure it out. Add to this the actual work turned out by the machine in that time—the better, quicker and more profitable work.

Parks Woodworkers are the one best investment a Carpenter can make. They pay their cost and earn their keep and then some. They never fall down on the job. Repair bills are practically nothing. You get real service through the years —the kind you appreciate.



Parks Woodworkers are built to do their work well. They are light but not too light. They are low in price but not too low for there's too good stuff in them to make them cheap. They can be carried from job to job—used winter and summer. They double and treble a man's productive capacity turning out exterior mill work, interior trim and dimension material. They save materials you would otherwise throw away.

*Get our Catalog and know the many wonderful features of the Parks Planing Mill Special.*

## The Parks Ballbearing Machine Co.

Station A, Cincinnati, Ohio

# WOODWORKING PARKS MACHINES

# How to get Workmen's Compensation Insurance that Reduces your Costs on Jobs

ARE you getting a return each year of 30 per cent of your annual premium?

Are you getting a reduction in the number of accidents—or a reduction in your insurance rates?

If not—you are losing a considerable portion of every dollar you pay in compensation premium.

You can buy, at actual cost, protection which includes such service.

You can obtain it in the Liberty Mutual—a mutual, co-operative organization of over 4,000 of the biggest and highest-rated contracting and commercial concerns in the United States.

The Liberty Mutual has paid back to its policyholders more than $3,000,000—30 *per cent of the yearly premiums.*

And it maintains an accident-prevention and educational service which has reduced premiums of its policyholders from 20 to 50 per cent. Here is what one prominent contractor has saved:

NEW ENGLAND CONTRACTOR RATE REDUCED 33.2 PER CENT

1916—accidents on jobs reduced 22%
1917—accidents on jobs reduced 54%
1918—accidents on jobs reduced 66%

*In addition* to this 33.2 per cent rate-reduction, this contractor received a *cash dividend* of 30 per cent of his premium. His insurance cost is now less than half what many other contractors are paying to stock companies that have stockholders' profits and agents' commissions to pay.

This accident-prevention service effects reduction of time-losses, which often saves in dollars and cents more than the total cost of the insurance.

It is needless to point out what such a saving in this labor-cost item means in competitive bidding—*vastly lower figures without a cent cut from profits.*

Get the *facts* about Liberty Mutual protection. Ask us about the concerns in this mutual organization—such concerns at Fred T. Ley & Company, Inc.; Norcross Brothers; Roydhouse Arey Company; Hugh Nawn Contracting Company; McClintock-Marshall Company. Ask us how our *reinsurance* gives strongest known protection; and other features of this better form of compensation protection.

Write, phone, or mail coupon to our nearest district office. Not the slightest obligation is thus incurred.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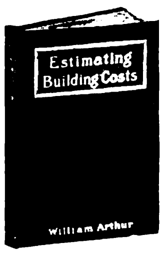
**WORKMEN'S COMPENSATION, PUBLIC LIABILITY, AND AUTOMOBILE INSURANCE**

# A List of "Guaranteed" Books on Building

## Money Back If They Are Not Satisfactory

### Arthur's Estimating Building Costs

This book contains unquestionably the biggest dollar's worth of information ever put on the market. The builder who starts contracting does not treat himself squarely if he fails to purchase the experience of many contractors in all lines of building work. It is all well enough and necessary to get experience of our own; but to fail to get that of others, when it may be had at a low price, is unwise.




In modern engineering, architectural, and contracting offices there is not time to teach estimating to young workers. They are supposed to know something about the fundamentals, just as they know that there are 27 cubic feet in a cubic yard. If they do not know they must, at least, be able easily to find the information. The Index of this book is arranged to serve them. Why get "stuck" when an investment of $1 will save you and probably your job? You may not know how much material you actually need to send per cubic yard of concrete at various proportions, but if you can turn to the table that gives the quantities you are not apt to be hindered. It is almost as important in our day to know where to find information as to know it without the book.

Quite frequently people come into a lumber office and ask what amount of material is required for certain parts of a building. The lumberman often knows, but sometimes forgets. This book, Estimating Building Costs, gives quantities for all purposes. If a customer has received the wrong kind of information and has taken home too much material he is displeased, because he has spent more than he needed to, while if he did not get enough material and has to return for more, he feels just as sore about it. Is it worth while to run the risk when a dollar will give certainty?

It should be remembered that this book is based on work actually done, and time taken. Different conditions change the necessary labor time, as excavating in frost compared with the work in summer; but a fair average can always be made out if we know what others have actually done.

This book is arranged to be of great service to builders, contractors, students and instructors. Each chapter has a series of questions for a test of progress. The Key is printed at the end of the book. In technical classes of colleges and Y. M. C. A.'s this feature will be appreciated. For certain requirements Estimating Building Costs is a superior book to even The New Building Estimator. It is written on simpler lines, and is new from title page to the end.

The book begins with the excavation, and ends when the house is finished. The chapters are: Excavations and Piling, 7; Concrete, 18 pages; Brickwork, 24; Stonework, 7; Plastering, 5; Metal, 9; Roofing; Painting, 9; Plumbing and Heating, 7; Miscellaneous includes Hardware, Electric Wiring, Tiling, Bonds, Tables, Rafters, Cisterns, Weights, Comparisons of Cost between Brick and Frame Buildings, 18; and a final chapter entitled, Hints on Drawing, taking up 41 pages.

**218 Pages. 4½ x 7 in. 29 Figs. 91 Tables. Leather $1.50**

### Hicks' Specification Blanks for Frame or Brick Buildings

It pays to have definite specifications covering all details of the work when preparing your estimates. These new blanks are arranged to cover all the work apt to be called for in erecting residences, churches, schools, and other small public buildings in various sections of the country. All the user has to do is insert his sizes, quantities, etc., and cross out what he does not want. Plenty of space is left at the end of each specification for extra data.

The Carpenter's Specifications cover: Framing Lumber; Joist Spacing; Doubling; Bridging; Rough Floors; Sheathing; Roof Sheathing; Shingles; Tin Roof; Slate Roof; Other Roofs; Paper; Siding Outside Finish; Porch Finish; Frames; Windows; Special Glass; Doors; Finish Floors; Interior Finish; Thresholds; Front Stairs; Rear and Attic Stairs; Cellar Stairs; Medicine Cabinet; Pantry; Closets; Mill Work.

**8 Pages. 7 x 10 in. Paper, 25c., $2.50 per Dozen**

### Hicks' Estimator's Price Book and Pocket Companion

This, as its name indicates, is a guide to prices of all kinds of building materials, together with handy rules, tables and general information for the architect and builder. Almost everything required in the construction of the ordinary building has been considered together with average market prices. The items have been arranged in such a way as to enable the estimator to readily find what is wanted both in regard to size, weight and prices. The work is designed to supplement that section of "Hicks' Builders' Guide" which relates to estimating with a more comprehensive reference to prices and material and labor. Ample spaces have been left throughout the work for the insertion of local prices, memoranda, etc. It may, therefore, be used with equal advantage in any section of the country. The entire matter has been classified according to the nature of the work and it will be found of unusual interest and value to the practical estimator, contractor and builder.

The work is of a size to be readily carried in the pocket, and the 14 pages of cross reference index will be found a most convenient feature for the man in a hurry to find a specific matter.

The chapter on Carpentry gives the number of board feet and cost of framing lumber per square of 100 sq. ft., and many valuable tables, including timber measure, common and hip rafters for roofs of various pitches and with from one to eighteen feet run, the safe bearing loads of timber and yellow pine posts. Reliable data on figuring the strength and weight of materials is also given.

**Contents.**—Introductory; Preparing Estimates; Excavating; Stone Work; Plain Concrete; Reinforced Concrete; Concrete Cement Stone; Cellar Bottoms and Walks; Brick Work; Hollow Building Tile; Masonry Tables: Estimators' Guide; Plastering; Carpentry; Iron Work; Sheet Metal and Roofing; Plumbing; Heating and Ventilation; Electrical Work; Tile Work.

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### Hodgson's Estimating Frame and Brick Houses, Barns, Factories, Stables and Outbuildings

It tells how to estimate, step by step, the cost of labor and materials, from the work of excavation for the foundation to the finishing of the building. It gives a careful analysis of each item of cost in construction, all being demonstrated in progressive order, and by means of figures and rules.

These methods of figuring costs are brought out in the clearest and simplest manner, and may be applied in estimating the cost of constructing any dwelling, stable, barn or outbuilding.

The author has endeavored to make this book so general in its scope that the builder living in any part of the United States will find it of great service in getting the actual cost of the different items in builders' work.

**Contents.**—Order in Estimating; The Frame Construction; Interior and Exterior Trim; Stair Work; Plastering; Painting; The Cellar; The Superstructure; Rough Lumber Required; Plastering for Brick House; External Wood Finish; Inside Finish; The Kitchen; The Conservatory; Estimating Brick Work; Estimating Cost of a Stable; Estimating a Barn; Details in Estimating; Form of Tender.

**252 Pages. 5 x 7 in. 25 Figs. Cloth. $1.00**

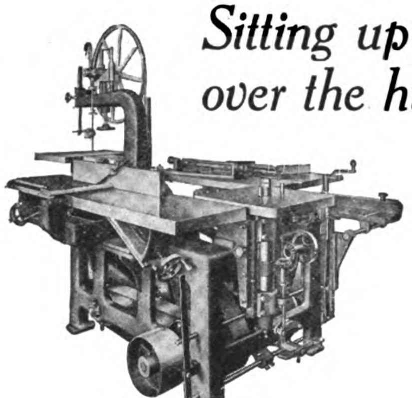
### Maginnis' How to Measure up Woodwork

This book was written so as to place in handy and concise form reliable directions to enable builders and mechanics to measure up the quantities of woodwork for brick and frame houses accurately and without hesitation.

**Contents.**—Measuring Window Frames and Sashes; Door Jambs, Base and Trim; How to Measure Up Wainscoting; Getting Sizes of Doors; Finding Dimensions of House Fixtures; Determining Sizes and Quantities of Portiere Screens, Transoms and Mouldings; Measuring Up Stairs, Balustrades and Handrails; Inside and Outside Blinds; How to Figure Up Rough Timber for Frame Buildings; Miscellaneous Information.

**79 Pages. 4¾ x 7¼ in. 161 Figs. Cloth. $0.50**

**Sent prepaid by U. P. C. Book Co. Inc., 243 West 39th Street, New York**



## *Sitting up nights poring over the high cost of production isn't going to get the results you are looking for*

On your choice of machinery depends largely your success or failure. You cannot expand your business if the productive power of your machinery is limited.

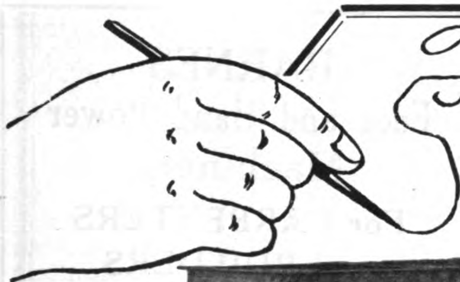
PROMINENT CARPENTERS AND BUILDERS
have found that the first step toward big business and big profits is the installation of dependable, efficient, quantity producing machinery.

FAMOUS WOODWORKING
double the work with no extra labor. They enable you to handle a greater variety of work. They give you all the speed you can possibly use, winter or summer. They save actual cold cash for their owners. They pay a handsome profit straight through the winter.

*If you haven't the complete details of our new proposition you're missing a real opportunity.*

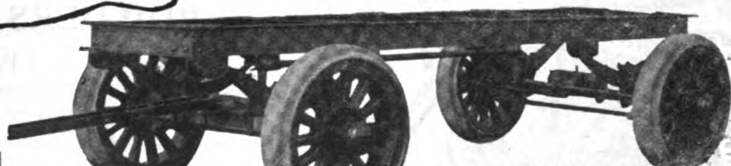
**The "famous" woodworker**

**The Sidney Machine Tool Co.**
**Sidney, Ohio**



## *Figure your Hauling Costs*

No matter how efficient your workmen are and how fast they work, they would earn more for you if there were no loss of time in transporting your lumber and material.



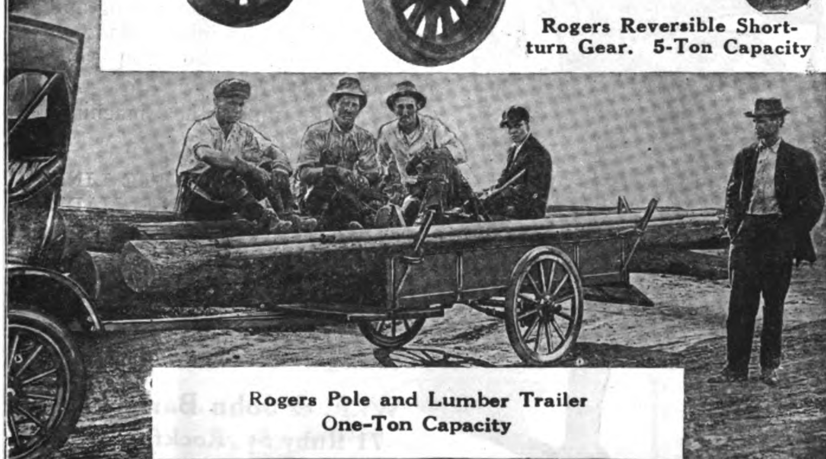
**Rogers Reversible Short-turn Gear. 5-Ton Capacity**

You don't have to buy another truck, a trailer doubles your hauling power.

A Ford car or any inexpensive automobile and a Rogers Light Trailer will do the trick just as well.

For heavier hauling there is a trailer that will exactly suit your needs.

Rogers Trailers are All-Steel. They are made to stand hard usage.



**Rogers Pole and Lumber Trailer One-Ton Capacity**

*Ask for Catalogue A*

**ROGERS BROS. CO.**
**Albion, Pa.**

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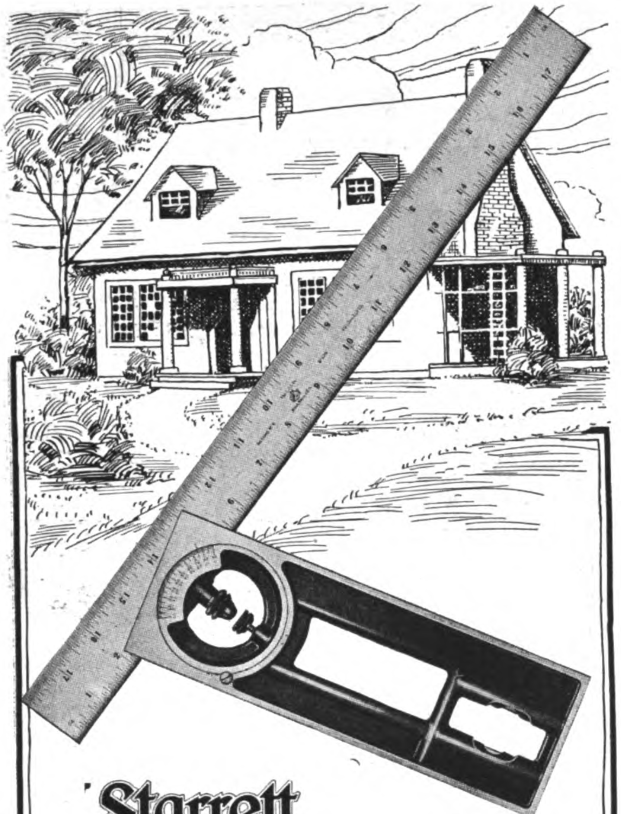

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Make it easier to do good work.

For instance, the Starrett Builder's Combination Tool combines seven ordinary tools — a rule, square, level, protractor, bevel, pitch-to-foot indicator and plumb. It makes it easy to lay out valleys or hips of different pitches. When used as a try-square, the blade can be shortened to meet obstructions. In any kind of laying out it saves time and calculations—and it weighs less than three pounds.

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42-997

# National Conference on Concrete House Construction

## Feb. 17-18-19, 1920

**Auditorium Hotel, Chicago**

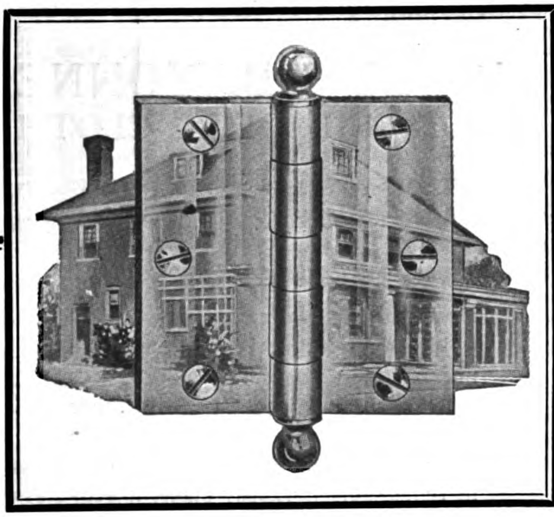
**COME** to help plan a solution of our national housing situation.

**COME** to see and hear how concrete houses will help in this solution.

**COME** to tell about the concrete houses you have designed or built.

RESERVE THESE DATES

*Write the Secretary*
111 West Washington Street, Chicago
*for Program*



Your

# ATTENTION!!

is called to the hinges on the door. To some people door hinges may seem rather small and unimportant—nevertheless, their mission in helping to make or mar the appearance of the rooms in a modern home is worthy of serious thought. The

## GRIFFIN

**"The Door Butt of America"**

is designed along lines that insure both beauty to the home and *service* whenever the doors are opened and closed.

The Griffin operates freely and easily, it is amply strong for heavy doors and it is such a pleasing fixture that architects and home builders are glad to specify and use it.

Being finished in the various Griffin hardware finishes, it is in wide demand for the better class of houses and office buildings.

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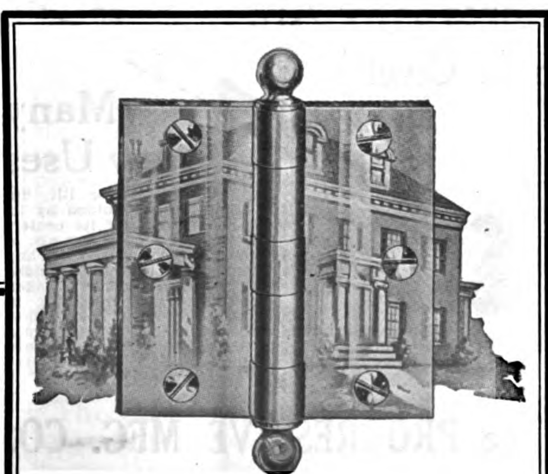


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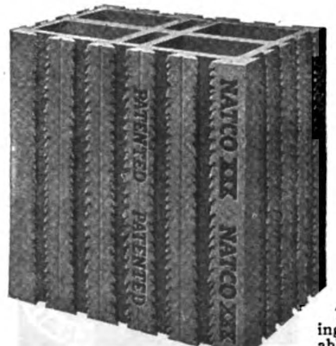
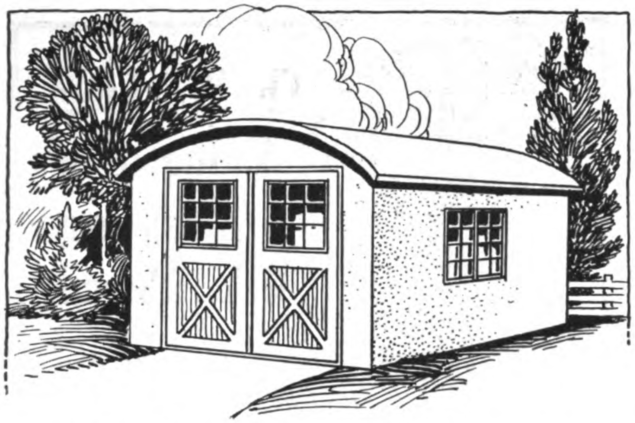



T—3

# NATCO

***"Made the Skyscraper Possible."***

**The co-operation of our engineering department is at all times available. Put your construction problems up to these men of specialized experience.**



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- Walkway
- Driveway
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- Garages
- Spring House
- Small Dam
- Milk House
- Ice House
- Manure Pit
- Septic Tank
- Oil Storage Tank
- Tennis Court
- Concrete Roof
- Greenhouse
- Gate Posts
- Overcoating of Old Dwellings
- Barn and Silo
- Corn Crib
- Storage House
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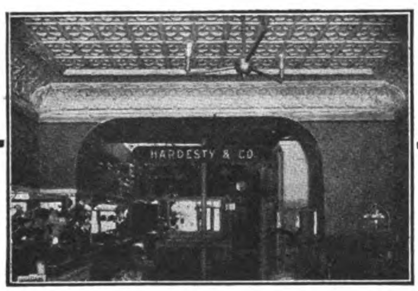
## Get in the Weatherstrip Business

Every day this Winter you can make a good steady income by selling and installing weatherstrip. Hundreds of home owners in your locality will actually need it—to save fuel and to provide against the prevailing coal shortage. Start today to get your share of this business. Ask us for complete details of our weatherstrip and how we assist you to make sales.

**Allmetal Weatherstrip Co.**
**122 Kinzie Street**
**CHICAGO**

Home at Pendleton, Ind., equipped with Allmetal Weatherstrip. How many similar homes in your locality need weatherstrip?

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The demand for Edwards' Metal Ceilings and Walls isn't coming—**it's here now!** Thousands of home owners and home builders are reading our advertisements in the leading magazines. We **must** have more agents. Our product is **right.** Our prices are **right.**

***Write for Territory***

**It's going to be a case of "first come, first served" with favors to no special one. Right now the territory is being snapped up. Don't wait. One day's delay may mean that some one else will be given your territory. Don't delay; write today for new Ceiling catalog and special agent's proposition.**

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The World's Largest Manufacturers of Metal Roofing, Metal Shingles, Metal Spanish Tile, Metal Ceilings, Metal Garages, Portable Buildings, Metal Lockers, Rolling Steel Doors, Partitions, etc.

Richard Ott, Berger Ceiling Erector, says: "I've handled a good many kinds of ceilings in the past 6 years and I'll say

"BERGER'S Classik" STEEL CEILINGS

are the best. They aren't flimsy and never sag in the middle like some ceilings. And the designs stand out so clearly and every plate has a *real* coat of paint on both sides.

They sure make a fine looking job—the kind I'm always proud of.

*If you've never seen a Berger Ceiling, then write today for Booklet* D-13.

**The Berger Manufacturing Company**
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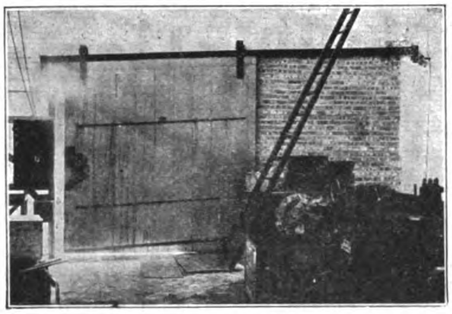
**FIRE DOORS SAVE $1,500,000.00**



On the opposite side of the wall from the door shown above, property worth $500,000.00 was destroyed by fire at the Universal Tractor Works, Moline, Illinois, Sunday evening August 24, 1919.

**RICHARDS-WILCOX**
**AUTOMATIC FIRE DOORS AND HARDWARE**

including the door in the illustration, stopped the conflagration and saved $1,500,000.00 worth of property.

RICHARDS-WILCOX R-W AURORA TRADE MARK

***Write for illustrated book N. A. 14 "Richards-Wilcox Fire Door Hardware"***

**Richards-Wilcox Mfg. Co.**
A Hanger for any Door that Slides
AURORA, ILLINOIS, U.S.A.
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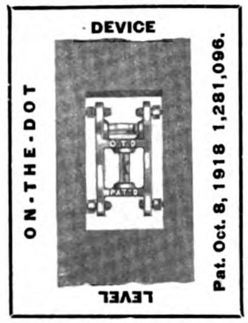
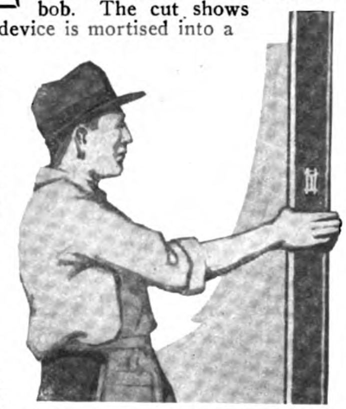
# ON THE DOT
## LEVEL DEVICES




This remarkable little leveling device is just the instrument carpenters, builders and mechanics have long been waiting for.

Where the job requires a level bar of considerable length and absolute accuracy, O-T-D level devices are of particular advantage.

O-T-D is a small instrument about three inches in length that can be mortised into any board (picked up on the job) making a perfect level or plumb bob. The cut shows how the O-T-D level device is mortised into a board of any length desired and is adjusted by four set screws—one at each corner—which hold it firmly in place.



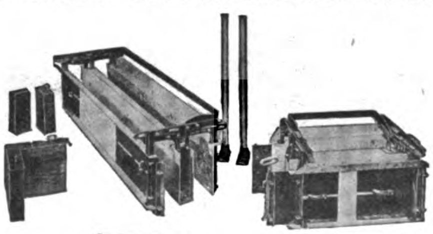
O-T-D does away with the old-fashioned inaccurate plumb bob—saves time and trouble and makes for speed and accuracy.

**Price $3.00 at your dealer or direct**

*Write us today*

**CHAS. M. NEIMES SALES COMPANY**
**30 North Dearborn Street**
**CHICAGO, ILLINOIS**

# Van Guilder Outfit
**for building reinforced concrete**
## Double Monolithic Walls



**Our Patent Angle Iron Corner Guides make absolutely plumb and true corners; they are a wonderful time saver.**

The window frames are set in place and cemented tight, with air space brought up to frame by the sliding plates on sides of machines—no solid wall anywhere to carry dampness through.

Our wonderful New Window Machine gets into all the small places and short angles, and follows complex architectural designs. Our special exclusive features are time and money savers, and are worth the cost of our entire system.

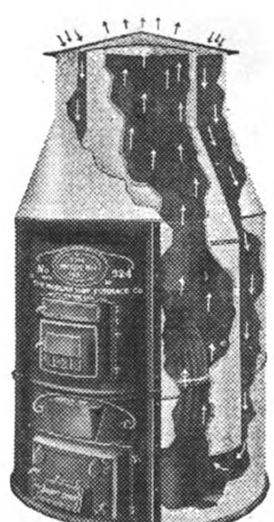
## BUILD ANYTHING

**from cottage to mansion; chicken house to full dairy plant including Double Wall Silos that will not freeze; garages, factories, theaters; triple wall store houses and cold storage plants. Concrete construction at the cost of wooden buildings and even less.**

**VAN GUILDER DOUBLE WALL CO., Inc.**
**20 Wagner Bldg. Rochester, N. Y.**
***"Built Like a Thermos Bottle"***

# "We Used Far Less Coal and Had Splendid Heat"

one of the remarks you often hear from home owners after a Winter's experience with the



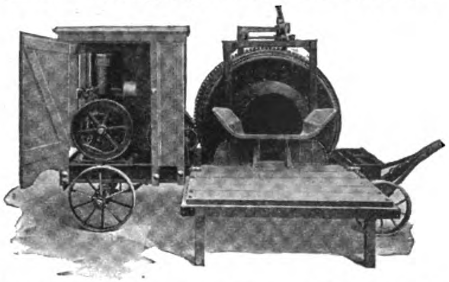
## MODERN WAY PIPELESS FURNACE

**It is all in the simple, scientific construction, and wide awake contractors and builders are realizing more and more that this is the furnace that absolutely fulfills all claims and delivers the goods. Made in several sizes for bungalows, large residences, schools, etc. If you are of the hustling type and want to boost your income, write for literature and details of our business-building agency plan.**

**Modern Way Furnace Co.**
**Ft. Wayne, Ind.**

# "THE STANDARD"

## Low Charging Concrete Mixers



## Increase Production—Cut Costs

Speed and thorough mixing are the most important points to be considered when you are in the market for a concrete mixer. The faster you can place thoroughly mixed concrete, the more money you will make on the job.
"The Standard" Concrete Mixer is adapted to every sort of a building project.
In addition to Concrete Mixers, "The Standard" line includes Hoists, Pumps, Air Compressors, Wheelbarrows, Engines, Block Machines—everything needed by the contractor.

*Ask for Catalog No.* 48 *and specify the particular items in which you are interested.*

**The Standard Scale & Supply Co.**

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| **Pittsburgh** 1631 Liberty Ave. | **New York** 145 Chambers St. | **Chicago** 163-171 N. May St. |
| **Philadelphia** 523 Arch St. | **Cleveland** 1547 Columbus Rd. | **Baltimore** 409 N. Gay St. |

# "CREO-DIPT" Stained Shingles

## Build Now *and* Build to Endure

Your selection of building material for side walls as well as roofs is important **now** to insure delivery.

All authorities agree that the housing demand must be satisfied. You can not afford to postpone building, especially if simply awaiting lower prices.

Offset high prices by using "CREO-DIPT" STAINED SHINGLES on side walls and roofs. They come creosoted, stained, bundled, ready-to-lay without waste. Save painting and repair bills. Afford delightful architectural and color effects that are permanent.

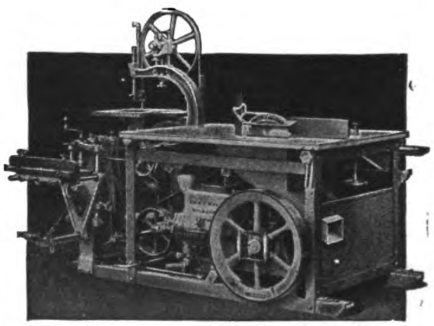
Write today for Portfolio of Holmes and Sample Colors on Wood. Ask about "Dixie White" and 24" Shingles for side walls. If interested in "Thatched Roof Effects," ask for book.

**CREO-DIPT COMPANY, Inc.**
**1030 Oliver St. No. Tonawanda, N. Y.**

Home of Thomas L. Hickey
South Bend, Ind.

C H & E

# C. H. & E. Portable Saw Rigs



**No. 6 Portable Saw Rig**

A complete combination woodworker with engine or electric motor "built in" and under the table. Write for price and large new catalog just off the press.

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ALLIED — ALLIED CONSTRUCTION MACHINERY CORPORATION — ALLIED

**DON'T let your handiwork fade into mediocrity. Have Bay State Brick and Cement Coating rescue the walls from ruinous weather. To old buildings of brick, concrete or stucco, "Bay State" can bring back the bloom of youth and the vitality to *ward* off wet weather.**

Bay State Coating comes in white and a variety of charming tints.

Our Book No. 19 and samples will be gladly sent to you.

**WADSWORTH, HOWLAND & CO., Inc.**

*Paint and Varnish Makers*

**Boston, Mass.**

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The Bay Stater

## A Low-Priced Timkin Bearing Light-Running Holland Trailer

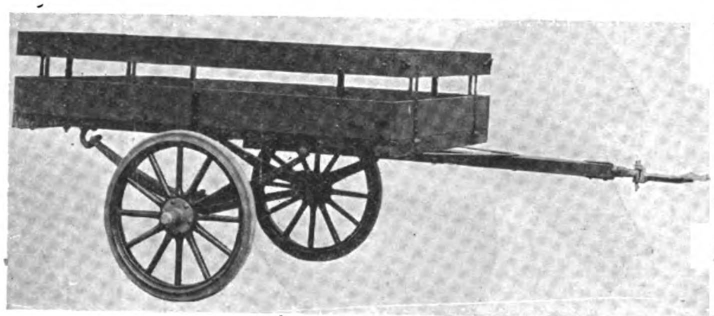
May be attached to either an automobile or truck.

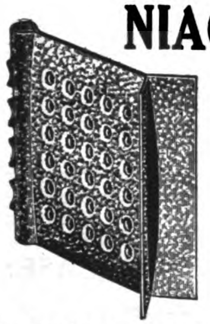
Will handle a half ton of building material, tools or supplies at a minimum expense. Durable and inexpensive.

*Write for Catalog A*

**HOLLAND TRAILER CO.**

**289 First Street** **Detroit, Mich.**





## NIAGARA JUNIOR WALL PLUGS

**Will last with the building.**

**Take a nail to perfection.**

**NIAGARA FALLS METAL STAMPING WORKS**

**239-241 Tenth Street** **Niagara Falls, N. Y.**

## The Lunken Unit-Window

Completely assembled. The frame forms a safe shipping package. The glazed and weighted sash and copper-cloth fly-screens are in the boxhead. Sash and sill are primed. Hardware and weatherstripping are applied. A time-saving, money-making innovation in building construction. Send for interesting literature.

**The Lunken Window Company**

*Unit-Windows*

**4026 Cherry Street** **Cincinnati, Ohio**

***(Copyrighted, 1918, A. E. CHAPPELL)***

The WAYVELL CHAPPELL AUTOMATIC BALL BEARING ELECTRIC FLOOR SURFACING MACHINE is what you need to finish your new or old wood floors *quickly* and just the way you want them.

Patented roller eliminates vibration, also reaches all baseboards, doing away with unsatisfactory work of narrow edge roller.

Pat. 1912-1916

Four sizes—for the largest areas or the smallest rooms. Built to last.

The LITTLE AUTOMATIC ELECTRIC SURFACING MACHINE (on desk) is a wonder for removing varnish from desk tops, counters, etc., or for new work.

Write for folders.

*Accept Our Free Trial Offer.*

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Manufactured by

**Wayvell Chappell & Company**

**410 W. Grand Ave.—Telephone Superior 6864—Chicago, Ill.**

## HESS SANITARY LOCKER

MEDICINE CABINET

The Recessed Steel Medicine Cabinet

**The Only Modern, Sanitary**

**STEEL Medicine Cabinet**

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimming. Steel or glass shelves.

**Costs Less Than Wood**

Never warps, shrinks nor swells. Dust and vermin proof, easily cleaned.

**Should Be in Every Bath Room**

Four styles — four sizes. To recess in wall or to hang outside.

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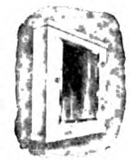
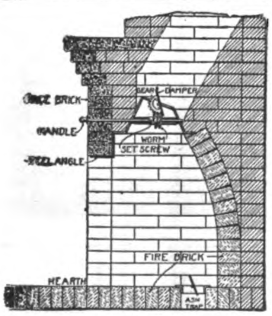


The Outside Steel Cabinet

**HESS, 1201-L Tacoma Building, Chicago**

*Makers of Steel Furnaces. Free Booklet.*




## Builds the Fireplace Right

Don't try to reduce the cost by leaving out a good damper. It results in an expensive fireplace to operate and allows rain, wind, birds and other objectionable things to enter the room when the fireplace is not in use.

Stover Dampers support the brick work, form a smooth throat, regulate the draft perfectly, and reduce the labor cost of erecting fireplaces.

The price is low enough so a Stover Damper can be used in every fireplace. Made in several styles for all size openings. The improved style shown above is one of the most popular.

No. 16 Improved Style Made in 7 sizes

Send for catalog No. 1740 showing our fireplace fixtures and giving information as to the best fireplace construction.

We also make windmills, feed mills, gasoline engines, hinges, pulleys, saw vises, latches, sink brackets and other hardware.

**STOVER Mfg. & Engine Co.**

**Freeport, Illinois**

**Stover Mfg. & Engine Co., 747 East St., Freeport, Ill.**

**Send us Catalog 1740.**

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## CALDWELL SASH BALANCES UNIFORM MORTISES


**They have stood the test of time**

***For use in all classes of new work***

**Box frames unnecessary**

**Mortises cut at mill reduce cost of installing. Counterbalance sashes at any given point. They outwear ordinary weights and cords. Unaffected by atmospheric conditions.**

Cheapest method for modernizing old windows, as alterations in sashes and frames are not necessary. Sashes should be weighed before ordering.

***Write for Circular***

**Caldwell Mfg. Company**
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including woodworking plants, pattern shops as well as cabinet and carpenter shops, housing projects, etc., have adopted the 'Wallace Idea'; they take the machines to the work instead of the work to the machines. They have thereby eliminated foot work, saved hand work and have made a tremendous cut in their costs, and have greatly speeded production. It would pay you to investigate this idea thoroughly."

***Address:***

**J. D. WALLACE & COMPANY**
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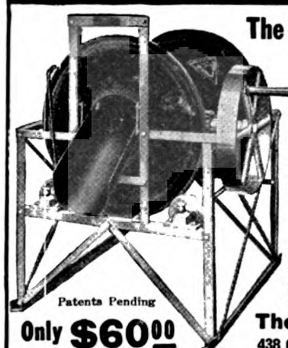
## ONE MAN CAN RUN IT




**The Little Whirlwind Concrete Mixer**
**THE MASTER MIXER**
**From Factory to You—Save 40%**

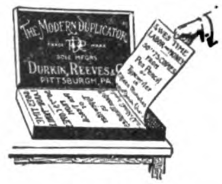
Only ***real practical*** small mixer producing same ***perfect*** work as most expensive big machine. Complete with hand and power drive. A ***winner*** for the contractor or cement worker. ***All steel and iron.*** Just like the big $500 mixers, only simpler. Just the size you need at a price you'd like to pay. Does your work in one-fifth time.

**The Whirlwind Way Makes Mixing Pay**

Saves its cost on one job. Capacity about 3 cubic ft. Mixes a batch a minute. Does PERFECT work, wet or dry, empties clean. Discharges direct to forms, cuts out the wheeling and backache. Satisfaction guaranteed or your MONEY BACK. Reference: Any La Crosse bank or Dun Agency. Write for circular or order direct from this adv. and avoid delays.

**Only $60.00**

**The Little Whirlwind Mixer Co.**
**438 Gould Street La Crosse, Wisconsin**

## 8 MEN CAN'T STICK IT

## At Last! A Very Perfect Duplicator

**"A Business Getter." Print your own Typewritten or Pen Written Letters, Drawings, Lessons, Circulars, Price Lists, Quotations, Music, or anything you write or draw with pen, pencil or typewriter. Every Business and Professional Man should own and operate a "Modern" Duplicator. It will save Time, Labor and Money.**

When you want ten, twenty, forty or more letters or anything of same kind, just write one, put it on the Duplicator and a strong copy is transferred to Duplicator. Remove it and put blank papers on one at a time and print the duplicate (fac-simile) copies in one or more colors of ink at same time. Lasts for years. Can be used several times daily. So simple a child can operate it. Contains NO GLUE OR GELATINE. MONEY-BACK GUARANTEE TO PLEASE YOU. Letter Size, 9x12 inches, complete $5.00—Less **Special Discount** (if ordered direct from this ad) of 10 per cent, or $4.50 net. Booklet of other sizes free. No middlemen. Address the manufacturers.

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## Something For You

in our Pamphlet 29; viz.:

Valuable Tables for finding size of joist, safe load of joist, actual load on hanger, etc., etc.

Some of these Tables are not in print elsewhere.

The Pamphlet and the Mounted Model Hanger will be mailed on request.

SOMETHING FOR US. We ask your special attention to items 5, 6, 7 on page 5 of the Pamphlet and to the matter on pages 23 and 24 relating thereto.

**The W. J. Clark Co.**
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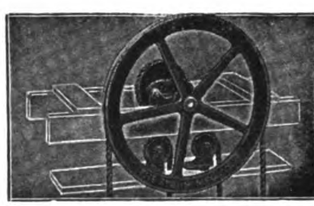
There's beauty and durability and satisfaction for contractor, architect and owner in every brushful of

TRADE MARK **NICE** REG. U.S.A.

**VARNISHES**
**WOOD FILLERS**
**PAINTS, STAINS**

Prices, Samples, Literature on request.

**EUGENE E. NICE, Philadelphia**



**Dumbwaiters *and* Hand Elevators**

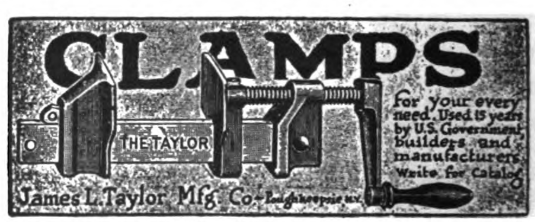
Backed by 20 years of successful manufacture.
Our catalog will interest you.
May we send it?

**The Storm Mfg. Co.**
**52 Vesey St., Newark, N. J.**

## MACK & CO.

YOU will always feel secure when you use Barton Planes and Edge Tools. The making of keen edged tools that hold their sharpness is our hobby. If your dealer won't supply you we will.
There is some mighty interesting and profitable reading in "The Carpenter's Catalog" and "True Stories." Both free, of course.

Brown's Race & Platt St., Rochester, N.Y.




## McCRAY Refrigerators For All Purposes

**OUR CATALOGS are yours for the asking—we want one or all of them in your files—No. 94 for Residences, No. 51 for Hotels, Restaurants and Clubs, No. 74 for Florists, No. 62 for Meat Markets, No. 71 for Grocers and Delicatessens.**

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**964 Lake Street. Salesrooms in all Principal Cities. Kendallville, Ind.**

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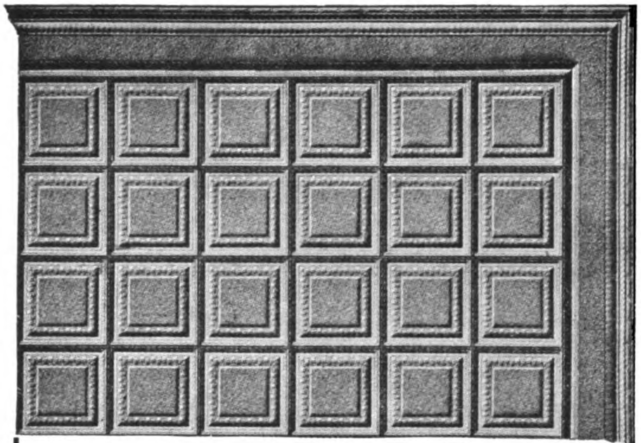
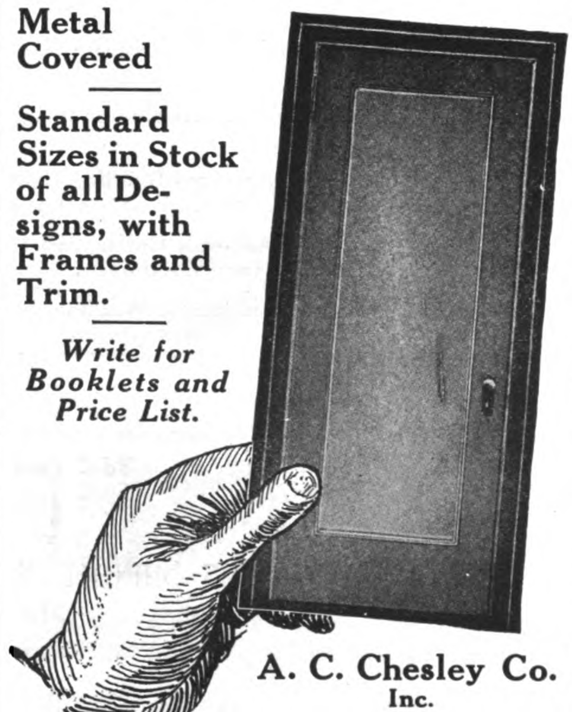


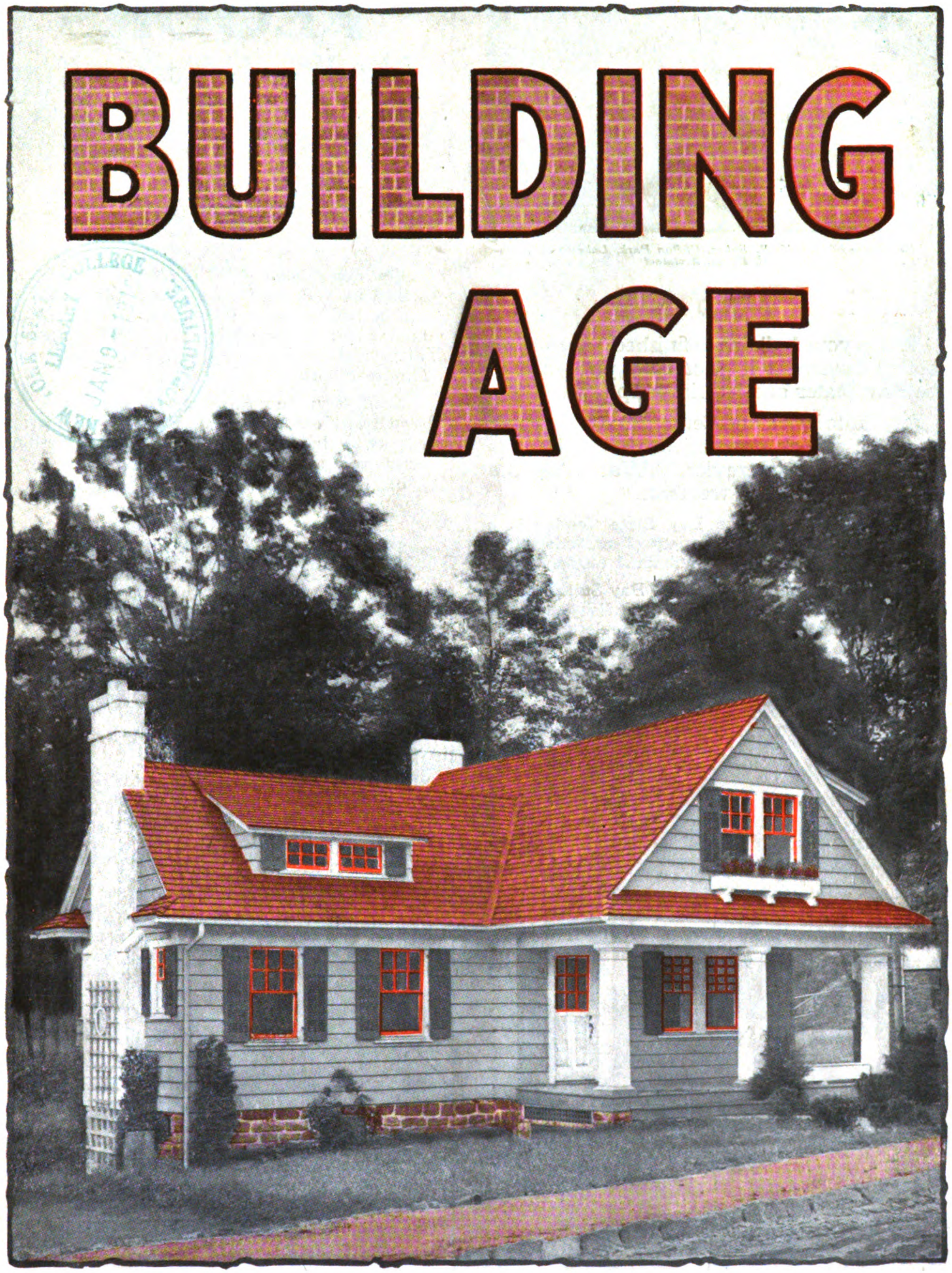






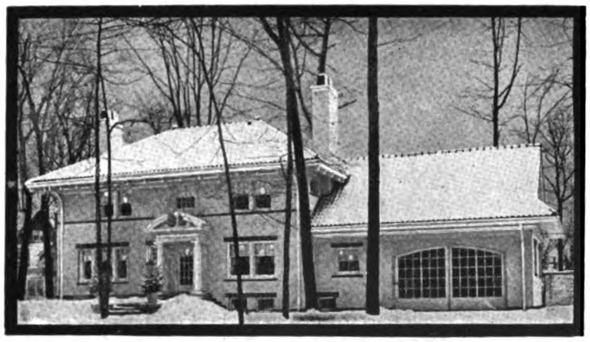


*January, 1919* *BUSINESS PLANNING NUMBER* *Price 25 Cents*




*House at Nepperhan Heights, New York. Philip Resnyk, Architect*

***A Description of this House will be Found on Pages 2-3 of this Issue***



*Residence of Mrs. T. R. Baker, Clifton Park, Lakewood, O.*
*G. B. Bohm, Architect*

## Guardian of Your Buildings

When your building is finished, when from roof to basement it *just* suits you—call in the Bay Stater and let him keep it so.

Bay State Brick and Cement Coating covers up walls of brick, concrete or stucco. It seals every crack and crevice. Wards off the effects of wear and weather.

Besides a preservative Bay State Coating is a beautifier. White and a variety of attractive tints offer a selection that meets individual tastes.

Entrust your handiwork to the Bay Stater's care. Write for Booklet No. 19, which tells you a lot about "Bay State" and ask for a sample which will prove all the book says. Do that today.

*Bay State Cement Crack Filler makes cracks in cement disappear like magic. It makes a patch that shows no seams. A sample will prove it.*

WADSWORTH, HOWLAND & CO., Inc.
*Paint and Varnish Makers*
BOSTON, MASS. New York Office: Architects' Building

## BAY STATE
## Brick and Cement Coating

The Bay Stater

# FLOORS
## *The Wood-Mosaic Kind*

For every home—Old or New. Can be installed by your mechanics. Our 5/16" flooring can be laid in old or new houses. We make all kinds and thicknesses; Wood-Carpet, strips Plain and Ornamental Parquetry, Tongue and Groove Flooring.

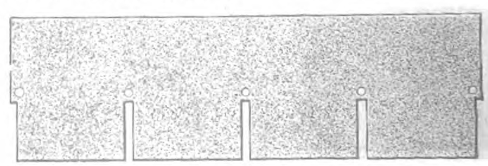
Send accurate measurements of rooms for sketch with exact estimate of cost of the flooring required. Instructions for laying and finishing accompany all orders shipped.

Send for free catalogue in natural wood colors.

**Wood-Mosaic Company**
**New Albany, Indiana**

## "STRIP CITY"

If the total number of REX STRIP SHINGLES we manufactured and sold last year were used in a single community a good size city could be built. Let us call this place "Strip City." The residents would have no roof worries or repair bills because REX STRIP SHINGLES are guaranteed for ten years. No danger from flying brands or sparks. The roofs would all be attractive—some red, others green, and for those who wished something out of the ordinary, mottled. With the fire hazard reduced to a minimum the insurance rates would be lower than in cities having inflammable roofs. Sounds like a rather attractive place to live in, doesn't it?

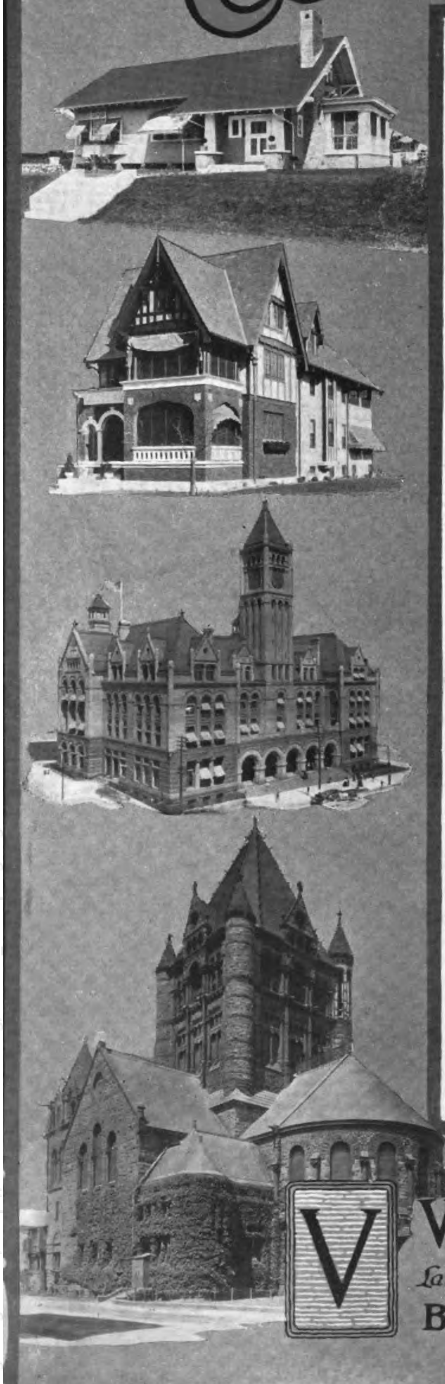


Of course "Strip City" does not exist, but you can have a roof of REX STRIP SHINGLES either over your present wooden roof or on that new home you have been planning to build after the war. You will find them cheaper to apply than individual shingles.

*Send for Catalogue No. 20 descriptive of* REX STRIP SHINGLES *and other* REX PRODUCTS

**The Flintkote Company**
**98 Pearl St., Boston**
**New York Chicago New Orleans**

# Slate Roofs Can't Burn or Wear Out



PREVENTABLE fire losses in the United States in 1916 were $60,-466,054, according to the latest annual figures provided by the National Board of Fire Underwriters.

Of this amount, fires caused by sparks on roofs and defective chimneys and flues totaled $20,079,364, or about 32 per cent.

And this does not include the 1916 conflagrations of Paris, Tex., Nashville, Tenn. and Augusta, Ga., amounting to $17,000,000, and for which shingle roofs were largely responsible.

If it did, the total would be $37,-000,000, or about 60 per cent—mostly due to sparks and flying brands being blown onto combustible roofs.

## Millions Can be Saved

Our fire losses are startling. They are greater than in any other country in the world.

Yet it is within the power of architects, builders and owners to make America practically free from fires that spread from roof to roof.

Slate will do it. And cost need not prevent its universal adoption, because slate is, in the end, the lowest-cost roofing in existence.

Slate *can't* burn, under any circumstances. Nor does it wear out or require repairs. A good slate roof will outlast any building.

Prompt shipment from an average stock of 150,000 squares.

VARIEGATED

DIAMOND

HEXAGON

OCTAGON

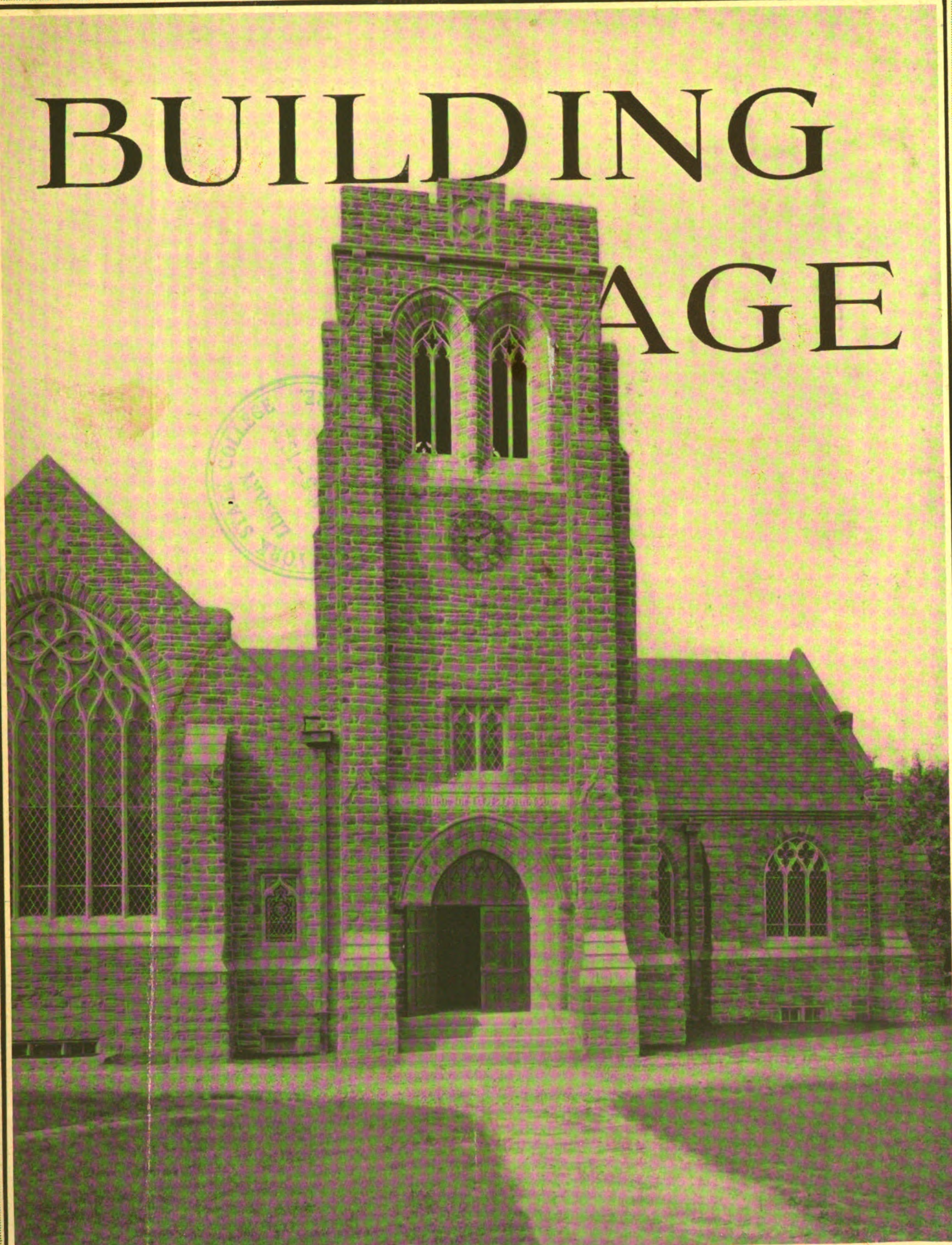
V VENDOR SLATE CO. INC V

*Largest Shippers of Roofing Slate in the World*

BANGOR, PENNSYLVANIA

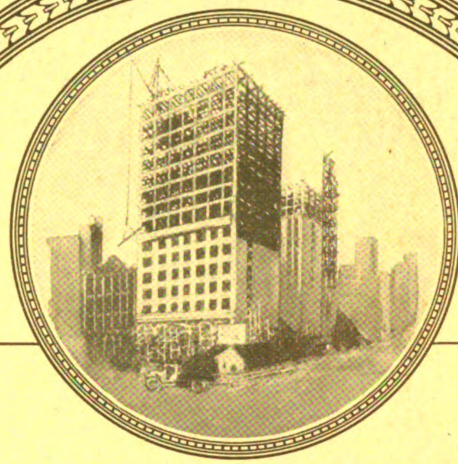
40th Year DECEMBER, 1919 Price, 25 Cents

# BUILDING AGE

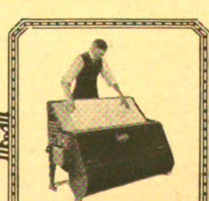


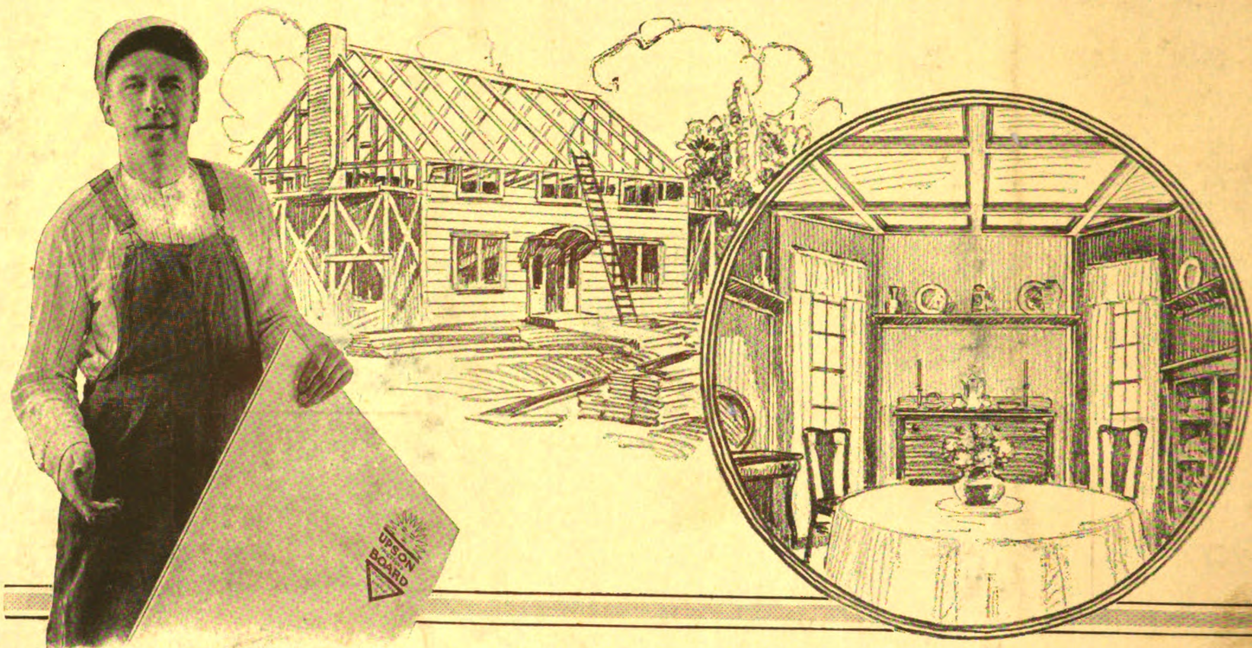
***Presbyterian Church at Lansdowne, Pa. Druckenmiller & Williams, Architects***

*A description of this church will be found on pages 410-416*



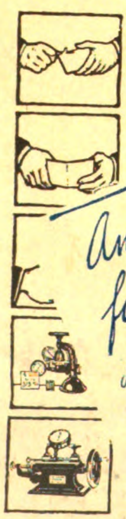






# "The finer the home — the more it needs Upson Board"

***Test Upson Board!***
***Prove its superiority.***



1. Whittle or saw it! It looks, feels and works like lumber.

2. Break it! It's nearly twice … strong as … boards …

… ma- … shows Upson Board has nearly twice the tensile strength of average board.

"IF I had my way, every fine home I build would have walls and ceilings finished in Upson Board.

"It makes the smoothest … test and most perma… and ceilings of … I know of …

"It …

Another of the carpenter-boosting full page ads running in Literary Digest, American Magazine and about 20 other publications.

… of any de… …ons — may run … floor to the ceiling … may be used in combination with frieze or wainscot.

They can be finished in soft, dainty tints or deep, rich shades—with an appropriate stencil. … …d, in some of the …

… deservedly … will recall, … interior … pictured … paneled … hether … wood.

… e

… e finest … of any wall … e market—and a … surface for paint than … ster and other materials.

It is so **good** that many paint manufacturers use Upson Board to demonstrate the quality of their paint products.

***Costs Less to Finish***

Upson Board comes to you surface filled or primed, ready for immediate decoration.

There is, however, no wax or paraffin in Upson Board to cause paint to spot, peel or blister. There **is** in some wall boards.

**Upson Board is cheaper when applied and finished even though it may cost a trifle more at first.**

***Not Like Other Boards***

Impartial tests on official machines show that Upson PROCESSED Board is nearly **twice as strong as other wall boards.**

*Genuine Upson Board has the famous BLUE center and each panel also bears the Upson trade mark on the back.*

Write for samples and booklet. Address The Upson Company, 62 Upson Point, Lockport, N. Y.

UPSON PROCESSED BOARD
THE UPSON COMPANY LOCKPORT N.Y.
TRADE MARK REGISTERED

# UPSON
## PROCESSED BOARD

*Made by the Fibre Board Authorities*

*The Upson Company Lockport, N.Y.*

THE DEPENDABLE BOARD WITH THE FAMOUS BLUE CENTER