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DECEMBER

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Contents for December 1920

Editorial "1921" ........................................ 5

Current Notes and Comments ............................ 6

Erie, Pa., Builder Claims Today's Conditions Favorable to Building. Building Permits Fall Off in Richmond, Va., Despite Large Demand. Open Shop Conditions Foster Harmony in Little Rock, Norfolk, Va., Finds Advantages in the Open Shop. Preparations for Export Trade Stimulate Building in the South.

A Practical Housing Group ....................... 7

Chicago Housing Association backed by public spirited men provides good houses for wage earners at low cost. Good design and permanent materials insure lasting value.

How's Business? ........................................ 13

By R. E. Dockham

A little "ginger" talk by a practical member of the building trades. Perhaps you will agree that all the troubles in building are not the fault of the "other fellow." Look around for the opportunity—it's there.

A Small Apartment House ....................... 15

A simple design for a building in St. Paul, Minn., with two apartments to a floor.

Hot Air Heating for Houses ....................... 16

By Maurice M. Osborne

Correct principles of hot air heating defined. Typical piping layout given and directions for getting efficient installation.

A California House ................................ 18

Simple type of design along cottage lines with roomy porch across the front.

THE BUILDERS' JOURNAL PLANS

No. 8. A Small Colonial House of Six Rooms ............ 19

Complete working blueprints and details with quantity survey for estimating purposes.

Special Departments

MASONRY

Popular Brick Bonds .................................. 23

By William Carver

English and Flemish types. Detailed drawings and illustrations showing method of laying and examples of effective use.

CONCRETE

Light Weight Concrete Roofs without Forms ........ 27

The cost of labor is so large an item today that any method of concrete construction without forms should have the immediate interest of the builder. Methods fully described.

CARPENTRY

"Thatched Roof Effects" with Shingles .......... 30

These roofs that are so popular today present a problem to the inexperienced builder. The detailed drawings and description given here make everything plain.

SHOPWORK

China Cupboard with Case of Drawers ........ 33

This is a popular feature of modern dining rooms. Here is a workable design that is good looking and inexpensive.

FINANCE AND REAL ESTATE ..................... 35

By C. Stanley Taylor, Associate Editor


BUSINESS GETTING METHODS ..................... 39

By C. Stanley Taylor, Associate Editor

Better relations should exist between architects and builders—what the builder can do. Co-operating with realty subdivision developers.

OFFICE AND JOB MANAGEMENT .......... 41

Methods in Quantity Estimating

By Frederick H. Hunter

Directions for taking off brickwork quantities and pricing items.

MOTOR TRUCKS ....................... 43

By H. F. Blanchard, Associate Editor

Saving the tires in bad weather. New helps that will give you greater tire mileage during the coming winter months.

CONTRACTING EQUIPMENT ..................... 46

Air Compressors and Rock Drilling

By Harold C. Bond

Advantages of the jackhammer and compressor over the obsolete steam tripod drill.

WHAT'S NEW ..................................... 50

Pictures and descriptions of some new details of equipment and materials of interest to builders.
When You Want Information
Where Do You Go?

There isn't a job comes along that you don't need a new material—hardware device—something that is important to the success of that job.

Do you know that the manufacturers of building materials and equipment have catalogs that will answer your questions?
Do you know that as a practical builder they want you to have them?

Every issue of THE BUILDERS' JOURNAL has a classified list of these valuable business helps. Turn now to pages 52-56 and look this list over. Write and tell us those you need and we will have them sent promptly.

The Builders' Journal

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Thirty Centuries Ago

THIRTY centuries ago along the River Nile stood the city of Memphis, capital of Egypt. Today this city—famed for its architectural beauty—is being uncovered five strata below the country's present level.

Out of these ancient ruins looms a new understanding of Egyptian accomplishment. Their knowledge of lighting effects, mural decorations and building technique is a revelation. But the greatest surprise came when historians uncovered great wooden doors, swung on brass hinges. Think of it. Hinges used 3000 years ago.

Down through the ages the simple, often unnoticed hinge has remained in constant use. Today its selection is important. A creaking, squeaking, sagging hinge ruins architectural perfection—cheapens expensive workmanship and presents a discord where harmony should prevail.

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At least $4,500,000,000 must be spent to meet the present building shortage in the United States.

$1,000,000,000 a year represents the additional expenditure which must be made to meet the normal demand in the building field. Of this total amount considerably over one-half will be spent directly through builders of moderate cost dwellings and structures of every type.

There can be little doubt that 1921 ushers in a period of increasing prosperity for the average builder. New levels are being established in material prices. Labor costs are lower as individual efficiency increases. From every section of the country come reports of improved transportation facilities.

A study of the volume of building during past years shows that a sound period of prosperity for the building industry comes usually after a period of industrial prosperity and at a time when rapid decline in commodity prices shows a tendency toward normal stabilization. In view of these conditions the builder may expect activity in his field.

The New Year is usually a period of good resolutions. The building field, however, needs no moralizing. What it does need is the definite, concerted effort of everyone interested to make certain that in the period of activity to come the best possible service will be rendered to those who may be called upon to invest in this field.

Conditions in many respects have greatly changed in the past few years. The public demand for better building has become widespread. The standards of living have been raised to a point where every man wants a well designed home with modern equipment. The rapid improvement of building practice in moderate cost construction, together with the placing on the market of many new forms of quality materials and methods, has developed building construction to the point of a science, not difficult, but absolute, in its requirements. The builder who will render a real service in the years to come is the man who seeks constantly to improve not only the product of his organization but the business relations between the owner, the architect and himself. The year 1921 should, therefore, be significant to many builders as the time when they begin to give a greater measure of close study to their business and to the application of service made available to them through manufacturers and manufacturers' associations, through co-operation with the architect and the banker, and through taking full advantage of the definite suggestions offered by such a publication as that in which this editorial appears.
Preparations for Export Trade Stimulate Building in the South

The opening of trade with South and Central America and Cuba has been responsible for the formation of new companies and the extension of others at Savannah, and incidentally has called for no small amount of construction. The latest is the construction of extensive coal docks by the Savannah Coal & Dock Co., which are estimated to cost $8,000,000 and are expected to be completed in a year. A. Bentley Sons & Company of Toledo, Ohio, have the contract.

In general, however, Savannah has experienced a building slump, the permits for October showing only $140,000 against $689,000 for the same month last year. The latter figure was increased largely by a building at the present location of 41 apartments which is now completed. October also saw the completion of a 6-story apartment hotel. The completion of these buildings has aided the housing situation, but the evidence of the continued demand for living quarters is seen in the fact that all apartments were leased before the completion of the buildings.

Open Shop Conditions Foster Harmony in Little Rock

Although a reasonably high wage has been paid all workmen for the last ten months, no decrease has taken place and none is expected during the present year, at least. There is general satisfaction with present labor conditions and this harmony between contractors and their employees is one of the great successes of the open shop principle in this city, which was adopted in January, 1920. Efficiency is greater and there is no tendency on the part of employees to limit production; all mechanics are going about their work in a businesslike way, with the view of earning an honest living and receiving an honest reward for their services.

The absorption of the builders was overcome by bringing in the plasterers, with whom no agreement was in force, demanded an increase from $1 to $1.25 per hour and upon being refused, struck. In February they were joined by the bricklayers in a sympathetic strike. These difficulties were overcome by bringing in men to work under open shop conditions in these trades. Upon the expiration of the agreement with the Council, a new one could not be arranged because of the wage demands of approximately $1 a day increase and all of the trades struck. Upon their refusal to return to work an open shop policy was declared by the contractors. This is now in force and labor is being satisfactorily supplied; most of the members of the Association are pleased with the present system and report that they would not return to the closed shop principle.

Erie, Pa., Builder Claims Today's Conditions Favorable to Building

Although prospects for building are not very encouraging in this section of the country at the present time, and from present indications there will be more men looking for work in the building trades lines, this winter than any time since 1912, it does not always help to fall in with prevailing views.

One large contractor in this vicinity says that right now is the opportunity to build. We can get the pick of skilled mechanics, much of the material we had difficulties in getting can be supplied now at a lesser price than three months ago and with the transportation problems fast clearing up conditions are more favorable than they will be next spring, when there will be labor shortage and another possible shortage of materials and a greater congestion of transportation. This contractor, of course, and the public should be informed of these conditions through the Chamber of Commerce and the Build a Home Campaign Committee in every city.

In a report made a few weeks ago at a convention held in Detroit, it was stated that the replies to a questionnaire showed a decrease in production from 81.5% to as high as 31%, regardless of the fact that the same questionnaires showed an increase in wages from 10 to 32% over 1918-1919. In one city with a population of 95,000 an increase of wages amounting to $875,500 has been granted to the building trades industries alone over what they received in 1919. The public pays this bill, yet it cannot understand why building operations run so high.
A Practical Housing Group

Chicago Housing Association provides houses for wage earners

Good design and permanent materials insure value

Charles S. Frost, Architect; Bright & Diamond, Contractors

The underlying thought back of this housing project was to give to the home buyer every advantage of economy in building through efficient and large scale operation. The chief feature in reducing the cost to the buyer was the manner in which the land was developed. The site comprises 40 acres and lies within the city limits of Chicago. It is supplied with good transportation facilities and is located conveniently with respect to large industries. Two of the streets crossing the property were laid out for business purposes and the lots fronting on them made 25 x 125 ft.; the balance of the plot yielded 35 residence lots 200 ft. deep and 140 lots 162½ ft. deep, all on a 30-ft. width basis. The business lots are to be sold at a price which will cover the cost of the entire 40 acres so that the purchaser of a house on an interior lot has to pay nothing for his land. It can readily be seen that in a community of 175 houses, which forms only a nucleus of a larger development, there will be an immediate demand for stores, small theater buildings and other community features and by applying the profit on land sold for these purposes to the cost of the residential lots a decided advantage is given at the start to the home buyer.

The houses have been designed for single-family occupancy and with the exception of a few duplex houses all are of the single type and contain 5 rooms. While they are placed closely together there is no feeling of crowding because of the depth of the lots and the 100-ft. wide streets with parkways between the sidewalks and roadways which will be planted with shrubs and trees. The houses, furthermore, are

The plan at the right shows the houses on a typical block. The letters indicate the type of house. Below is a view taken while paving was in process; note the wide street and absence of monotony in houses.
set back 30 ft. from the sidewalk with a hedge along the entire lot frontage. Although the work is not completed, from this description and the construction view on page 7 the reader will easily appreciate the fine effect that will be obtained.

This sub-division of land is not necessarily ideal, however, because there is always the danger with deep lots of having undesirable buildings eventually built in the rear, but owing to the fact that the Chicago street system had been extended through the plot it was necessary to adopt these dimensions and it is intended that the rear space will be utilized for home gardens.

It was natural in an undertaking of this size, in which a large amount of capital will be tied up for a number of years, that the promoters would investigate all types of construction and it is interesting to note that in view of exercising the strictest economy they decided upon a fire-resisting type of construction with concrete foundations, hollow tile or brick walls and asphalt shingle roofs. While normally this type of construction represents a slightly higher first cost than frame, over a period of years, when cost of repairs and insurance premiums are considered, the final saving is considerable.

The development is successful in showing what can be done with standardized designs for houses and still avoid monotony; there are only seven different types of exteriors and but three different plans, yet owing to the grouping of houses and the interesting broken roof treatment, the buildings present the appearance of individual houses.

The three types of plans are illustrated and with them are also shown reproductions of the architect's perspective drawings to give the character of the exterior design of a number of the types. These are reproduced, rather than photographs of the individual houses, because they indicate the planting which is so necessary to give a correct impression of the development and which, of course, is not yet in place. The general photographic views taken just at the completion of the houses show the grouping along the streets, however, and indicate the character of the construction.

The basement walls are of concrete to grade and the floors are likewise of concrete. Two soapstone wash trays are in each basement and also a one-pipe furnace. Tile drains are laid around the foundation walls for drainage. The exterior walls are of either brick or hollow tile and to comply with Chicago building laws the first story walls are 12 ins. thick and the second 8 ins. Furring strips have been used with both materials.

The porches have concrete floors in all cases and the wood detail is of the simplest construction, the roofs being supported by square, built-up posts and the balustrade being of 1 x 4 boards sawed to a pattern. The chimneys are built of concrete sections made on the ground. Where stucco is used it is of the magnesite type which gives a bright, clean surface.

The kitchens are provided with flues for coal ranges and also with

Exterior and plans of the double house at left (type G). They are placed in the center of the block.
gas connection. Hot water boilers supply hot water to both the sinks and bathrooms. The sinks and drain boards are of the enameled iron type equipped with nickel plated faucets. The bathroom floors are of composition and the usual three fixtures of good grade are installed. The floors throughout the other parts of the houses are of birch and the trim, which is the square cut type with cap moulding, is of cypress or gum wood stained brown. The simple character of the interior finish is indicated by the detail drawing of a stairway which is shown herewith and on which it may be noted the rail is made up of 1 x 4 boards cut to a pattern.

Owing to the small sizes of the houses it was desirable, in getting good proportions, to have them built as close to the ground as possible and in order to bring the cellar windows above grade and eliminate the use of areas the floor joists were framed around the windows and the heads of the windows brought very near the level of the first floor which is shown in the detail drawing on page 10.

One of the attractive features of the houses, and one furthermore that has a practical point for builders in this era of high prices, is the type of brick used. At the time these houses were put under construction there was a great shortage of common brick, but there were in the yards of the various brick plants many thousands of over-burned bricks that were not ordinarily salable because of their being off color and also irregular in shape. These brick, however, are fully as strong as the more perfect types and the architect saw in using them a possibility of obtaining some unusual effects at a minimum cost.

A large quantity of them was purchased in the fall of 1919 for $11 a thousand and, owing to their wide variations in tones ranging from a light yellow through all the shades of brown to almost black, it was possible to work out a number of different combinations by using one color for the trim around windows and doors and another for the body of the walls. By varying the color of the mortar joints further differences were had so that what at first might be considered an unpromising material produced an effect that would ordinarily be thought possible only at considerable expense.

Another feature which gives much character to the development is the broken roof line. It is ordinarily recognized that it is much more expensive to build this type of roof than one of simple planes, but by employing modern equipment in the way of power saws and eliminating entirely all hand sawing by carpenters on the job these attractive roofs were produced at a cost less than that of the usual box-like affair.

Other examples of the way in which cost was reduced are of interest. Owing to the fact that the

Floor plans at left and exterior view below of House F. This has a wider frontage than the others and is used at corner locations
houses were placed closely together and practically in straight lines the excavation of the cellars was done by a steam shovel which cut out a trench the length of the block and as wide as the houses are deep. In this trench the foundation walls were built which permitted fast construction of the forms for concrete. When the walls were up the steam shovel filled in, from the excavated material, the spaces between the houses.

As soon as the carpenters' forms were in place concrete mixers were installed at points where several houses could be served by means of runways and wheelbarrows. The construction of the houses was worked in groups. This called for the minimum number of mechanics and also enabled the contractors to keep all the trades constantly at work. As soon as the first group of foundations were completed the concrete men moved to a new group and the carpenters laid their floor joists and first story partitions and then the masons followed to lay up the exterior walls; in the meantime the carpenters moved to a second group of houses where the foundations had been completed and then returned to the original group for the roof framing.

Construction was begun in the fall of 1919 and continued through the winter, during which the excavation, water supplies, etc., were completed. In the spring months, however, owing to a great deal of rain, the construction progress was seriously handicapped by the broken and wet ground. The top soil of the property is black earth for about 2 ft. and this became impassable to horse-drawn vehicles or motor trucks. The emergency was met by the employment of two small, powerful tractors which were able to pass over the soft ground without any difficulty and to tow on a type of sledge the brick, hollow tile, sand, etc., needed for construction.

The method of financing the sale of the houses to the individual owners is of particular interest. The original money necessary for the start of the program was subscribed by important manufacturers, bankers and others similarly interested in the development of Chicago. The principal and most unusual feature of the financing is the fact that no profit goes to the promoters and that, as before stated, the business portion of the property is sold so that the profits from that pay for all the land.

The houses have been built so that they may be sold at prices ranging from $4000 to $4500 per family. The single corner houses sell for $4500 while the double houses sell for $4200 per family and the single houses on inside lots at $4000. The purchaser is required to make a down payment of 10% and the balance is covered by one mortgage which is amortized at the end of 15 years by monthly payments of from $33 to $85, according to the cost of the house. This monthly payment includes, in addition to the

Cornices were varied but all of simple construction as shown below.
The drawings at left show details of windows in 12-in. tile walls; note plaster jamb inside, and at bottom, soldier course of brick at grade.

interest and payment on principal, the premiums on a life insurance policy, a health and accident policy and a fire insurance policy.

The life insurance policy is designed to protect the family in case the head of the family dies, when the house is turned over to his widow without any further payment. In case of sickness the health and accident insurance meets the payments on the house for 6 months.

With such generous terms of sale it is only reasonable that some system of choosing the proper candidates for the ownership of the

Note the varied effect below in the use of brick and magnesite stucco

Stair balusters are 1 x 4 sawed boards
houses should be adopted and preference is given to American citizens who are living in poor quarters and supporting families on small incomes. People desiring to buy the houses are required to make applications giving the details of their present living quarters and the amount of money earned weekly by the members of the family contributing to the support of the home. These statements are investigated and if found satisfactory the sale is made.

In order to prevent speculation the purchasers agree not to resell the property except with the consent of the Association. If a man changes his employment and desires to remove from Chicago the Association will have first option on the property, being privileged to return to him the money paid and to resell the house to another. This prevents speculative dealing and insures to the persistent man who holds to the determination to become a home owner the benefits of increased value that comes to the property.

The money for mortgages is secured by the sale of 6% bonds in amounts of $100 and upwards. This arrangement enables the public to show in a practical manner its interest in improving housing facilities and, further, releases the original capital so that more houses may be built. The sale of bonds also offers poor people, who are not in a position to make a 10% down payment, an opportunity to accumulate this fund by buying on an installment basis the bonds which can be turned in as the initial payment on the purchase of a house.

From this brief description it will be seen that a fundamentally simple plan has been adopted for the financing and selling of houses and that, through economical and sound methods of developing and construction, the houses have been placed at the disposal of buyers at an extremely moderate cost.

Typical plans of narrow frontage houses. Types A, B, C, D, E and H have this plan with varied elevations. A and D are shown at top of page.
How's Business?

Are all the troubles in the building industry due to the "other fellow"? Perhaps builders can show more life—read this and look around for opportunities

By R. E. Dockham

"When the whole blame world seems gone to pot,
And business is on the bum,
A two-cent grin, with a lifted chin,
Helps some, my boy, helps some."

RIGHT at the start and to clear the air, so to speak, we'll admit that business is bad, yes even rotten, if you wish to put it stronger. Now then, what are we going to do about it? Let's size up the situation a little. Everything is high —wages, lumber, cement, brick, hardware, plumbing, furnace work and everything.

The people can't afford to build, yet these same people are buying autos, victrolas, pianos, better clothes and more luxuries than ever before. What's the matter? Well, I strongly suspect that you and I have much to do with the general situation. You are called to submit a price upon some work. What happens? You hand in your price and almost before your prospect has a chance to look it over you commence to apologize for the cost. "Of course, it's pretty high, but everything is very expensive. Wages are high, etc." You start at once to "gum the situation" instead of exercising a good brand of salesmanship which should point out the necessity of the work required, the quality you can deliver and the dispatch with which you can finish the work.

What are people waiting for? The answer is plain, of course. They are waiting for prices to come down. Do you personally believe that the next four or five years will see any material change in prices, that is, in a downward direction? The writer is only a member of the building trades, with ambition to be known as a man whose opinion is of weight. He has no conscientious scruples in saying to his customers: "If you have any intention of building or remodeling any time in the next five or six years, the cheapest time for you to do it is Right Now." This gospel has been preached pretty consistently by him for the past three years and it is still believed to be a good, honest doctrine.

In conditions such as confront us and in the light of certain statistics of the general trend of business as reach us frequently, it seems that one man's guess is as good as another's. You may differ with me in what I say, but I believe a backward look from 1925 will show that these words are not merely rambles. We may not be sure of the fact that labor will not be cheaper.

Material? Do you realize that there are scores of mills and factories making products which enter largely into building of which the output during the war was reduced 50%? These factories are still way behind in their work and are fairly begging buyers to purchase conservatively and only for immediate use. Furthermore, it is impossible to get from them any reasonable promise as to a positive shipping date. It is almost an unheard-of occurrence to get better than a six months' delivery. Now, in the light of these facts, can we consistently expect a reduction in price?

Do you know, for instance, that there is practically no pipe to be bought in the New England markets, and that only the skimpiest supply of plumbing and heating material is available?

Portland cement? It seems as if we would have to establish a "bread line" in order to get any of it. So the situation might be enlarged upon, but the fact I am trying to establish is just this: with such conditions in existence, are we doing ourselves justice in holding out to our customers the vain hope of a big reduction in price, when the coming spring will undoubtedly show, if not an increase, at least a continuance of the present schedule?

Families without number have been leased out, ordered out and actually kicked out of hired homes that they have occupied for years. Their attitude in regard to the housing situation is much the same as in the cases of those who have been through the coal and sugar famines. Never, when coal was $6 or $7 a ton and sugar 8 or 9 cents a pound, did thousands of people stock up. But, having experienced the pinch, these same good folks now make sure of enough to carry them by, and this at a slight advance of some 100%. We may rest assured that these folks are going to, somehow or other, by hook or by crook, provide themselves with permanent homes. It is not preposterous, I believe, to predict that one result of present conditions will be a greater percentage of home owners in this country. That is one hopeful sign of the times.

WELL, what are we going to do about it? Let's be specific and ask what are you going to do about it? I have put that question, in a little different form, to several builders of my acquaintance: "What are you doing to create new business?" The answer in every case was "Nothing."

Is there anything we can do to help the situation? Let's see. Advise smaller buildings, and build with an eye to additions in the future. Bruce Barton, in his wonderful little book, "More Power to You," in a chapter, "A House or a Home," asks, "What is the ideal house?" and in answering writes: "I should say, first of all, it is a cozy place, a place not large. The turtle does not construct a shell 10 times larger than it needs; the bird does not spread her nest across a whole tree-top merely because materials happen to be at hand. Only man commits the foolish error of building a house too large to be a home."

Yes, advise building smaller. The possibilities of attractive layouts for the combination dining-living room with furniture selected to harmonize have not yet been fully realized. The small kitchen with all its appliances in easy reach makes a strong appeal to the housewife who has lived for a time in a small apartment with its kitchenette. The advantages
Next as to material. It is surprising
that building methods have not
undergone some radical changes in
recent years. Yet apparently we
build today much the same as we did
10 or more years ago. In frame con-
struction, for example, we erect our
studs, then rough boards covered
with paper and finally with clap-
boards or shingles. I wonder why
cut siding, which finishes the outside
of a building in one operation, has
not come into more general use. My
contractor friend informs me that it
costs some $600 to rough board a
house of average dimensions. Fol-
lowing that comes the clappingboard
and you men know how much more
that adds to the cost as given above.
Ah yes, I hear somebody say, and
siding may look just as well as a
house done with rough boards and
clapboards. I wonder why.

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studs, then rough boards covered
with paper and finally with clap-
boards or shingles. I wonder why

What about the warmth, you ask?
Let us stop here long enough to dip a
little into science—just deep enough
to get a fundamental truth fixed in
our minds. Now then—"Radiant
energy when it enters a medium
which can transmit it, and which
differs in density from that in the
which it is traveling, is changed in ve-
locity." Again—"Since the mole-
cules of substances differ in mass,
as well as in complexity of chemical
composition, it is natural to infer
that wave action may be taken up
and transmitted by them with very
different velocities." From "An
Elementary Treatise on Heat."
(Marden.)

Let's count up our layers on the
side of our house. We are on the
inside looking out.

FIRST our skim coat of plaster,
then under that, upon one side of
our plaster board, a layer of paper,
next plaster of paris (gypsum),
then paper again upon the other side
of our plaster board. The board be-
ing applied to the studs the next
layer is an air space. Then our regu-
lar building paper and finally our
siding. Keeping in mind the law
given here, I ask you if you think
the heat loss through this building
is going to be a rapid process.

Next let's eliminate blinds; we
never use them anyway and they are
somewhat like a fifth wheel. And,
therefore, the idea is growing.

Don't scoff at our house, good
folks, for it is practical, economical
and exceedingly comfortable. The
writer has been interviewing an
owner and occupant of the house
described who is enthusiastically
pleased with it. He has dwelt therein
for two years, which means last win-
ter and the preceding season, which
in the words of the street was "some
winter," if you remember.

THERE is another phase of the
building situation we should
keep in mind. Not 20 miles from
where these words are written is a
new concern which is turning out
ready cut houses. Does this have
any significance to you? To me it
does. Where is the natural outlet
for this product? The logical an-
swer would seem to be,—the builder.
I commend this feature of the situa-
tion to you for earnest consideration.

Heating.—We've got to heat our
building so, though I hate to admit
it (Mr. Dockham is a steamfitter!—
Ed.), let me say to you, good fellow
craftsmen, the one-pipe furnace is a
"war baby" with wonderful possi-
bilities and, incidentally, it's cheap.
Plumbing too must be considered;
a careful study of local ordinances
and conferences with local men of
that trade will pay in many cost-saving
short cuts to a perfect installation.

Of the cost of tinted walls vs.
papered, poured cement chimneys vs.
bricks, center electric drops vs.
side lights—all these and many others
I mention simply in passing but
your mind will suggest ways and
means to further our object, for I
must hasten to finish.

About financing. Haven't some
of your prospective customers a lit-
tle money they plan to put sometime
into a home? Couldn't you chaps
manage a second mortgage through a
Morris Plan bank?

Perhaps you know of a man who
wishes to buy.

Among my acquaintances is one
who will buy me a house, secure a
mortgage loan, remodel it for me and
turn it over to me ready for occu-
pancy. Incidentally, he will collect
from its previous owner his commis-
sion for selling it.

And to you, designer of life, this
talk of mine. Is your mind working?

Finally, a word in general. I pass
daily, from my home to my office,
many houses with valleys which leak
every time snow packs in. It's strange
that some builder has never
gotten to the owners.

Coal is up $15 or more a
ton. I can shake the windows
of my house, and no carpenter has ever
tried to impress upon me the impor-
tance of weather strips and storm
doors or double windows. Recently
my roof developed a leak; it looks
badly and needs shingling. No car-
penter, and I am friendly with many,
having business relations with them,
apparently noticed that there is
a job waiting for some one. I'll have
to do the looking up myself.

My last word is this. It's largely
a question of good salesmanship.
Think it over.
A Small Apartment House
Simple plan and construction noted in this St. Paul building
H. A. Sullwold, Architect

This small apartment house was built in 1916 at a cost of $15,000 exclusive of lot, or at 15c. per cu. ft. The architect advises that this type of building can only profitably be built under today's conditions on a co-operative basis and that it should then be made 3 stories high.

There are 2 apartments to a floor and the janitor's rooms as well as storerooms for the tenants are in the basement. The walls are of red brick; the front portion has a small pitched roof covered with tile and the remainder a flat roof as shown in the detail opposite. Heating is by hot water; the kitchens are equipped with incinerators and gas ranges, the bathrooms are tiled and the glazed porches are heated. Patent wall beds are installed in the dining rooms of the first floor and in the sun porches on the second floor.
Hot Air Heating for Houses

By Maurice M. Osborne, Monks & Johnson, Engineers

Engineers and architects are agreed that a simple hot air furnace, of moderate size, with properly designed flues and cold air inlet, furnishes the best heat for any small single dwelling of compact form, not too extended as to plan. With a good hot air apparatus installation cost does not exceed cost of installation of any other type of system, heat can be secured with properly designed flues and with natural draught, and we must have enough area to burn the number of pounds of coal required to give the heat.

It has been found that total window surface + 1/4 total exposed wall surface, divided by 200 = required grate area, all surface areas being in square feet.

The total glass area is assumed to be 132 sq. ft., and the total exposed wall area is assumed to be 3536 sq. ft., then:

$$\frac{132 + 3536}{200} = 5.08 \text{ sq. ft. grate area.}$$

Practically all hot air furnaces have some method of adding moisture to the air. The usual scheme is a water pan attached to one of the doors on the furnace front. This pan must be filled frequently, as its capacity is not great and it quickly becomes dry. The simplest method of keeping it filled is to have a connection run from the cold water piping in the basement to a point just above the pan when the door is swung wide open. A faucet at this point allows the pan to be filled every time the furnace is attended to. A somewhat more costly, but automatic, arrangement is to have the pan connected with an outside tank at the same level in which there is a bail-cock exactly like that in a water closet tank. For the very best results the water pan should be located not on the side of the air entrance but in the dome of the furnace.

Some furnaces are made in this way, and, in addition, have either a porous earthenware container for the water or porous earthenware plates set edgewise in the water pan in order to assist in the evaporation of the water. These refinements doubtless add considerably to the humidification of the air. They are not necessary if the air is to be re-circulated.

An important item is the size of hot air pipes leading to each room. An established rule for sizing is to divide window surface plus 1/4 exposed wall surface in square feet for each room by 1.2 for first floor, 1.5 for second floor and 1.8 for third floor. This area will be in square inches. The figuring for the living room will then be:

$$\frac{60 \text{ sq. ft.}}{1.2} = 50 \text{ sq. ft. wall}$$

The detailed computations for other rooms are not figured out but results obtained are:

- Hall: 55 sq. ins.
- Dining room: 106 sq. ins.
- Pantry: 28 sq. ins.
- Bed room No. 1: 70 sq. ins.
- Bed room No. 2: 48 sq. ins.
- Bed room No. 3: 54 sq. ins.
- Bed room No. 4: 63 sq. ins.
- Study: 30 sq. ins.
- Bath: 20 sq. ins.

It may be assumed that the kitchen is heated from its coal range and the second floor hall from the first floor hall. The attic is not heated.
In choosing actual pipe sizes it is better to use round pipes as being less expensive and of better form than the thin, flat type designed to be concealed in partitions. Somewhat more planning is required to accommodate these, and some extra furring, but their use is well worth while. The thin, flat pipes of rectangular section, designed to fit within 6-in. partitions, are extremely inefficient as conductors of air. The circumference of a section of pipe is what causes friction in it. The most efficient section is the circular, in which the area is greatest in relation to the circumference. The sizes shown in the plans are taken from a table of areas of circles, to the nearest 1/4 in., upper limits being always used. In case of the living room and the dining room, where two pipes of normal size are required to carry the air, a single oval pipe has been fixed upon, the larger diameter of which equals that of the two pipes, and the small diameter being the same as that of one pipe.

Registers are chosen, wherever practicable, about twice the area of the pipes themselves, so as to cut down velocities of air entering the rooms. Registers are placed in the walls where possible, rather than in the floors, and should be on the opposite sides of rooms from fireplaces and windows.

The method of carrying vertical stacks up in furred spaces is shown in the detailed drawing. By fitting the pipes between studs and using 2 ins. of wire lath and plaster for the furring, and by allowing 2 ins. for pipe covering and to clear woodwork, the total thickness of the furred partition must be 16 ins. to accommodate a 10-in. round pipe.

The cold air flue should be 3/4 the area of all the hot air pipes combined. In this case the total area will equal 468 sq. ins., or a little less than 2 ft. square. Dimensions are 30 x 16 and it is built under the floor, leading from an opening in the basement wall on the most sheltered side of the house to the space around the furnace. It will be made of concrete with smooth sides and wood top. Connecting with this is a flue 30 x 20, attached to a large re-circulating register in the front hall. A damper at the junction opens one as it closes the other, allowing the use of all fresh air, all air from the house, or a mixture.

The exterior of the furnace should be covered with asbestos air cell covering or, still better, 1-in. magnesia blocks wired on and finished with hard cement. If the outer metal covering of the furnace is double, with an interlining of asbestos, this is not necessary. Leaders in the basement and vertical stacks should be covered with asbestos air cell covering, wired on or held with bands.

Some provision should be made for the escape of the air entering the rooms, otherwise circulation will not be good when all cold air is being used. Open fireplaces, equipped with proper dampers, take care of this need and where there are only a few fireplaces a vent from the upstairs hall is adequate. This has an opening at the ceiling for summer use, and one at the baseboard for winter use. When air is being re-circulated both openings are closed.
A California House
The cottage lines and large open porch give it distinction
E. W. Stillwell, Architect

In studying the exterior view of the house shown here the very attractive porch, which extends across the front, should be noted. Especially interesting is the way in which the columns are used in pairs with lattice work between.

The walls of this house are of hollow tile surfaced with cement stucco which, with all trimming material, is white. The roof is shingled and painted green and there are green shutters at the gable windows. The porch awnings are of white and green stripes. Tasteful planting gives the house a very attractive setting.

The floor plans show the interior arrangement. Glass doors are used between first floor rooms and there are many built-in features and convenient closets. These include, on the first floor, china cupboards in both the dining room and the breakfast room, medicine case and clothes chute in the bathroom, the usual conveniences in the kitchen, and several clothes, linen and storage closets in the hall, rear entry porch and elsewhere. While the house is of the so-called story-and-a-half kind, three good bedrooms and a bathroom of practically full ceiling height are included on the second floor, and many wardrobe and storage closets, built-in drawer cabinets, etc. Hardwood floors are used for the first floor except in kitchen and bathroom. The house has a large basement, reached by an inside stairway, and is equipped with a furnace.
The big outstanding demand today in house construction is for small single-family houses that can be built at a moderate cost in view of today's building conditions. People with a limited amount of money must revise their ideas about the house they want to build; there is only one way to get a house for a moderate price today and that is to plan it so that all necessary features are arranged in the smallest possible space.

The construction, furthermore, must be simplified so that the labor in building may be cut to the minimum. In a frame house everything should, if at all possible, be contained in a rectangle thus eliminating breaks in foundation walls and framing, the roof should be made up of the fewest planes and it will generally be found that a simply framed, full 2-story house will be cheaper than one where the roof is broken by dormers, because the saving in labor is greater than the cost of the additional material required. Floor framing should be arranged to take standard lengths of joists without cutting. Every effort made in working out the plans to reduce the amount of cutting and fitting on the job will pay in labor cost which is the principal item of expense.

The house shown in this issue of The Builders' Journal has been designed with these various economies in mind and it should prove a very popular plan for many people who will build in the spring. In the first place its total dimensions are only 23 x 24, yet it has a pleasing arrangement of rooms on both floors and would entirely suit a family particular about its home. The framing is of the simplest type and with short spans which permit the use of 2 x 8 joists and rafters. The floor area of the house is only 552 sq. ft. and it should be built in most sections of the country for about $6500. In many instances builders who are clever in saving expense can do better than this; the fireplace and china closet could be omitted at a saving, but these features are desired by so many people today that they are included in our plans to make them complete. If they were omitted a single flue chimney could be brought up through the second floor in the corner of the rear bedroom near the hall by moving the door to the room nearer the bathroom partition.

Another economy that will be noted is the arrangement of the staircase so that a bulkhead cellar entrance is eliminated; a cellar door at grade opening on a stair landing is the most economical arrangement that can be had, especially when it serves also as the kitchen entrance as in this case. Note should also be made of the place for the refrigerator; it can be reached easily by the ice-man and is equally convenient for the housekeeper. The second floor hall has no waste space but it is not crowded and room is in addition found for a linen closet.

In small houses ingenuity in planning will provide many features that can be fitted into space that would otherwise be wasted. In the small bedroom there is a built-in dresser provided and by extending over the stair well, as far as headroom conditions will permit, a number of useful drawers are included. A detail is shown on drawing No. 6.

The design is based on simple colonial lines and depends entirely for its effect upon good proportions and the grouping of windows. There is no ornament whatever on the exterior and the moulded finish used is of the simplest kind. In selecting this from stock, the builder should examine the details carefully and choose mouldings of the same size and section as shown in so far as possible. The porch is made up of square posts with a shed roof and the lattice gives a decorative touch at a very small cost. Note should be made of the slight projection on the gable ends; this should be followed closely to give all colonial character, because it is in using these simple details that the correct effect will be obtained. The exterior walls may be of clapboards, siding or shingles; in the last case no corner boards would be needed. The walls should be painted white or, in the case of shingles, one of the white shingle stains would be effective. The trim should likewise be white. Doors and shutters should be painted a light, bright green or a grayish green. The roof is designed for slate but where every economy in first cost is necessary gray-green asphalt shingles would look well. The large chimney is desirable to give a homelike look to the house and this can best be accomplished by studding out around it above the roof and covering this framework with metal lath and stucco. The top should be carefully covered with sheet metal to prevent water getting down around the blocking.
No. 8. A Small Colonial House of Six Rooms
By Gordon Robb, Architect for The Builders' Journal
The Builders' Journal Plans

No. 8. A small colonial house of six rooms
Quantity Survey

By Frederick H. Hunter, Quantity Surveyor

The quantities listed here are for estimate purposes. All measurements are NET unless otherwise noted. Quantities such as sheathing, flooring, roofing, etc., are given by area with no allowance for wastage, matching of lumber, etc. Minor outs are disregarded. No attempt has been made to include all the small items or such items as clearing the site, drains, supplies, etc., which must be governed by local conditions. Where the word "Item" appears in the quantity column it indicates that the expense of the work in question would probably be set as a lump sum based on data available.

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip loam: about 10 ft. around site—assuming loam to average 8 ins. deep</td>
<td>47 cu. yds.</td>
</tr>
<tr>
<td>Excavation for cellar</td>
<td>156 cu. yds.</td>
</tr>
<tr>
<td>Excavation for footings, areas, etc.</td>
<td>7 cu. yds.</td>
</tr>
<tr>
<td>Concrete for foundations</td>
<td>29 cu. yds.</td>
</tr>
<tr>
<td>Forms for same (contact area)</td>
<td>1650 sq. ft.</td>
</tr>
<tr>
<td>Form trowel wash for basement sills</td>
<td>12 lin. ft.</td>
</tr>
<tr>
<td>Concrete cellar floor</td>
<td>51 sq. yds.</td>
</tr>
<tr>
<td>Common brick for chimney, rough fireplace and trimmer arch</td>
<td>134 cu. ft.</td>
</tr>
<tr>
<td>Strip girders included in above</td>
<td>2</td>
</tr>
<tr>
<td>Metal thimbles for smoke pipe and gas range vent</td>
<td>2</td>
</tr>
<tr>
<td>Firestopping: it would require 11/4M brick to fire-stop according to the best requirements.</td>
<td>Item</td>
</tr>
<tr>
<td>Finished fireplace (rough fireplace and trimmer arch included in chimney item)</td>
<td>Item</td>
</tr>
<tr>
<td>Damper for 36&quot; opening</td>
<td>1</td>
</tr>
<tr>
<td>Mantel bar (unless patent damper which forms lintel is used)</td>
<td>1</td>
</tr>
<tr>
<td>Brick for facing, lining and hearth</td>
<td>180</td>
</tr>
<tr>
<td>3&quot; iron basement column with cap and base</td>
<td>1</td>
</tr>
<tr>
<td>Cast iron clean out door and frame</td>
<td>1</td>
</tr>
<tr>
<td>Framing lumber</td>
<td></td>
</tr>
<tr>
<td>There are no especially long lengths needed—no joist over 12'-0&quot;. Lengths are scheduled &quot;to the next whole foot.&quot; That is, a piece 14'-4&quot; is counted 15'-0''. Length allowed for splices in sills, plate, ridge, etc. (Schedule is for a girt frame)</td>
<td>(See third cover)</td>
</tr>
<tr>
<td>4 x 6 sill</td>
<td>190 ft. B. M.</td>
</tr>
<tr>
<td>6 x 8 girders</td>
<td>60 ft. B. M.</td>
</tr>
<tr>
<td>2 x 8 joists</td>
<td>1275 ft. B. M.</td>
</tr>
<tr>
<td>Cross bridging of 1 x 2 stock</td>
<td>84 lin. ft.</td>
</tr>
<tr>
<td>4 x 6 girt</td>
<td>196 ft. B. M.</td>
</tr>
<tr>
<td>2 x 8 rafters, lengths are 15 ft.; this includes ridge, etc.</td>
<td>640 ft. B. M.</td>
</tr>
<tr>
<td>2 x 6 ceiling joist</td>
<td>350 ft. B. M.</td>
</tr>
<tr>
<td>2 x 6 and misc. for porch floor and roof</td>
<td>175 ft. B. M.</td>
</tr>
<tr>
<td>Wall framing 2 x 4, 16&quot; o. c. Include in price for plate of 2 x 4's doubled, usual bracing, etc. No outs taken for windows or doors on account of doubling and trussing</td>
<td>1780 sq. ft.</td>
</tr>
<tr>
<td>2 x 4 stud partitions with 3 x 4 Y. P. cap and one row of herring-bone bridging. Lengths measured to girders or partition cap below and no outs deducted</td>
<td>125 sq. ft.</td>
</tr>
</tbody>
</table>

Total Brought Forward
Non-bearing partitions of 2 x 4 and 2 x 3 studs (include cap, sole and bridging) 1080 sq. ft.
Studding 12" o. c., for false chimney 70 sq. ft.
2 x 10 and smaller stock for stair stringers and framing, including landing 130 ft. B. M.
Wall sheathing 1550 sq. ft.
Roof sheathing 780 sq. ft.
Underfloor, squares edged boards 920 sq. ft.
Attic floor, matched boards 440 sq. ft.
Strip furring 1 x 2, 16" o. c. for wood lath (if sized timber is used omit this item) 970 sq. ft.
Furring down for recess in dining room Item Joist hangers 4 x 8 over 4" 8
Roof shingles 7 sqs.
Ridge (shingled) 19 lin. ft.
Ready roofing for porch roof 1 sq.
Cap and under-flashing around chimney 17 lin. ft.
Flash ing over porch roof 11 lin. ft.
Flash ing over cornice returns 6 lin. ft.
Flash ing over window heads 74 lin. ft.
4" metal gutter for porch 11 lin. ft.
End pieces for same 2
Metal cap for false chimney about 3'-0" x 5'-0" Item
Wood leaders 65 lin. ft.
Goosenecks and bends for same 5 each
Iron or Akron pipe for leader ends 5 lengths
Exterior windows (include frame and sash; note backhands on casings) (See pp. 55 and cover)
Cellar windows, 3 lbs. 10 x 13 4
12 lbs. d. h. 9 x 12 4
Mullion frames with 2 d. h. windows 12 lbs. 9 x 12 2 units
12 lbs. d. h. 9 x 11 8
Mullion frame with 2 d. h. windows 24 x 18 1 unit
Fan light casements in gables 2
Stock blinds for 12 lbs. 9 x 12s 8 pr.
Stock blinds for 12 lbs. 9 x 11s 8 pr.
Exterior doors (include frames) (See pp. 55 and cover)
Front door, 3'-0" x 7'-0", glazed 6 lbs., 2 panels under 1
Side door, 2'-8" x 6'6" 2 panels under 1
Exterior finish (See p. 55 and third cover)
Cap mould over 1st story windows 23 lin. ft.
TOTAL BROUGHT FORWARD

Rake mouldings for gables ........................................ 64 lin. ft.
Cornice returns ...................................................... 4
Cornice mouldings (including 3 x 5 gutter) .................. 48 lin. ft.
Corner boards .......................................................... 66 lin. ft.
Water table ........................................................................ 84 lin. ft.
Rake strip for porch roof ............................................. 14 lin. ft.
Fascia for porch cornice .............................................. 11 lin. ft.
Sheathing for ends of porch ........................................ 16 sq. ft.
Plain posts for porch, 4½" square, 8'-0" high .................. 4
Half posts at wall .......................................................... 2
Plain box beam for porch ............................................. 23 lin. ft.
Lattice strips ⅜" x 1½" .................................................. 285 lin. ft.
Bottom rail 4½" x 6½" .................................................. 16 lin. ft.
Floor blocks under rail ................................................ 8
Fascia board for porch about 12" wide, 24 lin. ft. .........
Riser, tread and check pieces for steps .......................... 7 lin. ft.
Clapboards ........................................................................ 1330 sq. ft.
Sheathing for porch ceiling ......................................... 55 sq. ft.
Y. P. flooring for porch ................................................ 70 sq. ft.

Interior doors

(See pp. 4, 55 and back cover)
2'-0" x 6'-8" ............................................................... 2
2'-4" x 6'-8" ............................................................... 3
2'-6" x 6'-8" ............................................................... 6
2'-8" x 6'-8" ............................................................... 1
Frames for single doors ................................................ 12
Flap door for linen closet .............................................. 1

Interior finish

(See p. 55 and third cover)
Trim with mitered angles for doors and windows .......... 725 lin. ft.
Mullion casings ........................................................... 13 lin. ft.
Window stools and aprons .......................................... 62 lin. ft.
Stop beads ........................................................................ 155 lin. ft.
Head stops ....................................................................... 50 lin. ft.
Base ................................................................................ 350 lin. ft.
Plain plinth blocks ....................................................... 28 pr.
Chair rail .......................................................................... 118 lin. ft.
Mantel in living room ................................................... 1 unit
Jamb casings in living room ......................................... 20 lin. ft.
Shelves for closets, about 2'-0" long ............................ 6
Book strips ....................................................................... 45 lin. ft.
Dresser in bedroom No. 3 ........................................... 1 unit
Picture moulding .......................................................... 250 lin. ft.
Shelving and drawers for linen closet ......................... 1 unit
Lining, shelving and special doors for china closet ....... 1 unit
and cupboard under in dining room ........................... 1 unit
Case A and counter with drawers under in kitchen ....... 1 unit
Case B in kitchen .......................................................... 1 unit
Sink frame and drain board in kitchen ......................... 1 unit
Stairs to 2nd story and down to entry ..........................
Treads with one open end ............................................ 4
Treads with closed ends ............................................... 6

TOTAL CARRIED FORWARD

TOTAL BROUGHT FORWARD

Starting tread with rounded end .................................... 1
Special treads next to landing ...................................... 2
Special nosing on landing .......................................... 1
Risers ........................................................................... 13
Special risers, curved ............................................... 3
Skirt board at wall ....................................................... 20 lin. ft.
Face string ....................................................................... 4 lin. ft.
Stair rail ......................................................................... 4 lin. ft.
Newel post and ramp ................................................. 1
Wall rail on brackets .................................................. 7 lin. ft.
Starts ............................................................................. 3
Ramp and twist ........................................................... 1
Nosing strip at top of stairs ........................................ 2
Hardwood floors for living room, dining room and hall .......................................................... 340 sq. ft.
Floors for rest of house ............................................ 525 sq. ft.
Cellar stairs
Plain treads ................................................................. 8
Risers ............................................................................ 9
Nosing at entry ........................................................... 1
Batten door at foot of stairs ........................................ 1
Door frame in sheathed partition ................................. 1
Sheathing partition for stairs .................................... 30 sq. ft.
Studding for coal bin partition ................................ 110 sq. ft.
Sheathing for coal bin partition ................................. 70 sq. ft.
Shovel hole and slide for coal bin ............................... 1
Frame for 2 laundry trays ............................................. 1 unit
Plastering interior

(See p. 3)
Ceilings ........................................................................ 110 yds.
Basement ceiling (if plastered) .................................... 53 yds.
Stair softs ...................................................................... 5 yds.
Walls, net ................................................................. 275 yds.
(or half outs, 321 yds.)
Dado in kitchen and bathroom (4 ft. high) .......... 110 yds.
Keene’s cement plastered on metal lath ....... 24 yds.
Corner beads ..............................................................
Exterior stucco for chimney on metal lath or patent wood lath ................................. 8 yds.

(See p. 3)
Form projection for cap (top of cap is metal) ............ 16 lin. ft.

Allow for work not listed in the survey:
General or overhead costs Item ....................................
Grading — walks, planting, sodding, etc. Item ........
Connections for water, sewer, gas, etc. (including trenches) Item
Insert sub-bids for other trades

Hardware

(See p. 4 and back cover)
Allow for setting hardware Item .................................
Painting and papering ..................................................
Plumbing ..................................................................
Heating ..................................................................
Electric work .............................................................
Fixtures ..................................................................

TOTAL AMOUNT
WHEN designing a building, the architect, after roughly sketching out the plan, conceives the idea of its general outline or mass, the good proportion of which is essential to a pleasing effect. When this has been achieved he proceeds with the design by solving the larger problems, then the lesser, finally working out the details. Every portion of the building must bear its proper relation to, and harmonize with, the general design of which it is a part. Thus, ornament around a window must scale with and be properly placed in its own section of the facade which must, in turn, bear a harmonious relation to the entire composition.

In every architectural scheme the units composing the masonry wall play a part just as important as any other feature of the design. If these units are not pleasing in their proportions they will undo to some extent, and may even spoil entirely, the effect which the designer tried to accomplish, no matter how satisfactory the general lines of the building may be. The units must therefore not only be in scale with the elevation but must, in their own dimensions, bear the correct ratio of length to height. Who has not at some time seen what might have been a cozy little home built of clumsy looking units that were not only entirely too large, but proportioned so badly that they ruined the appearance of the building? Such instances are regrettable and can be avoided by the selection of units which experience has shown will look right in the wall. Brick, with its numerous courses, is always in scale with any elevation, no matter how small or how large the building, and each brick has correct architectural proportions. Universal experience proves that brick, being thus fundamentally right in point of size and having a surface that is alive with interest, harmonizes with any design.

The last article (October issue) dealt with common bond and the cost of more expensive bonds. Common bond is a variation of one of the three fundamental types of bond—stretcher or running bond.

Stretcher or Running Bond—The exposed surface of running bond consists entirely of stretchers, which fact explains also its weakness, unless built as described later, for a wall must be tied together with headers to develop its proper strength. When the wall is 12 ins. or more thick, sometimes the brick in the center of the wall is laid diagonally every few courses, the tri...
angular area of the brick which projects beyond the backing thus forming a bond which, although sufficient to tie the facing to the backing, will not permit the facing to be included in the total thickness of the wall when figuring its bearing capacity. Thus the wall here illustrated (Fig. 1) should be classed as an 8-in. wall when figuring its strength, because the bond between the facing and the backing is inadequate. The same objection holds true in the case of walls in which the facing is tied with metal ties (Fig. 2) which, in addition to having uncertain bonding strength, are also liable to rust away. Neither diagonal bonding nor bonding by means of metal wall ties can be classed as first class construction.

The best method of laying a wall in this bond is to build it in a similar manner to common bond, with a few courses of stretchers followed by a course of headers, but with the mortar joint between each pair of headers colored the same shade as the brick, thus forming a "blind" joint that is practically invisible, and giving the effect of a course of stretchers. This is, of course, camouflaged common bond and when using it the facing brick bears its proper portion of the load and such construction is thoroughly sound. It is also obviously cheaper than diagonal bond which requires a great deal of cutting of brick.

Fig. 8. An attractive combination of brick and stucco. This work is laid in Flemish bond. Edward L. Palmer, architect
that the corner without closers makes the strongest looking wall.

*English Cross Bond*—While English bond, carefully laid, results in a wall of very pleasing and neat appearance, it is possible by a little variation to vastly improve its effect and introduce a patternwork of Greek crosses over its surface by making the stretcher courses break joint, and thus form English Cross or Dutch bond. An examination of the diagram, Fig. 6, will illustrate clearly what is meant, the joints at the ends of the stretchers in the bottom course being found to center on the stretchers in the next stretcher course. There are also two methods of starting this bond at the corner—one method being shown by Fig. 5, and the alternative by Fig. 6. By using the method shown in Fig. 5 all cut brick "closers" are eliminated. A full header closer in each alternate stretcher course is necessary in any case and there is little doubt that the corner gains in appearance by the avoidance of closers in each header course.

According to the method shown in Fig. 5, assuming the first course to be all headers, the next course starts with a three-quarter brick, followed by a full header, the remainder of the course being all stretchers until the other corner is reached. The next course is an all header course, followed by a course of stretchers, but starting with a three-quarter brick on the corner. In other words, every stretcher course starts with a three-quarter brick placed at the corner and in every alternate stretcher course the three-quarter brick is followed by a full header placed as a closer.

By the second method, shown in Fig. 6, again assuming the first course to be a header course, a header is placed at the corner, fol-

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**Fig. 10.** Note pleasing effect of Garden Wall bond. Headers are dark and two stretchers come between them. Frank Chouteau Brown, architect

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*Staggered header courses in 12-in. wall* at left and raking joints at right. The horizontal joints will be blind, giving long, vertical lines
followed by a stretcher, then a header, etc. The next course is started with a three-quarter brick, followed by a header, then a stretcher, etc. In the lower example the bottom course starts with a header, then follow closer, stretcher, header, stretcher, etc. The next course starts with a full stretcher, then a header, stretcher, header, etc.

It will be noted that with all the bonds here illustrated the back of a 12-in. wall is laid in common bond. The three bonds just described—

Running, English and Flemish bonds—are the three fundamental bonds in which all brick are laid. Endless variations can, however, be worked out, using these bonds as a basis, but the builder cannot go wrong if he sticks to the bonds described. One caution is necessary—never put a closer right on the corner with any bond. To do so is not only structurally incorrect but makes a weak looking corner. A three-quarter brick is permissible, but use nothing less than a full header.

Double Flemish Bond—This term was in years past used to describe a wall with each side exposed, each face showing Flemish bond. Latterly it has been used to describe a variation of the ordinary Flemish bond shown here which, instead of having a single stretcher between headers, has two stretchers in that position, but with a blind joint between them. This is shown in Fig. 9. The blind joint between the stretchers constitutes the sole difference between Double Flemish bond and Garden Wall bond.

Garden Wall Bond is a variation of Flemish bond, but has from two to four stretchers between headers, the vertical joints being typical joints, not "blind" joints. This is shown in diagram Fig. 4 and in illustration in Fig. 10.

Angles and Corners—These are rather expensive to form and most builders nowadays avoid features which tend to increase costs. The type of angle shown by Fig. 11 which involves the leaving of "pigeon holes" in the wall, should be avoided as such openings allow the lodgment of dirt which may streak down the wall after rain. Of the two, we recommend the detail shown by Fig. 12. A better detail is shown by Fig. 13. A method of forming an acute corner is shown by Fig. 14. This applies to any bond.

Bands—Bands and trim of stone are often used effectively with brick, but should be selected with some care and strongly contrasting effects avoided. It is possible to spoil a design by selecting a stone that stands out too strongly, thus making the building too "spotty." With a dark brick especially a very light stone should not be selected. A type of band or "string course" much used in Europe but seldom if ever seen here, consists of using pieces of broken roofing tile set in mortar joints the same width as used for the brick, here illustrated. This makes a very agreeable and appropriate trim for brickwork, recalling in its texture something of the brick itself. Such bands are rather expensive to lay, however, which fact will be appreciated when it is remembered that each piece of broken tile takes almost as long to lay as a brick.

NOTE: Figs. 1, 2, 3, 6, 7, 11, 12, 13, 14 are reproduced from "A Manual of Face Brick Construction," by the courtesy of the American Face Brick Association.
TELEPHONES, automobiles, wireless, aeroplanes—these are the things that occur to most people as symbols of rapid strides made in modern life. Yet there are other fields which have had developments just as extraordinary though possibly not so spectacular.

The prosaic building industry, which gets scant attention from the average man, has probably brought out more new ideas and improvements in the last quarter of a century than in all the years of its long previous history. The mere suggestion of what some of these are will confirm the truth of this statement—skyscrapers, sanitary plumbing, reinforced concrete, daylight factories, standardization, elevators, fireproof construction, steam heat and modern lighting. One need only go through the districts constructed a generation ago to realize the radical changes that have taken place in building methods and results.

As indicated, reinforced concrete belongs strictly to the modern age of construction. Two decades ago reinforced concrete was practically unknown for general use. Today hardly a job of construction goes on without using it, more or less, from the small reinforced concrete porch in the home to the immense industrial plant built entirely of it. In this specialized field many systems and products have been developed to meet most efficiently and economically certain requirements and our purpose here is to tell of one of these interesting developments.

As is generally known, the ordinary types of reinforced concrete are built with forms which are left in place until the concrete has properly set. Such construction is ideal for general types of buildings, but there are many cases where the difficulty of providing forms makes the expense of the construction almost prohibitive. Take, for instance, the case of a roof located 20 or 30 ft. above the floor, such as frequently occurs in factory buildings. The expense of providing suitable false work to build a concrete roof would of course be very great. Other cases occur in roofs of all kinds, including those which have irregular angles, dormers, etc., which would make the necessary form work very complicated.

An additional requirement of roofs is comparatively light weight. The ordinary types of reinforced concrete are built with slabs 4 ins. in thickness and upwards. Now, the actual loads of wind and snow coming on a roof are never figured over from 30 to 40 lbs. per sq. ft. The use of metal mesh eliminates the danger of misplacing reinforcement when concreting.

It is unnecessary, therefore, to provide a heavy construction of which the dead weight alone is 50 lbs. and upwards. This dead weight, in fact, is more than the live load it is required to carry.

Elimination of forms and light weight, combined with fireproofness and permanence, were the urgent demands in roof construction. Naturally specialists in this field saw the need and manufacturers worked on products to meet it. Probably the first material of this kind developed was a product consisting of deep ribs spaced about 4 ins. on centers with an expanded metal lath between them. Ribs and lath are manufactured and formed from the same sheet of steel and there are now many products of this nature on the market.

The ribs in these products are usually about 5/8 in. to 1 in. in height and give great stiffness.
When these sheets are laid over the purlins they will carry the weight of the wet concrete over a considerable span, the ribs giving the requisite strength and the mesh holding the concrete and preventing it from falling through. When the concrete has set the ribs and mesh reinforce the slab, making a complete reinforced concrete construction. The under side of the slab can then be readily plastered for fire protection and finishing. We thus have in these materials a combined reinforcement and forms. The thickness of the concrete is comparatively thin, assuring light weight. Thus are met the essential requirements of a permanent, fireproof roof construction—the elimination of forms and light weight.

The building of a roof of this kind is so simple as to be almost self-evident from the accompanying illustrations. The materials are usually furnished in large sheets which are easily handled, usually about 24 ins. wide and in standard lengths of from 6 to 12 ft. These sheets are merely laid over the purlins or roof members. In the case of structural steel they are fastened by means of special clips furnished by the manufacturer; to wooden members they are nailed, and with reinforced concrete they are an integral part of the construction.

Simple form of concrete floor where metal reinforcing mesh spans without forms the distance between beams. The metal sheets are supplied bent to any degree and their edges rest on the flanges of the steel beams.

The sheets interlock along their sides and ends, making a continuous reinforcement of uniform strength in all directions. The interlocked ribs are wired together every 24 ins. along the sides and at each rib at the ends. Sheets should be lapped 2 ins. where splices occur over the supports, otherwise every 8 ins. The attachment to the roof framing should be ample to hold the construction in place, and of course depends somewhat on the slope of the roof. However, attachments should occur at the interlocking side splices every 8 to 16 ins. apart.

The ribbed materials will span a reasonable distance as centering without any support. However, they are quite frequently used on roof spans of greater length. In such cases a temporary support should be provided in the span. The illustration indicates one method of providing this temporary support, which is readily seen to be of the simplest kind. In the tables there are also noted the maximum span on which these materials will carry various thicknesses of concrete. Carrying capacities of the slabs after the concrete has set are indicated. Of course it is self-evident to anyone that these same materials can be used with equal success for carrying greater loads, and in fact have been used very extensively, in floor construction.

An interesting development in these ribbed materials is the fact that they can also be furnished in curved sheets. This permits of arched construction which may be desired either for architectural effect or additional strength. Not only are the ordinary segments of circles furnished but the sheets can also be provided with the center part flat and the ends curved. This latter construction often works out very well for roofs with light loads such as factory saw-tooths expanded metal reinforcing with light steel framework enables construction to proceed rapidly. The mesh supports the wet concrete without forms.
Using shingles to produce what is sometimes called a "thatched roof effect" is not done with the idea of making a modern shingle roof look like a 16th century thatched roof but to secure, by a means quite legitimate, something of the picturesque irregularity of outline and surface which makes the thatched roofs of old English cottages so attractive. There is no idea of making one material look like something else for no one could possibly mistake a shingle roof for one of thatch.

To use shingles in this way is not particularly difficult when once the method of treatment is thoroughly understood. To begin with, the entire surface of the roof must be given a slightly convex surface which is best done by furring the top of each rafter from 4 to 6 ins. in height at the center of the rafter, gradually diminishing the furring until it disappears entirely at the eaves and at the ridge. Shingle lath are then applied horizontally at about 3 ins. on centers.

Especial care must be taken with the furring at the gable ends of a roof by using 1 x 2 shingle lath running with the roof rafters which will carry the generally convex lines of the roof to meet the hanging verge board. At the rounding of the gable the furring is brought well forward over the verge board and then returned against it by forming, in section, the arc of a circle (Fig. 4). This rounding of the edges of the roof at the gables is greatest at the apex of the roof and diminishes gradually toward the eaves. Sometimes, when it is desirable to have a decided softening of the gable, the roof rafters are set lower at the ridge for a distance of 3 or 4 ft. back from the verge board. To get the best results in such instances the curve at the verge boards should be sudden or abrupt. The valleys and hips are constructed with two rafters blocked apart. This blocking is cut...
satisfactorily with either structural steel or reinforced concrete beams. The ends of the sheet curve down so as to form the sides of the beams. In this way the only form work necessary for the entire floor construction is the boards required at the bottom of the beams. Economy and speed of construction are assured. The curved materials are fabricated in the factory, thus eliminating all field work and saving expensive curved forms.

The operation of concreting itself does not differ from ordinary concrete construction. Runways, consisting of boards, are laid over the mesh for the use of wheelbarrows or carts. The stiffness of the material is considerable, presenting all the aspects of a sheathed job. A 1:2:4 mixture of cement, sand and stone is used, with stones not exceeding 1/2 in. in diameter. A medium wet mixture is used; not the sloppy wetness that is often seen on a job nor too dry but just wet enough so that water will come to the surface when the concrete is tamped. As in all good concrete construction, the concrete work after it has set should be protected from too rapid drying by means of damn burlap or canvas or by frequent sprinkling. The slabs should be kept thoroughly wet in this way for at least two days.

It will be found that just enough of the concrete has bulged through the mesh to provide a perfect surface and key for the plastering of the under side. This can be done any time after the concrete has set.

Factory roof showing metal mesh being applied to steel purlins

Any of the standard types of plastering materials may be used. We would recommend, in this connection, the use of the standard mixture of Portland cement 1 part, sand 3 parts and lime paste 1/10 part. The cement and hydrated lime, after being thoroughly mixed dry to a uniform color, should be added to the dry sand and the whole manipulated until evenly mixed. Add enough water to secure proper working consistency and sufficient long cow hair for key. This mortar should be applied within 30 minutes from the time of mixing.

Where the construction is used on roofs over 200 ft. in length, at right angles to the main ribs, expansion rods should be placed over the ribs and at right angles to them. 7/32-in. or 1/4-in. round rods are satisfactory for this purpose and should be spaced 30 ins. on centers.

The use of this light weight, formless, concrete roof construction is not limited to any type of building. It has been used for large areas of industrial plants, as indicated in the illustrations, and it has proven equally satisfactory in the smallest bungalow or garage. The extreme flexibility and simplicity of the material make it a product of practically universal usefulness. Furthermore, these materials are being stocked locally in all principal distributing centers so that it is a simple matter for the builder to secure either large or small quantities as he may desire. This method of construction has a record of successful use for over a decade, so that the builder can use it with entire confidence of success.

### Safe Loads in Pounds per Square Foot for Slabs Reinforced with 15\% Material (Safe loads include weight of slab. For safe live loads, deduct weight of slab.)

<table>
<thead>
<tr>
<th>Thickness of Slab above Base Material</th>
<th>Moment of resistance per foot of width</th>
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### Maximum Spans for 15\% Material as Centering to Support Wet Concrete

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### Safe Loads in Pounds per Square Foot for Slabs Reinforced with 3\% Material (Safe loads include weight of slab. For safe live loads, deduct weight of slab.)

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<td>8% thick slab</td>
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A thatched roof effect with mineral surfaced asphalt shingles. Note the texture given by the torn edges to form a concave surface in the case of the valley and a rounded surface in the case of the hips. The construction for a typical roof is shown in Fig. 1 and for the valley, hip and ridge in Fig. 2, while the construction for cornice or eaves is shown in Fig. 3.

Instead of following long horizontal lines the shingles must be laid out of the horizontal in long and irregular "waves" so that the exposed courses will vary in width from 1 in. to 5 or 6 ins. The edges of the butts should be cut to a curve and matched one to another so that these long, sweeping curves may be evenly laid. In laying shingles in this way the best effect is had when the "wave crests" and "hollows" come, to some extent, in a diagonal instead of in a vertical axis. It is generally unwise to leave such laying of shingles entirely to the workmen unless they are well trained, so when two courses of shingles have been started at the eaves with their butts together the foreman or the builder himself should use a soft pencil to draw the long, sweeping, curving lines to which the shingles should be laid.

Wooden shingles need be steamed or wet only when laying the rounding at the gables or for sudden turns Gable showing sharp curve to verge board diminishing as it reaches the eaves. W. D. Austin, architect

A roof with dormers breaking the plate in the manner of English cottages. W. Stanwood Phillips, architect
A complicated roof which shows methods to fit various conditions. W. Stanwood Phillips, architect

in the angles between the side walls of a dormer and the surface of a roof. Most wooden shingles are brittle when dry but when wet or steamed can be made to bend to almost any extent likely to be required. The demand for roofs of this character has led to the making of shingles which may be had already bent to almost any degree likely to be needed and with the edges of the butts properly cut. When wooden shingles are being used care must be taken to nail the shingles thoroughly in place so that when they become dry their tendency to straighten out will not pull the nails out of place. Mineral surfaced asphalt shingles have lately been used with good effect on these roofs and because of their being more flexible than wood they present little difficulty. In using them added interest is given the roof if the edges are torn as shown in one of the illustrations which can be easily done in a clamp.

There are several methods of treating the ridge cap when wood shingles are used but perhaps the best method is to cover the cap with metal, carried down at gable ends to within about 2 ft. of the verge board. The objection may be made that metal will weather to a color different from the shingles but the flattening out of the ridge will make the metal covering practically invisible from the ground. Another method of covering the ridge is to use shingles bent with the grain. This, of course, requires considerable care in nailing the shingles into place.

A roof shingled in this way requires the use of more shingles than if they were laid in the usual manner, usually from 50 to 60% more, but, apart from its decided advantages in the way of appearance, a credit item should be entered on the ledger in favor of the thatched roof method by reason of the longer wear of the shingles. When laid in the customary way a shingle is exposed to the weather for about 5 ins. so it is self-evident that a far longer term of service may be obtained from a roof in which the shingles have an average exposure of only about 3 ins. to the weather. It is claimed that a shingle roof of a good quality of shingles and laid in this manner should give good service for 40 years.

A hip roof in which a modified form is used. The curves are slight and the shingles spaced wider for economy.

Alfred Busselle, architect
A CHINA closet is today a necessary feature of the well equipped dining room. In addition to providing an attractive note to the room it is of practical use and in small houses often takes the place of a sideboard, particularly when it is fitted with drawers for the storage of linen.

The cupboard illustrated here is unique in that it has been built in connection with a kitchen dresser, both cupboards being placed back to back. It is simply constructed with the regular room trim enclosing it; a single molding placed near the jamb of the doors follows the curved top of the doors and breaks into "ears" to give a decorative touch. Note that the shelves and muntins are arranged to come at the same levels. A sliding door in the partition between the cupboards makes it possible to pass dishes through from the kitchen.

This would make such a cupboard particularly valuable where, for the sake of economy, a pantry has been omitted.

The construction of drawers is an important detail and a word here about good methods to use may not be amiss. In the first place the cases containing them should be made so there is only sufficient contact with the drawers to support and guide them. A flat frame is built in the case on which each drawer rests and slides. The bottom of the drawer should be let into the sides so that there is a space between it and the bottom edge of the sides. A strip of wood about an inch square is nailed to this frame at each end so that the drawer will fit between them. In a long drawer it is well to have a guide strip also in the center. The bottom should have the grain running across the drawer and should extend beyond the back to allow for shrinkage.
CUPBOARD
from the design of Grandgent & Elwell Architects

SCALE
DETAILS 1/2 FULL SIZE
ELEVATION AND SECTIONS 34'-10''
The Building Loan and Mortgage Situation

**By C. Stanley Taylor, Associate Editor**

Many builders probably know, the United States Senate Committee of Reconstruction, of which Senator William M. Calder is Chairman, has been traveling throughout the United States visiting various important points on an investigation of housing and building conditions, particularly in the chief industrial centers. Investigation has been made of housing and building conditions, in response to appeals for assistance to centers. Investigation has been made of housing and building conditions, in response to appeals for assistance to centers. Investigation has been made of housing and building conditions, in response to appeals for assistance to centers.

Practically all of these hearings have been held in response to appeals for assistance through chambers of commerce and other civic bodies and have involved questions of material cost and supply, transportation, labor cost and supply, coal supply and mortgage money. The most important finding of this committee, applicable at every point, has been the fact that there can be no great resumption of building operations until there is a liberal supply of money provided for first mortgages.

Just when a definite release of mortgage money may be expected is problematical, but it is interesting and encouraging to note that there is a definite tendency toward the development of a condition where mortgage money will be more easily obtainable. One of the most important movements which has been made recently to release considerable money for mortgage purposes has been the concerted attempt by the National Association of Real Estate Boards and through the recommendation of various important committees to have Congress exempt from tax the income derived from real estate mortgages during the next five years.

Walter Stabler, Comptroller of the Metropolitan Life Insurance Company, in discussing this recommendation, says:

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Mr. Taylor is in touch with men promoting building enterprises. Write him for information on any problem of Real Estate or promotion you may have and he will take the matter up by correspondence.

"Undoubtedly the most serious shortage in the entire situation is the shortage of money for mortgage loans to finance building operations. There is plenty of money in the channels, in which the chances of profit are greater or the income taxes less, or where securities are tax exempt. "Mortgage money has heretofore come very largely from individuals and estates, very many of whom preferred this very safe and sure form of investment to other securities of fluctuating values. Formerly, very many conservative men of large means directed their executors to invest the funds of their estates in bonds and mortgages. I doubt if this practice will be continued so long as the income taxes on large incomes remain as high as now.

"When a gross interest rate of 6% is reduced by income taxes to a net of 2 to 3% the non-taxable municipal or State or county or school or even road bonds paying 4% to 5% net are naturally preferred."

"What is the result? Untold millions of money are being entirely removed from the real estate mortgage market and this process will continue unless the income tax laws are so modified that investors will feel justified in again putting their funds into mortgages. They surely cannot be expected to leave their money in highly taxed mortgages or make new investments of this kind when there are many other perfectly safe securities which will pay twice as much because of tax exemption."

"Many of our largest real estate owners have been selling their holdings and requiring payment in full in cash. The replacement of these mortgages and the cash needed to pay all cash for such real estate purchases must be and has been obtained from the savings banks and life insurance companies, which are not so heavily taxed or are practically tax exempt. This removes from the mortgage market just so much money that could have been used for the production of new buildings.

"The life insurance companies, not being subject to taxation in the same way as individuals, can and are lending to the limit of their ability; but life insurance loans must be divided between city loans and farm loans, and farm loans do not increase housing to any extent.

"If all the life insurance funds went into the building of places to live, they would be only a drop in the bucket to what is needed. The savings banks are in much the same position, and they are doing their full duty, but these two great sources of money are and will be totally unable even to begin to meet the necessary demands."

"These being facts beyond dispute, should we not face the issue squarely? Few of the buildings of all kinds that are so much needed can be built unless mortgage money can be obtained in very large amounts. It is imperative that the funds of individual investors and estates be induced to return to the mortgage market if we are to have any resumption of building that will begin to relieve the present serious situation.

"How can this situation be improved? What will bring these vanishing funds back into real estate loans? Manifestly by relieving this best of all investments from income tax exemption."

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"These being facts beyond dispute, should we not face the issue squarely? Few of the buildings of all kinds that are so much needed can be built unless mortgage money can be obtained in very large amounts. It is imperative that the funds of individual investors and estates be induced to return to the mortgage market if we are to have any resumption of building that will begin to relieve the present serious situation.

"How can this situation be improved? What will bring these vanishing funds back into real estate loans? Manifestly by relieving this best of all investments from income tax exemption."
taxes for a period of years long enough to enable us to build what we must have and what we cannot get without this relief.

"There should be Federal and State exemption of all interest on real estate mortgages from the provisions of the income tax, for a period of five years, by which time we should be again in normal condition and our people so well supplied with houses that the fear of lack of shelter and exorbitant rents would be removed; and this should be done at the earliest moment practicable."

Another encouraging feature regarding the building loan situation is the fact that opportunities for investment carrying unusually high interest returns or special features of speculative profit are not now being offered to the public as frequently as in the past two years. The price index of the bond market is gradually climbing which means that standard bonds are offering a decreasing appeal from the investor's viewpoint. The types of promotion activities involving stock sales are not as sound or as interesting as many which have been offered since the war period. Consequently we find that the interest of the public is returning again to the possibilities of building loan and real estate mortgages as a sound investment.

It is evident, therefore, that a turn for the better may be expected in building financing. Every builder should actively support any movement which tends to increase the supply of mortgage money. Recent experience at various points in the country shows that direct pressure by the builder has in some instances resulted in the provision of mortgage money from savings banks and from local institutions. Through the concerted activity on the part of every person interested in any phase of the housing and moderate cost building situation the pressure may be made continually greater until the demand results in a definite increase of money available for financing the construction of dwellings and moderate cost utility buildings.

Good Design a Selling Feature
Realty company recognizes interest of public in attractive houses and secures unique elevations

Walter Hopkins, Architect

In the November issue we illustrated a group housing development in Long Island City which met with exceptional success from the standpoint of sales owing to the careful manner in which the developers, the Rickert-Brown Realty Company, had studied the requirements of the buying public.

These houses were well arranged in their plans and in their interior finish and equipment they showed response to approved modern ideas. The exterior designs, however, left something to be desired. The long series of front porches and the false tile roofs held up by heavy cornice brackets did not distinguish them from many other row houses.

It is interesting to note that this company, in spite of the success attending the sale of these houses, has recognized this defect and in a second development now under construction it has secured the services of Walter Hopkins to design a number of distinctive elevations.

It will be seen from our reproductions that the unusual effect of these houses is obtained by simple and inexpensive means. Combinations of stucco with brick and tile, trim and shutters painted in different and pleasing colors, and the occasional use of a gable between houses with flat tile copings give a variety that will make the block of houses appear practically as individual designs, which is a feature that the home buyer considers a big asset and is willing to pay for.

These houses have a frontage of 20 ft. and are arranged in rows made up of various combinations of the three elevations shown here. The exterior designs show the modern way of obtaining distinctive appearance by tasteful use of materials, color and simple ornament.

Floor plans of houses on this and opposite page
Practical Development Project
This proves that progressiveness stimulates business

A LETTER recently received by the Editor of this department outlines a constructive method of developing a home building operation which may prove of interest to others similarly situated. The letter is quoted approximately as follows:

"I have read with much interest your statement of 'How One Builder Developed a Large Job' (September issue) and relate my experience in a similar development. For the past 20 years I have been agent for an estate which held an attractive piece of property located in a residential town in New Jersey, about three minutes from the railroad station and adjoining a beautiful park. This land comprised the entire center of a block with a 52-ft. strip for a road and also 1200 ft. on an adjoining street. As the estate wished to sell this property I organized a corporation consisting of an architect, a mason builder, a boss carpenter, another real estate man and myself.

We had the property surveyed and laid out exactly as your description outlined except that we expected to build ten 6-room houses around a circle to cost a purchaser (with land 40 x 150 ft.) about $9,000. Also two houses on 60 x 150 ft. to cost $15,000 each. Having purchased the land, laid it out and designed the houses, we were ready to start and had a promise from an insurance company to make a permanent loan of $5,000 each on the small houses. We have, however, been unable as yet to get building loans anywhere as all the building loan companies seem to be loaned up and private capital was not interested, claiming that money was worth 7 or 8%.

"My plan now is to get ten families who will agree to buy the houses when completed to advance at least $3,000 on each and take the finished houses subject to a first mortgage of $5,000 and a second of $1,000."

The method of financing indicated in the above letter is unusually interesting: first, because the owners of the new company are experts in the various necessary lines involved in such a development; and second, because the president of the development company, not being able to get building loan money, but having arranged for permanent loans, is seeking in a practical manner to raise the necessary funds.

Home Sites Demand Continues

EVERY builder knows that activity in the sale of lots for home building purposes represents a valuable indication as to future building activity. In every section of the country, particularly in important industrial centers, the sale of lots on a speculative basis, where the purchaser expects to turn over a lot of the profit, is cut to a minimum. On the other hand, it is evident that the sale of lots, the use of which is directly intended for the construction of homes, continues with almost no decreasing interest. This fact has been demonstrated recently in a number of important cities at auction sales of lots where, if the land is available for home building, the public interest has been intense and no trouble has been experienced in selling lots on a reasonable price basis.

Another interesting indication of the developing interest in home owning is shown by the records of a number of real estate concerns which have sold home sites on an easy payment plan. In spite of the depression in the industrial field, which has resulted in decreased wages and increasing unemployment, payments on lots which have been purchased for home building are not falling behind. In every instance where information was requested from real estate concerns which had sold on this basis it has been found that the purchasers are continuing their payments and seem determined to hold...
the lots until such times as they may be able to build homes. It is found also that there is a considerably increased interest in building loan associations and that many lot owners are turning to this method of financing their future homes. These indications are all healthy and tend to show that there will be within a comparatively short time an active resumption of home building for the individual owner. Naturally, at this time a period of interesting activity will develop for the speculative builder.

A further analysis of the business of real estate developers shows that those subdivisions on which a number of houses have already been constructed, either by the individual owner or by the developer on a speculative basis, still continue to show considerable activity in the sale of lots. In the Business Getting Department of this issue there will be found a discussion of the possibilities offered here for developing business in connection with realty developing. It will be worth while for any builder to analyze for himself local conditions in connection with the sale of lots for home building purposes. Determination of owners of a number of lots which have been sold through real estate offices together with the continued interest in such purchases and the continuation of payments on lots may serve to indicate locally what interest may be expected in home building.

Attractive Small Houses

Attention to plan and design reduces cost to $3500 each

THE industrial housing division of Lockwood, Greene & Company, engineers, has proved in the design of these houses that careful planning will largely offset the high cost of construction. A group of 10 of these houses has just been completed at Newton Upper Falls, Mass., for the Saco-Lowell Shops at an approximate cost of $3,500 each. The plans shown here indicate the attractive and economical arrangement of rooms without any waste space. The houses are grouped about a curving roadway and are all of the same design, although variety has been gained by placing some with gable ends toward the street and others with the ridges parallel to the street, the positions of the porches being changed to correspond.

The houses are complete with good plumbing, furnaces, electric wiring and combination sinks and laundry trays in the kitchens. The foundations are concrete.
Building Contractor’s Relations with Architect

By C. Stanley Taylor, Associate Editor

In recent discussions with a number of building contractors it was found that there seems to be no well-defined opinion as to architectural service and a builder’s relations with an architect. There can be no doubt that a better mutual understanding of the activities and responsibilities of the architectural and building contracting field will prove of value in developing closer and more helpful relations between the architect and the builder. The very fact that an increasing number of architects are developing a knowledge of the construction field to a point where they are placing sub-contracts directly for the owner would seem to indicate that the average general contractor in moderate cost construction has not continuously demonstrated the value of his services in a proper manner to the architect. The principal reason for this condition is, we believe, a lack of understanding on the part of the builder of the exact progress of a job through an architect’s office, and what assistance he may be to the architect in rendering a proper service to the owner.

Perhaps the most practical manner in which such information may be given is to trace the course of a job through an architect’s office showing his service and responsibilities to the owner. Of course many building jobs, particularly where the construction is simple and does not call for architectural design, are placed directly with the builder; in almost every instance, however, where the project is to be of an investment or speculative type, the value of good architectural service is definite in that it provides better selling and renting features. It is usually found, therefore, that the owner who is to invest his money in a good dwelling, store group, theater, automobile sales building or structures of similar types will retain the services of an architectural firm in order that his building may have merit in design and that the plans and specifications may call for the best modern ideas in utility installation.

The architect, therefore, called upon to prepare the sketch plans of a building which can be built at an approximate price designated by the owner. Sketch plans consist simply of an elevation or perspective drawing together with floor plans showing the general layout of the building and any special installations necessary for its character of service. These sketch plans are submitted to the owner, together with a general estimate of cost and upon his approval and authorization working drawings and specifications, together with detail cost estimates, are then prepared.

The first responsibility of the architect, therefore, involves at least two very important points: (a) to make certain that the building is designed to eliminate waste space and to provide the best possible application to the purposes of the owner; (b) to limit in cubic footage and general specifications so that the ultimate cost of the building will not exceed the amount stipulated by the client. Here immediately may be seen an interesting possibility for the builder to render practical service to the architect. The wise architect will call in a practical builder at this point in order to get his opinion regarding layout and cost as closely as may be estimated from sketch plans.

During the past two years it has been very difficult to estimate building costs and many architects have found, to their sorrow, that the sketch plans they have made call for buildings costing two or three times as much as the owner has signified his willingness to pay. Those architects who have worked with practical builders in preparing general preliminary costs have been more successful in limiting the allowance of building space to the possible expenditure. This constitutes a point which the builder may well take up with any architect to aid him in determining the number of cubic feet he can allow in sketch plans for the expenditure which the owner is willing to make. This can be determined by getting an average cubic foot cost on buildings of a similar nature built under like conditions.

After working drawings and specifications have been completed, there are three ways in which the architect may direct the carrying out of the work on behalf of the owner. The first is to place the plans in the hands of several contractors for lump sum bids; the second is to select a reputable contractor and give the work to him on a cost-plus-a-fixed-fee basis; the third is to ignore the general contractor and to place sub-contracts directly along these general lines:—

1—Excavation, foundation, masonry and plastering
2—All carpentry work, including roofing
3—Electrical installation
4—Plumbing and heating installation
5—Painting and decorating

Usually the architect will choose the first method of letting out the work, but it is often found that, because of the uncertainty of the market, the bids from reputable contractors are unusually high. There is also to be considered the fact that the relations between the architect, owner and contractor, where a straight contract is let, are usually strained from the beginning of the operation.

The method of letting jobs on a basis of cost plus a fixed fee is undoubtedly the best, provided the contractor selected has sufficient experience and interest in the work to proceed along lines of the greatest economy to the owner. Unfortunately, the attitude of the average contractor has not been conducive to the establishment of this method.
of doing business in moderate cost construction. There are certain contractors who have done work under this arrangement and given such satisfaction that they may expect a steady line of business. On the other hand, many contractors have undertaken work and have strained their relations with the architect and the owner because they have not felt that definite responsibility which is usually the result only of a straight contract arrangement. If any builder can carry out work on a cost-plus-fixed-fee basis in such a manner that he gains the favor of the architect and owner, he may be certain of a constantly increasing line of business.

Where the architect is interested in letting sub-contracts direct, the general contractor is, of course, eliminated unless he wishes to take certain portions of the work where he will be called upon to compete with sub-contractors bidding. Many building projects which are going ahead at this time have been the result of active promotion work carried out through the cooperation of an architect and a builder. The builder will find it a wise course to give some thoughtful consideration to the actual work performed by the architect not only in developing contact with future owners, but in the introduction of good design and the use of quality methods and materials. What can be more valuable than a proper co-ordination of the experience of both architect and builder, combining the best service of design, selection of material and actual construction in order that the owner may feel that he has received not a part of the service but the service of a real service?

Some builders have an impression of architects in general which they would do well to eradicate from their minds. This is the thought that the architect is only an artist and as a result is impractical and without business or building knowledge. It is true that many architects are hampered by lack of knowledge of actual field conditions. On the other hand, their attention is directed toward gaining more practical field experience or developing the service of a practical builder in co-operation with their own organizations.

In almost every phase of the development of a job through the architect’s office he has need either of practical, direct knowledge of actual construction or of the consulting service of a practical builder. In rendering this service the builder must give due consideration to the demands of good design and at times must be ready to sacrifice what he may consider the most economical construction in order to meet a definite requirement of design which may be an important factor in the entire plan which has been developed by the architect. It will therefore pay any builder well to give more thoughtful consideration to the architect’s place in the construction field and to strive to understand and know him better.

In many cases considerable friction develops when the job is going ahead and the architect or his representative is in the field supervising and checking the work according to plans and specifications. If the builder will take pains to present his difficulties in the proper light and will be slower in resenting what he considers interference on the part of the architect, much of this friction can be avoided and the job will proceed in a smoother and quicker manner. We find that the spirit of architects today shows a wish for closer co-operation and better understanding with building contractors and it is certainly up to the contractor to take advantage of the possibility of closer relations.

Co-operating with Subdivision Developers

We have recently had occasion to receive considerable information from developers of real estate subdivisions in various sections of the country. Some of the points brought to our attention in this analysis are of direct constructive interest to the builder and will be briefly outlined in this article.

The first interesting point is that invariably where subdivisions have been laid out and lots offered for sale greater success has resulted when a number of houses have been constructed on the property. In fact, the alert real estate developer is giving serious thought today to the practicability of building some dwellings on each section of property laid out for sale. The benefit from a selling viewpoint is obvious. Where land is laid out and offered for sale in the form of lots for home building it is evident that greater interest attaches when a number of houses have been constructed on the property. In fact, the alert real estate developer is giving serious thought today to the practicability of building some dwellings on each section of property laid out for sale. The benefit from a selling viewpoint is obvious. Where land is laid out and offered for sale in the form of lots for home building it is evident that greater interest attaches when a number of houses have been constructed on the property showing the residential type which may be expected to develop. At the same time lot purchasers always like to see signs of development and an indication of the type of neighbors with whom they will come in contact if they build on the property. In the case of one large subdivision project in an industrial town of Ohio, a builder was the first to make such a suggestion to the real estate developer. Noting that an attractive piece of land had been subdivided and was offered for sale, he went to the agents and offered to build several houses on the following basis: 1, that they provide the necessary lots free and clear of all mortgage taking in payment a second mortgage on the houses payable in easy installments; 2, that they make use of their credit to assist him in obtaining necessary time on building materials. One real estate company recently informed us that they planned to build on one of their properties a number of dwellings to be sold at actual cost or even at a small loss in order to stabilize values in that particular subdivision and to increase public interest.
Methods in Quantity Estimating

Part VII. Estimating and Pricing Brickwork

By Frederick H. Hunter, Quantity Surveyor

In considering excavation and concrete or stone foundations in the previous articles we have been dealing with matters about which there is little difference of opinion among builders as to how the units for estimating are to be handled. Occasionally a contractor does not take the trouble to separate his own excavation and his trench excavation, and some do not even take the time, in estimating concrete foundations, to figure out the area of the forms but make their price per cubic yard of concrete. Such practices save time in estimating but are less accurate than the more detailed methods which we have described. In the hands of an experienced man they can be made to serve almost as well, but are not to be recommended for use except by men who are thoroughly familiar with the subject. On work that varies very much from the usual, any contractor is much safer in having the details that we have outlined to guide him in setting prices. For instance, if a job has foundations that go well below the basement grade or if the concrete walls are much thinner or thicker than usual the man who trusts too much to averaging his excavation and concrete prices may fool himself badly as to the proportion of trench excavation to open digging or the average amount of forms per cubic yard. One man figures all the brick on the job as common brick and then allows an "extra only" price for the face brick—while another man figures his common brick net and then prices his face brick for the entire cost. It would be a long and tedious matter to attempt to decide which of these methods is better in either case. The Boston report referred to in the first article of this series recommends that brickwork be reported and priced by the cubic foot and that face brick and common brick be reported separately and each kind priced for the entire cost. The writer's personal experience leads him to agree with this report in the first recommendation, but not in the second. On a brick job we think it better to price the face brick as an "extra only" item after having included them in the common brick. Most masons look at the quantity of common brick to get a general idea as to the extent of the job, and if this quantity covers all the brick in the building, except paving brick, it is a much better guide than if one has to hunt through a number of items to get an idea of the whole brick proposition. Again, if we take the face brick as a separate item a certain proportion of them extend into the common brick as bonders and these must be deducted from the common brick quantity and added to the face brick to get each item exact.

When we turn to brickwork, however, we take up a subject where there are many differences of opinion as to how the units for pricing should be handled. One man figures his brick by the thousand, and another by the cubic foot or cubic yard. Some masons do not take any outs for the stonework that comes within the body of the brick wall on the theory that the quantity of brick you figure in will pay for the cost of setting the stone. This is a crude way of handling stone setting because, in most cases, it does not allow a proper amount for setting the stone, and also because it makes the quantity of brick inaccurate just as has already been explained, the practice of "doubling the corners" does. We know of some masons who, after leaving in
the volume of the stone in their brick quantity, add an additional price for setting the stone representing what they already have in as imaginary brickwork.

The procedure in getting at the quantities of brick would not differ essentially were use made of any of the methods noted and the estimator who knows how to take off the cubic foot of brick can easily adjust his quantities to suit the contractor he may be working for. We shall proceed on the basis that the entire quantity of brickwork will be computed in one item and that the face brick will then either be deducted or priced as an "extra only" item. This really makes a difference only in the final figuring.

The man who prices "by the thousand" figures his brick in cubic feet and then multiplies by whatever number of brick he is in the habit of using. Below is given a table of comparative prices of brick "per cubic foot" and "per thousand." This table has been worked out to suit the estimator who figures anywhere from 19 to 24 brick per cubic foot. We have occasionally met a contractor who figures even higher or lower than the range we have covered, but the majority of builders use a number covered in the table. It should be noted that it makes considerable difference as to how many brick are figured as there is a range of about 25% between the man who figures 19 brick per foot and the one who figures 24 brick and sets the same prices per thousand. From the prices given in the table it will be easy to work out intermediate prices or to extend the figures to cover the prices beyond those we have included.

In measuring brick it is best to take the exterior walls of the building first and then the interior. It is also advisable to take the walls one story at a time, as the thickness of the walls, location of "outs," etc., will show on the floor plan for the story you are considering and there is less danger of making a mistake than if you try to take two or more stories at once. Occasionally in a plain building, such as a factory, you will get two or three stories with the same wall thickness and the same arrangement of openings, and it is easy to take these in one lump. In the modern steel frame office building or apartment house where the brick walls are supported on the steel frame at each story and in reality are only a jacket for the building, the walls will usually be the same thickness and have the same outs for a number of typical stories, and much time can then be saved by taking these several stories in one operation. Frequently, for such buildings, one floor plan covers the building from "out to out," occasionally also where a building is a plain box one can save time by taking the two opposite walls in one operation, but this should not be done if there are any considerable differences as the extra time of taking off each wall by itself is usually good insurance against errors. Sometimes on a simple building time can be saved by taking all the exterior walls for a story at one measurement. This, of course, is only where the story height is the same throughout the building, and the walls of the same thickness and openings, in general, of the same size.

If a portion of the exterior basement walls of brick these should be taken off very carefully up to the first floor level. Sometimes there is more detail in the work of taking off the walls for the basement story than there is for the entire work above. If the building is on a sloping site the grade at which the brickwork starts may change several times in the length of one wall and it is necessary to take a series of items, the length of each being the distance the wall runs at a certain grade and when it steps down or up, a new measurement must be begun. If the steps are of even height and evenly spaced you can figure nearly enough by taking an average for several steps but the inexperienced estimator had best go slowly in this matter of striking averages.

As shown on the estimate sheets in the September number a sheet with two columns for extensions is most desirable in taking off brickwork. The "outs" which belong with each "in" item should be set down as soon as the "in" is recorded. In this way there will be much less danger of making a mistake than if all the "ins" are taken off first and then the "outs." Also, the person who figures will be much easier to check over in case it has to be verified or any subsequent changes adjusted, because the number and size of the "outs" which accompany each will help identify the items.

In taking the exterior walls of a building it is best to start at some corner measuring, say, the front of the building from "out to out," then taking the left side wall, beginning the measurement for length at the inside face of the front wall so as not to include the corners in both walls. Then carry this measurement to the outer face of the rear wall so as to include the corner, and so on around the building, taking the last wall measure only from the inner face of the rear wall to the inner face of the front wall because the corner where the side wall meets the front wall has already been included in the measurement of the front. This method of "taking the corner ahead of you" is the safest habit for the estimator.

Occasionally you will find a building that has panels in the walls, the face of the brick being set back 2, 4 or even 8 ins, between the pilasters. In such a case it is best to take the wall as an in for the entire thickness at the pilasters and then take an out for the area of the panel or panels by 1/3 ft. or whatever the panel depth may be. Remember, however, in taking the window openings, which come in these panels, that the thickness of these outs will be only the dimension from the face of the panel to the inside of the wall and not the full depth of the wall, as it appeared in the in.
Saving the Tires in Bad Weather

By H. F. Blanchard, Associate Editor

The builder who needs new tires for his truck is probably hesitating because of the price situation. He is afraid that if he buys now prices will come tumbling down soon afterward and he will therefore lose the amount of the reduction. It is difficult to say what will happen in the tire industry. Some time ago one maker cut his tires 10 to 15%, but none of the others has followed although it was confidently expected that they would. Usually the big tire companies raise or lower prices in concert and the smaller concerns follow suit, but not this time. One of the largest tire manufacturers, who was expected to follow the lead of the maker just mentioned, did make a reduction on the wholesale list of 3%. Retail prices, however, were unaffected.

The conclusion is that tire prices are not coming down much, nor generally; at least not until wages and costs of raw material are reduced. That time is coming, but until that time prices are likely to remain about where they are.

What has been said just now about the tire situation also applies with fair accuracy to the truck business. A few manufacturers have reduced their prices a little, but the price cut, by and large, has been very small. It is not probable that there will be any considerable shrinkage in truck prices until labor and material come down. Therefore the builder who is considering whether to buy a truck now or to wait another month or so will be little or no money out of pocket if he buys now.

Saving on Tires

Truck owners should not attempt to get the last mile out of their solid tires at the expense of repairs to truck power plant, springs and other parts. Tires should not be allowed to wear down so close to the edge of the steel tire base rim that the rim is liable to come into contact with stones on the road.

In this connection the practice of a fleet owner operating forty-seven trucks is illuminating. A tire is removed when it has worn down evenly to a line across the tire drawn at a point 1 inch above the edge or top of the steel tire base. The depth of the rubber of the tire when worn down to the point when it is desirable to remove it is measured from the top edge of the steel base instead of from the line joining the resilient rubber and the hard rubber base because the former measurement can be made more readily. When the 1-inch line has been reached approximately two-thirds of the tire has been used.

Closer attention should be paid to the tires on the front wheels than to those on the rear ones because of the fact that the engine with all its delicate mechanism is carried by the front tires. In no case should a front tire be permitted to run after it has worn below this point although in emergencies rear tires may be permitted to wear a trifle more. If dual tires are used in the rear more chances may be taken because if one tire should go to pieces unexpectedly the other half of the dual may be used to get the truck home.

The rear wheel of the average truck is so heavy that its removal, when necessary, is a problem to anyone who has not had experience. The rear wheel on a large truck may weigh a thousand pounds or more and so it is an awkward thing to handle. The axle should be jacked up prior to removal so that the wheel clears the floor by just a hair. Then

A four-wheel drive truck with pneumatics and trailer. This combination insures power and capacity.
the floor under the wheel and for a distance to one side should be copiously greased. After the nuts are removed it is then an easy matter to slide the wheel off because of the slippery surface.

**Winter Time Precautions**

Now is the time to prepare for snow-covered street and roads. Non-skid equipment should be procured for the rear wheels and carried in the truck so that it will be ready when needed.

When the streets are covered with snow or ice or where mud is deep non-skid chains are desirable in order to secure sufficient traction. Non-skid chains similar to those used on passenger cars may be used on pneumatically tired trucks but these will not serve on solid tired trucks. There are many designs of cross-chain units each one of which is securely anchored in place on the wheel, as illustrated.

It is not well to overload the truck. Note how flat the rear springs are never be simply run between two spokes and over the tread and then the ends fastened together. This method will give the required traction but the recurrent jerk as the chain comes in contact with the ground pulls the chain sharply against the spoke and injures and wears it away. The chains should be fastened securely, either to the spokes or to the felloes to avoid this friction. There are many devices of this nature, one of which is illustrated here.

It should be remembered that chains designed and of a length to fit a new solid tire will have too much play when applied to an older tire that has become worn. The chain is then taken up a link or two to reduce the play. To prevent the loose links from slapping about, the end link should be threaded on the bolt or other holding device before finally securing the chain.

Care should be taken in all cases, when applying chains, that they have some play; otherwise they will wear grooves in the tread of the tire.

On a freezing cold day even such a simple thing as lack of gasoline has been known to cause serious trouble, with a big repair bill resulting. There was a driver last winter who found, when his engine stopped abruptly, that he was out of gasoline. In his haste to remedy the difficulty he rushed off to the nearest garage which proved to be about a mile away. When he returned with the gasoline he found
that his cooling system had frozen solid in the short interim and that the cylinder casting was cracked from end to end. The moral is to remember to drain the water from the radiator as soon as the engine stops, regardless of why it stops. Or better yet use anti-freezing liquid in the radiator. That is the real moral. It is a precaution that is sure to pay handsomely.

These anti-freezing mixtures are recommended:

1. For temperatures below 32° and not lower than 5° above zero:
   - Alcohol 15%
   - Glycerine 15%
   - Water 70%

2. For more intense cold another mixture is advised and is satisfactory down to 15° below zero:
   - Alcohol 17%
   - Glycerine 17%
   - Water 66%

Alcohol should be added occasionally to make up for evaporation. Glycerine does not evaporate.

In summer the oil used in transmission and rear axles should be heavy. When cold weather comes this oil may congeal to such an extent that it fails to lubricate satisfactorily. Therefore it is a good plan to dilute it with cylinder oil, using a half and half mixture of cylinder oil and heavy oil.

If the builder has a place to keep it, it will pay to buy cylinder oil by the barrel. In this quantity the standard grades of oil may be obtained for 50 or 60 cts. per gallon whereas the retail price is $1 to $1.25 per gallon.

A simple device for pulling a truck out of a soft hole. The chain winds on the wheel so that it is forced to mount the plank

A sanding device for slippery streets controlled from the driver's seat

Below—The motor truck and the steam shovel are good partners.

WHERE THE REAR WHEEL DROPS INTO A HOLE OR "DIGS IN"

The Fifth Avenue Coach Co. has two good rules that are worth remembering when driving in snowy weather:

1. When coming to a stop the brakes should be released just an instant before the vehicle comes to rest allowing it to roll free for the last six inches or so. This will prevent the wheels from sliding and glazing the surface causing them to spin when the vehicle is started.

2. When the truck is to be started the clutch should be engaged with the utmost gentleness and the truck should be rolling nicely before it is fully engaged. This will avoid any tendency to spin the wheels.

When the engine refuses to start the cause of its balkiness may be any one of the following, arranged about in the order of their importance:

Lack of gasoline.
Magneto wire to switch short circuited; switch short circuited or not working. Remedy, find the short.
Battery weak; battery wires corroded; wires short circuited; loose or dirty connection at some point.
Breaker points worn or out of adjustment.
Water in gasoline.
Vacuum tank empty or out of order.
Moisture on spark plugs or on spark plug points.
Wet high-tension wiring.
Dirty distributor; worn or broken distributor brush.
Moisture on spark gap.
Air Compressors and Rock Drilling

By Harold C. Bond
Sec. Waldo Brothers and Bond Company, Boston

Rock drilling constitutes an important and often costly part of many classes of contracts. Trench work, road building, grading and foundation excavating are all operations where rock is likely to be encountered and where the methods with which it is handled may make all the difference between profit and loss on the entire job. It is the purpose of this article to deal chiefly with methods and equipment suitable for use in general contracting rather than with machinery of the types required by massed operations in quarries, ledges and mines.

Like most other forms of construction work, rock drilling has undergone several phases of development, and many important improvements both in machinery and in methods have been made in recent years. Only a decade ago the steam tripod drill was in almost universal use. These drills are cumbersome, ranging in weight from 300 to 800 lbs. (including the tripod and weights), and it takes time and men to set them up for operation. Valuable time is lost every time the drill is moved. A boiler is required to furnish the steam and this means fuel and water—both obstacles to easy portability. While the old tripod drill is still used by many contractors, and has its undoubted fields of usefulness in quarry installations and under conditions requiring deep drilling, its popularity on most forms of rock excavation passed with the introduction of the jackhammer. This met with such general approval that practically all drill manufacturers soon brought out machines of this type.

The great appeal of the jackhammer type of drill lies in the fact that it is essentially a one-man machine, carried by hand and ready for work at a moment's notice anywhere. The style most commonly used weighs about 40 lbs., operates by steam or air, and has a range of drilling depth up to 10 or 12 ft. This self-contained unit furnishes air as motive power; complete with gas engine, compressor and air tank.
The light weight compressor is specially fitted for road work. Inexpensive to operate and provides flexibility of plant depending upon conditions encountered. It is equipped with a rotating mechanism which revolves the steels so that the operator has only to keep his drill up against its work to successfully handle horizontal holes as well as vertical drilling. Drill steels with holes down the center are used which permit a portion of the exhaust to pass down through the steel, blowing out the dust and keeping the drill hole clean.

The advantages of such a light, handy drill in general construction work as compared with the heavy tripod drills can be readily appreciated. In trenches, tunnels and caissons, where quarters are often cramped, their economy is particularly marked. Steam shovel owners were quick to adopt them for drilling in front of the shovel, steam being taken from the shovel boiler. In road building, where the cuts are comparatively shallow but frequent, with the ever-present roller usually furnishing the steam supply.

Because of the fact that jackhammers operate with less discomfort to the drill runner and are also somewhat more efficient when air is used than when steam furnishes the motive power, the increased call for air-driven drills soon brought about a noticeable increase in the demand for air compressors. To fulfill the requirements of the general contractor it is necessary that his equipment should be as far as possible self-contained. In connection with rock drilling a gasoline-driven machine which combines the compressor with the engine to run it, together with the air tank, all mounted on a four-wheeled truck for portability, is generally found most desirable.

The earlier outfits were all large, heavy and expensive. Everyone wanted a compressor capable of furnishing sufficient air to run two jackhammers which, because of the fact that in designing jackhammers power rather than economy of air has been the chief consideration, means approximately 150 cu. ft. of air per minute and a 20 to 25 H. P. engine. These machines have been very successful, as far as operation goes, from the first and a large number of them have been and still are being sold. In fact a contractor who does a considerable volume of rock work can scarcely make a better investment than is offered by one of these powerful plants. $3000 is the approximate amount required at present to purchase a 25 H. P. compressor with the jackhammers, hose, steels and usual appurtenances.

But not every contractor can afford big machines like these and it takes a job of some magnitude to justify such an outlay. In addition, their operating expense is necessarily rather high and their weight places limitations upon their portability particularly over rough ground. The very success and popularity of the large machines have, therefore, paved the way for the introduction of smaller compressors which will perform, in a measure, the same classes of work—less powerful, it is true, but at only a fraction of the first cost and with the advantages of greater portability and lower cost of upkeep.

There is a great deal to be said in behalf of the small compressor. That it has met with prompt and general favor in the eyes of the contracting trade is attested by the steadily increasing number of them which have been sold within the past three or four years. Its adoption by the trade and the effective way in which it has demonstrated its usefulness and reliability constitute, in the writer’s opinion, the most significant development yet made in the rock drilling field. Not only has it made possible the use of modern and efficient methods on small operations, where hitherto the drilling has been done slowly and laboriously by hand, but it has also taught the big contractor a good deal about flexibility of plant—a subject which is wisely receiving no long lines of air hose required; the compressor can be placed alongside a trench or other convenient point.
more and more thought from progressive contractors every day.

The up-to-date dealer in equipment has learned to emphasize the importance of flexibility of plant, and its advantages are even more apparent when the same contractor has several widely separated jobs going on simultaneously.

Type B units will drill holes large enough for a stick of dynamite to a depth of from 6 to 10 ft. They are suited for the same general classes of operation as the type A just described but are somewhat heavier to handle as the compressors range in weight from 1 to over 2 tons, and they are of course considerably more expensive. On the other hand, the rotating jackhammer drill penetrates faster and deeper than the non-rotating type which the drill runner has to turn with his wrist. It is usually the nature of the work to be done which determines whether one type B or two type A units would be the better investment.

The type C unit is practically a combination of the two preceding types. There is less portability and flexibility than would be offered by two type A units, but where these two factors need not be considered it has the advantage of having only a single power plant to be looked after and kept running. The number of type C units sold is, however, very much smaller than of the other two kinds.

City and town departments, state highway commissions, industrial plants and contractors large and small are numbered among the users of light rock drilling units. Many of them find supplementary uses for their compressors in furnishing air for riveting, calking, chipping, boiler cleaning and numerous other operations requiring a moderate air supply.

Taking into consideration their reasonable first cost, their low cost of upkeep, their economy as compared with hand labor on small jobs and their flexibility on large work, these light units may well commend themselves to everyone who has rock drilling to do.

### Table: Specifications of Units

<table>
<thead>
<tr>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
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<tbody>
<tr>
<td>6-10 H.P. gasoline-driven compressor, complete with air tank, all mounted on 4 wheels</td>
<td>6-10 H.P. gasoline-driven compressor, complete with air tank, all mounted on 4 wheels</td>
<td>6-10 H.P. gasoline-driven compressor, complete with air tank, all mounted on 4 wheels</td>
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<tr>
<td>1 jackhammer rotating drill</td>
<td>2 non-rotating drills</td>
<td>1 sharpening tool for steels</td>
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<tr>
<td>2 sets drill steels</td>
<td>4 sets drill steels</td>
<td>1 sharpening tool for steels</td>
</tr>
<tr>
<td>1 sharpening tool for steels</td>
<td>1 sharpening tool for steels</td>
<td>2 sets quick-detachable couplings</td>
</tr>
<tr>
<td>1 50-ft. length of air hose</td>
<td>2 50-ft. lengths of air hose</td>
<td>1 jackhammer rotating drill</td>
</tr>
<tr>
<td>1 set quick-detachable couplings</td>
<td>2 sets quick-detachable couplings</td>
<td>1 sharpening tool for steels</td>
</tr>
<tr>
<td>Approx. price, complete unit, $1,000—</td>
<td>Approx. price, complete unit, $1,000—</td>
<td>Approx. price, complete unit, $1,000—</td>
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### Notes:
- The small compressor outfit has a great variety of uses; it is light in weight and may be set up anywhere.
- Five A units cost about the same as one of the large compressor outfits described earlier. Consider what
A Practical Builder's Book

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FOR THE SERVICE OF BUILDERS, CONTRACTORS, ARCHITECTS AND ENGINEERS

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Listings in this Department are available to any manufacturer at the rate of $5 per listing per month.

BOILERS—See Heating Equipment

BRICK
Fire Brick. Circular. Illustrated.

American Face Brick Association, Dept. B, J. 11, 110 South Dearborn St., Chicago, Ill.
The Story of Brick. Booklet. 7 x 9 1/2 in. 55 pp. Illustrated. Presents the merits of fire brick from structural and artistic in. 48 pp. Tastes of comparative costs. The Home of Beauty. Booklet. 8 x 10 in. 72 pp. Color plates. Presents fire designs for small face brick houses illustrated in national competition by architects. Text by Aynar Embury II.

Bradford Brick Co., 2 Main Street, Bradford, Pa.
"Red" Catalog. 7 x 5 in. 50 pp. Illustrated. Covers dry pressed and impervious smooth-faced brick.


BUILDING STONE—See Stone Building

CEMENT
American Materials Company, 101 Park Avenue, New York; Weed Street and Sheffield Avenue, Chicago, Ill. Every Stone of Permanent Beauty. Catalog. 8 1/2 x 11 in. 32 pp. Illustrated. Treatises on composition and application of the cement industry.

Carney's Cement Company, Mankato, Minn. Booklet. 8 x 10 in. 20 pp. Illustrated. Complete information on product, showing prominent buildings in which this cement has been used.

Muller, Franklyn R. Co., Waukegan, Ill. Everlastic Magnate Stone. Booklet. 8 x 11 in.


Medium Review. 6 x 9 in. 18 pp. Illustrated. House orders issued bi-monthly.

United States Materials Co., Weed Street and Sheffield Avenue, Chicago, Ill. See American Materials Co.

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CONSTRUCTION, FIREPROOF


Fire-proof Construction Handbook. 6 x 9 in. 72 pp. Illustrated. Describing Kilo-Form expanded metal lath.

Republic Fireproofing Co., 20 Cortland Street, New York.

Republic Fireproofing Construction for Buildings. Catalog. 8 1/2 x 11 in. 28 pp. Illustrated. A complete description on the two-way construction, its lightness, distribution of loads, saving of loads, saving in structural steel or concrete and its general adaptability to Fireproof Construction.

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Reliance Fireproof Door Co., 47 Milton Street, Brooklyn, N. Y. Reliance Fireproof Doors Catalog. 8 1/2 x 9 1/4 in. 44 pp. Illustrated. Contains details of door and window construction, including molding and trim details.

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Sedgwick Machine Works, 151 West 18th Street, New York. Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4 1/4 x 5 1/2 in. 60 pp. Illustrated.

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Western Electric Decorations for Duplexalites. Bulletin L-1. 6 x 9 1/4 in. 8 pp. Illustrated. Listing a great variety of shades and decorations in parchment, silk, etc., for standard Duplexalites.

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Otis Escalators. Booklet. 6 x 9 in. 36 pp. Illustrated. Description of step and cantle type single and double file escalators (moving stairs).
SELECTED LIST OF MANUFACTURERS’ PUBLICATIONS - Continued from page 52

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FLOOR DOORS—See Doors, Windows and Trim, Metal

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Armstrong Cork Co. (Linoform Dept.), Lancaster, Pa.

A Flooring That’s “Made to Fit.” Booklet. 8 1/2 x 11 in. 14 pp. Illustrated. Descriptive of Johns-Manville Aspenite Mastic Flooring.

Muller Co., Franklyn R., Wadsworth, Ill.
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Oak Floors & Stairways Association, 1014 Ashland Ave., Chicago, Ill.
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Moline Heat Supplement B. 8 1/4 x 11 in. 32 pp. Illustrated. Moline Heat as applied to factories, central station, dry kiln heating, etc.

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North Western Expanded Metal Co., 934 Old Colony Building, Chicago, III.


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Wan-River. Catalog. 6 x 9 in. 55 pp. Illustrated.

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Hope & Sons, Inc., L., Dept. 4, 264 Pearl Street, New York.

Faber Co., Eberhard, 37 Greenpoint Avenue, Brooklyn, N. Y.

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Kawanee Private Utilities, 442 Franklin St., Kewanee, Ill. Specification Sheets. 7½ x 10¼ in. 46 pp. Illustrated. Described in a concise way sewage systems and specifications covering water supply and sewer disposal systems.

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Harrison Granite Company, 205 Fifth Avenue, New York, N. Y. Harrison Granite Company, Clinton, Minn. 8½ x 11 in. 24 pp. Illustrated. A partial list of clients with illustrations of examples of monuments and mausoleums. Indiana Limestone Quarrymen’s Association, Box 706, Bedford, Indiana. Vol. 1, Indiana Limestone Library. 6 x 9 in. 36 pp. Illustrated. Construction details and specifications covering Indiana Limestone, its physical characteristics, etc. Vol. 27, Designs for Houses of Indiana Limestone. 8½ x 11 in. 32 pp. Illustrated. Being the best designs submitted in competition for the most detailed windows faced with Indiana Limestone conducted by The Architectural Review.

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Northwestern Terra Cotta Co., The, 2525 Cloyburn Ave., Chicago, III. Booklet. 8½ x 11 in. 77 pp. Illustrated. Showing in a concise way the usefulness of terra cotta.

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Samson Cordage Works, Boston, Mass. Catalog. 3½ x 6½ in. 54 pp. Illustrated. Covers complete line.

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