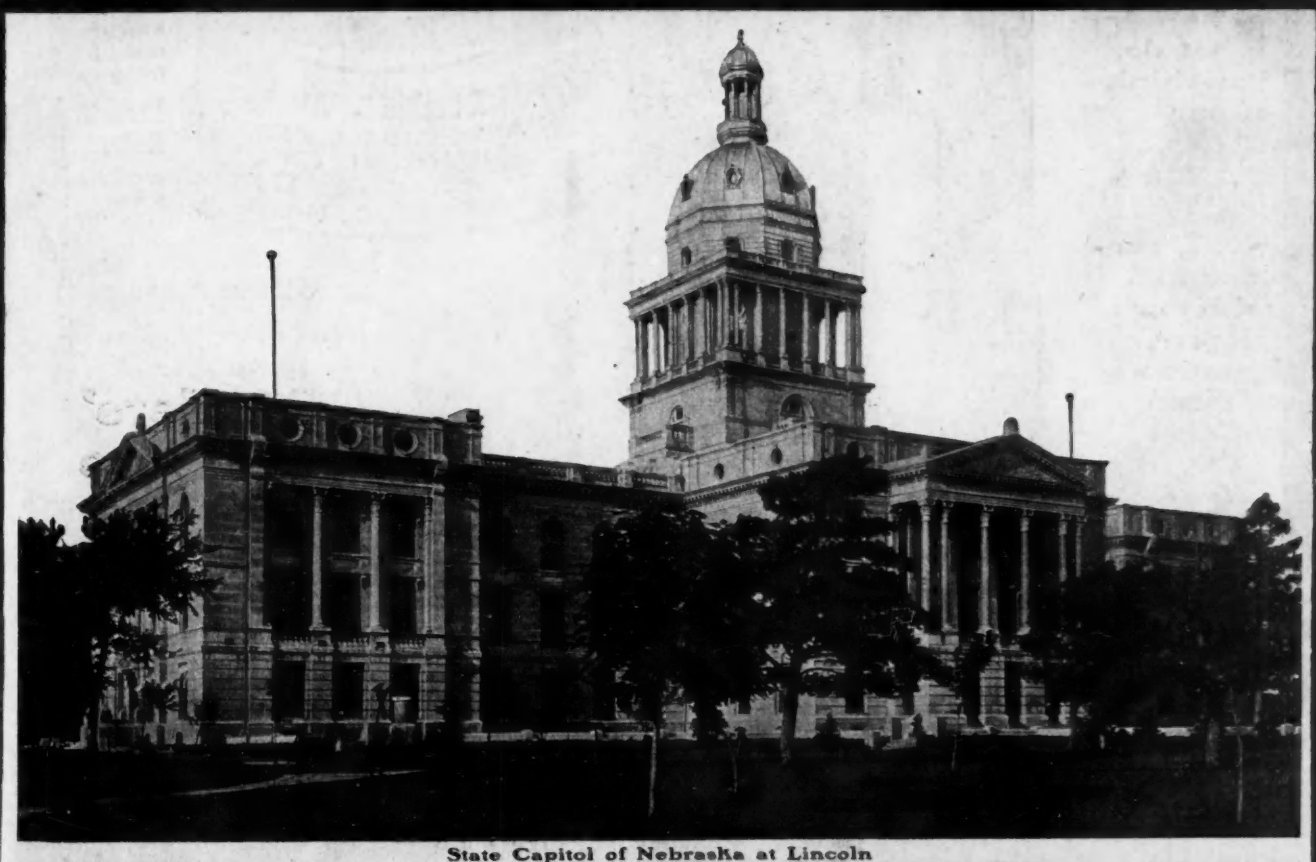


15

AMERICAN CARPENTER AND BUILDER

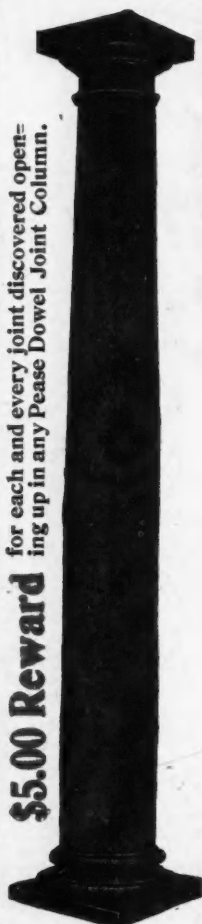


WORKS AND BUILDING PAPER



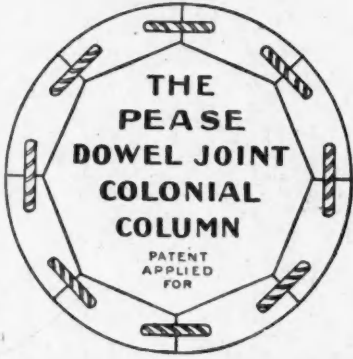
State Capitol of Nebraska at Lincoln

\$5.00 Reward for each and every joint discovered opening up in any Pease Dowel Joint Column.

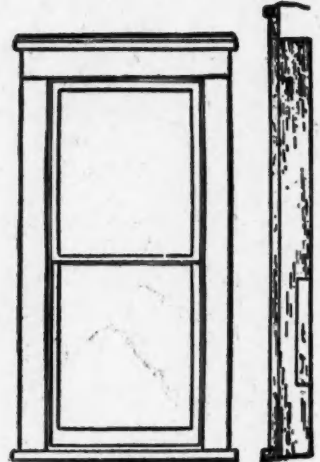


Pease Dowel Joint Column No. 70

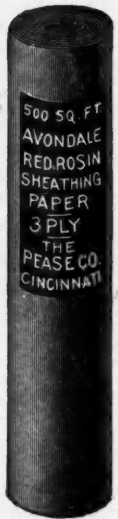
Have You Seen the New **Pease** Dowel Joint Colonial Column No. 70 at **\$1.76 up?**



Would You be Interested in Our Line of Door and Window Frames at **\$1.15 up?**



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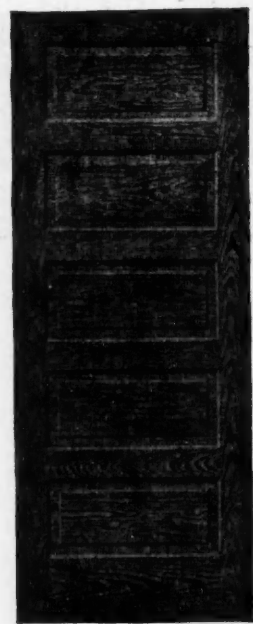


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Stair Newel No. 7



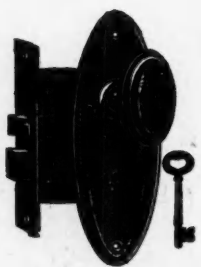
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SHEET & TIN PLATE
COMPANY,

FRICK BUILDING,

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**Our brand
protects you!**

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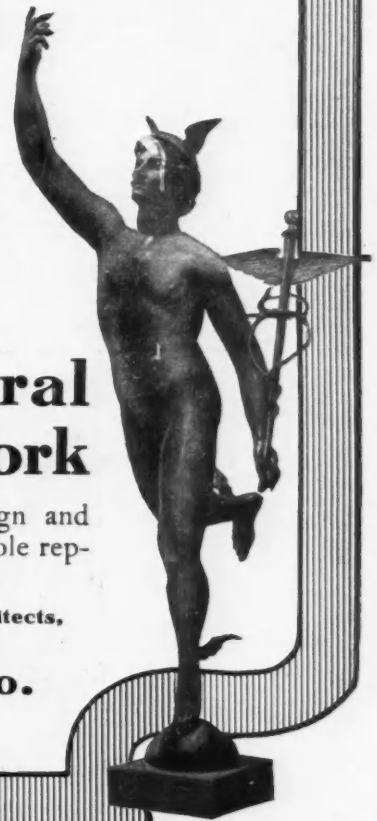
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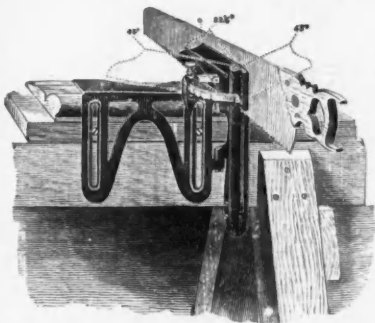
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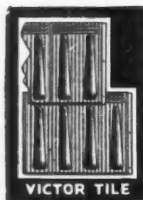
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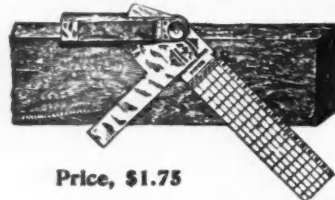
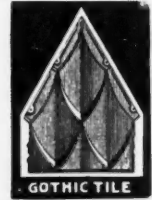
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Do you want to make money laying these shingles? If you do send us your name and address, and we'll not only tell you how it can be done, but help you do it.

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Price, \$1.75

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Saves from 3 to 24 hours in laying out a single roof. Saves time for the skilled mechanic, and enables the ordinary workman to frame the most difficult roof with absolute certainty.

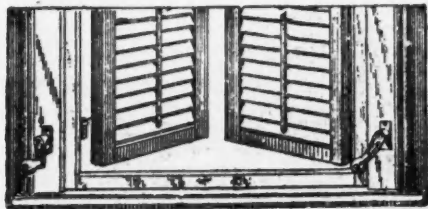
IT DOES ALL THIS. It is accurate, thus preventing all mistakes. It gives angles for any pitch. It gives lengths for any rafters. It gives cuts for principals, jacks, hips, valleys and cripples. Saves time for the skilled mechanic, and enables the ordinary workman to frame roofs with absolute certainty.

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The Hess Steel Furnace

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WE GUARANTEE SUCCESS OR NO PAY

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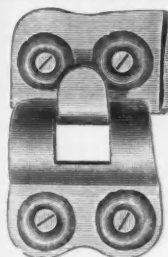
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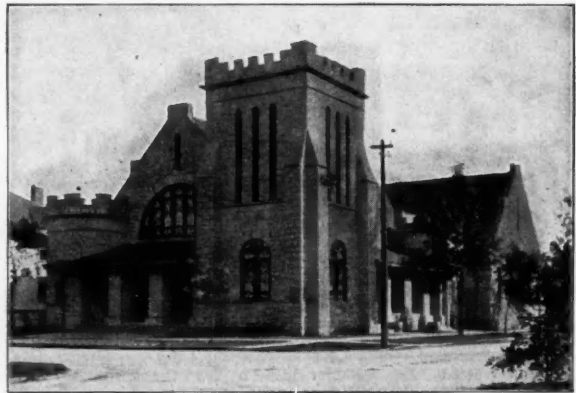
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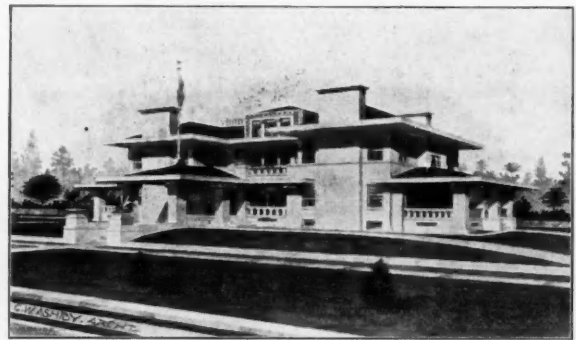
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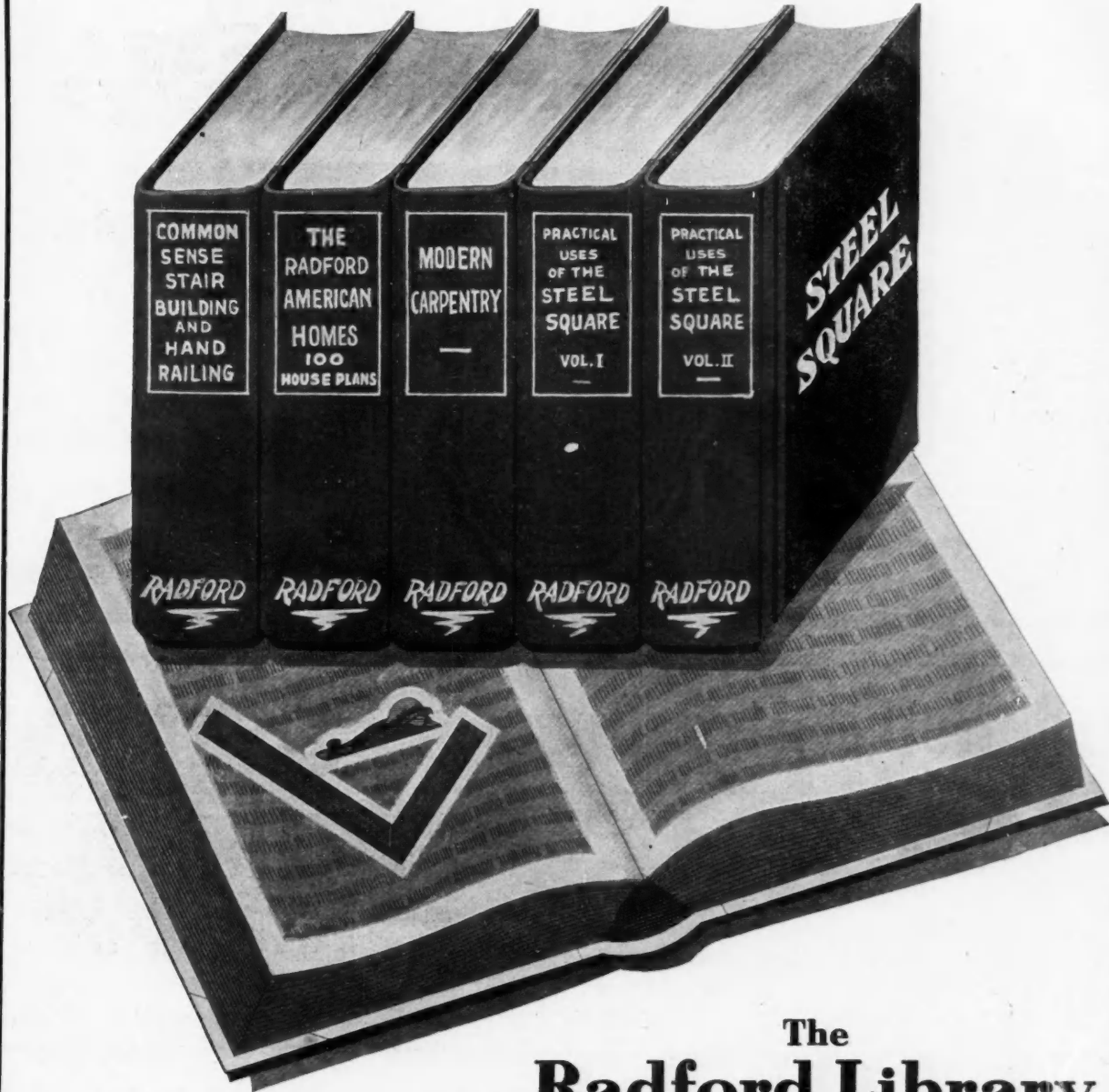
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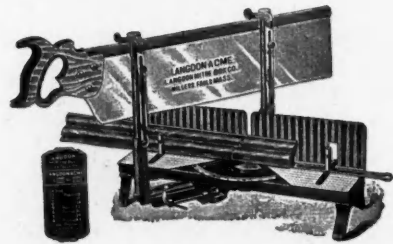
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with a "Little Wonder" faucet water motor. This furnishes the **cheapest, most reliable, and most convenient** light power plant in the world, and every mechanic should bless the day when he saw this ad. Costs but a penny a day to run and will pay for itself in time, trouble and energy saved within a week. Attaches to any water faucet and supplies from $\frac{1}{10}$ to $\frac{1}{2}$ horse-power according to your pressure. With the emery wheel or grindstone it will keep knives, hatchets or any kind of edged tools sharp and bright. The buffing wheels will clean and polish metal and steel tools so they shine like new. The pulley will transmit power for a dozen uses, such as running a small saw, fan, dynamo, sewing machine, etc.

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We recommend as a perfect tool and one that will give the utmost satisfaction



The Langdon Acme Mitre Box

This cut shows the Size 2 Box with the saw suspended by the elevators, the moulding held by the supporting guide on one side, and brought against the length gauge on the other.

The bottom boards to this Mitre Box are made of sheet steel, slightly roughened.

The elevators (as shown in cut) may be used for extreme heights or for varying depths for cutting tenons, etc.

The graduated arc indicates all angles. Attached to the box is a metallic index plate, explaining these angles.

The supporting stock guides and length gauge will be found very useful.

Polished parts are nickel plated.


These Boxes are made in three sizes with varying lengths of saws.

Send for catalogue C, giving full description and prices.

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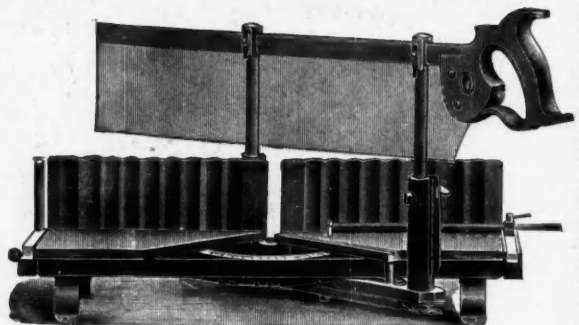
Goodell Mitre Box

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NO MORE BREAKING  FIRST
in QUALITY and IMPROVEMENTS

Automatic Stops for Holding up Saw. Corrugated Backs. Graduated. Gauge for Duplicate Cuts and many other features

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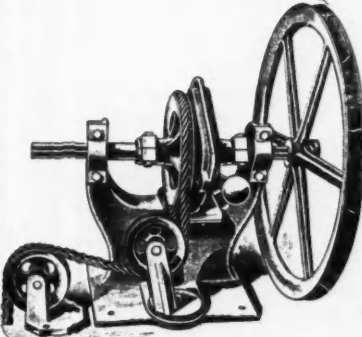
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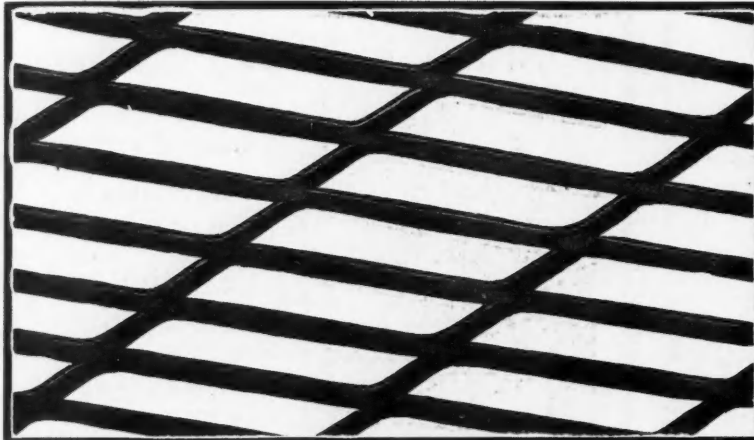
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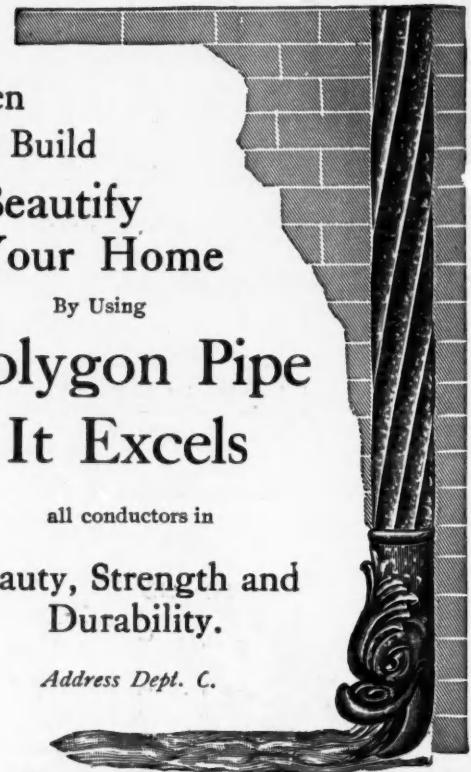
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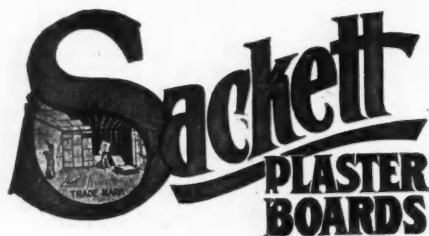
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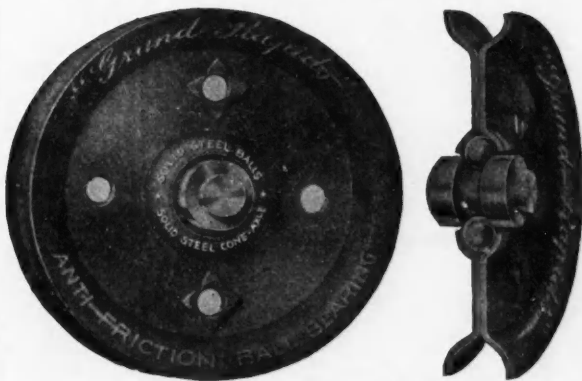
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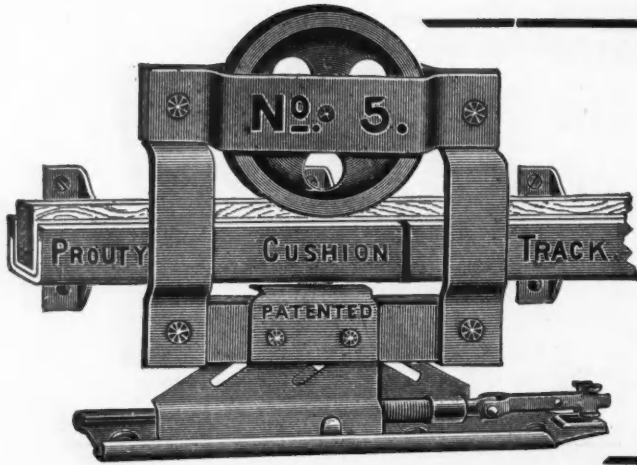
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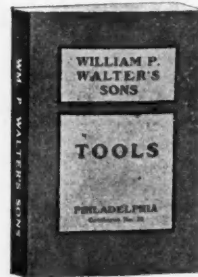
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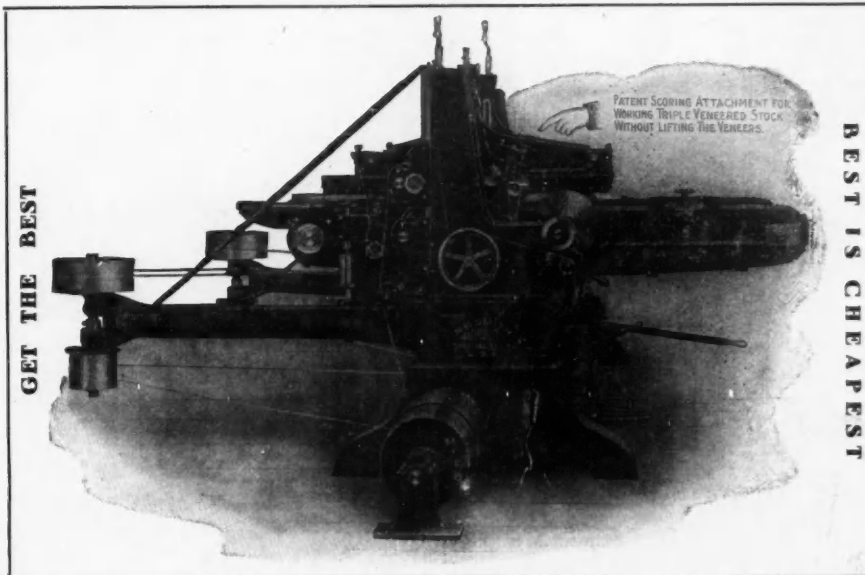
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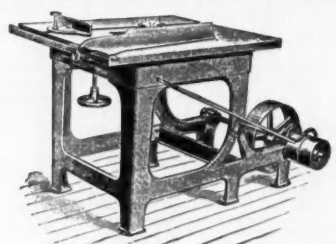
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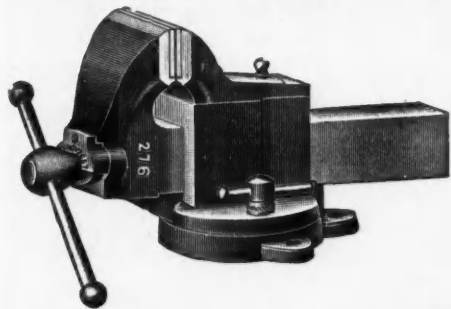


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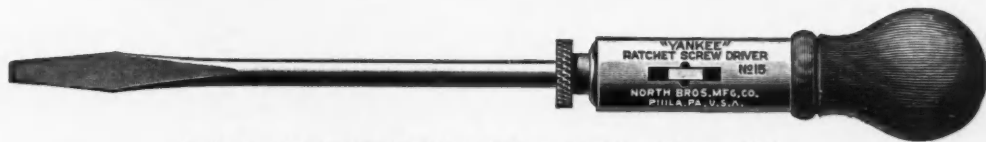
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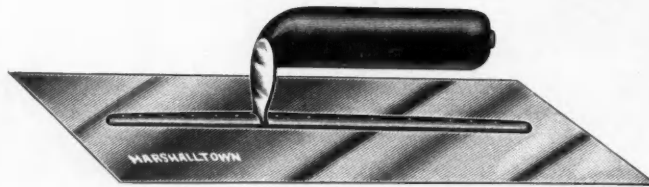
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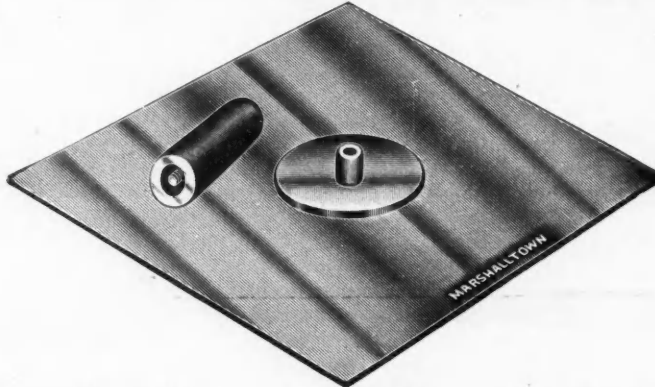
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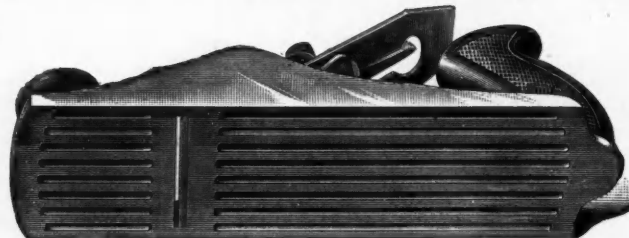
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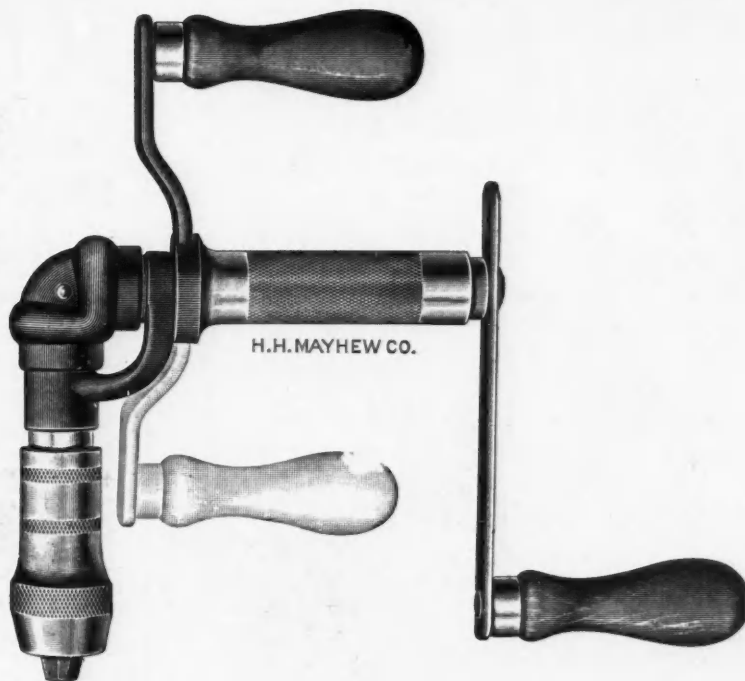
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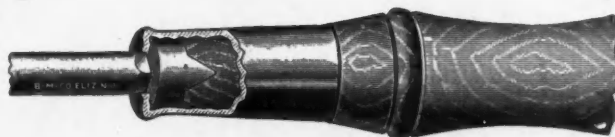
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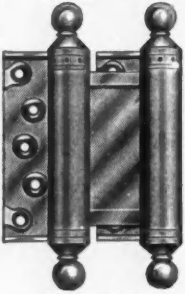

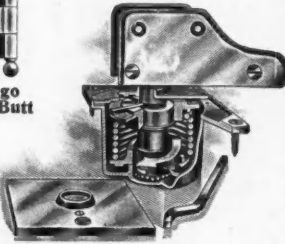
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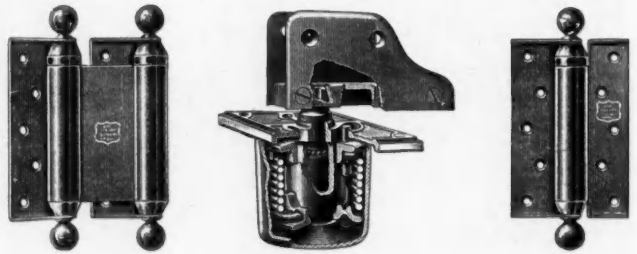
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American Carpenter and Builder

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WILLIAM REUTHER, EDITOR.

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Building More Homes

THE building of more homes and better homes by the people at large not only furnishes lots more work for the machine wood-worker, but it is an evidence of national development that stands for more real progress, more national backbone, than all the sky-scrapers that have been built. It is an indication that we are not only prosperous as a people, but

have learned how to use our prosperity to the best advantage.

Christmas

THIS is the season of the year when the children are counting the days and writing their annual letter to Santa Claus in which they express their greatest desires and trusting with the simple faith of childhood they will be fulfilled. On the other hand the parents are earnestly endeavoring to fill these desires to the best of their ability. It is a problem which must be decided in every home, and our Christmas wish is that your desires and those of the children are within your means and that the pleasures you anticipate will be fulfilled, for then your Christmas will indeed be a pleasant and merry one.

National Cement Users Convention

THE second annual convention of the National Cement Users will be held in Chicago January 7 to 12, 1907. As this is the most important convention of the year to those interested in the use of cement we would urge everyone to attend. Topics of vital interest to the industry will be discussed by men who are authorities on these subjects, and who are devoting all their time to the furthering of this great industry. Machine manufacturers who have profited by the experiences of the past year have completed new models which will be on exhibition for the first time and they will demonstrate the capabilities of their machines. As a convention is a gathering where valuable information is willingly handed out, it would be profitable for everyone to attend.

How Do You Do It

HOW do you do it? Questions like that regarding various operations in building are being asked by our readers every day. We are always glad to have them asked and take pleasure in helping you out. When you have a question to ask, why not also describe some plans of your own which you have found valuable? Information of this kind is always welcomed by our readers, and we will be glad to not only

answer your questions through the magazine, but also publish your letter. This will start a discussion among the boys which will be of benefit to all. Many of them will be under obligations to you, and in return they will describe other matters which will be of interest and value to you, and ask other questions the answers to which will not only benefit them but also you and many other readers. Don't be afraid to write and illustrate your letter with sketches or drawings—we have men who do nothing but redraw sketches. You furnish the idea and draw a rough sketch. We will put both in proper shape for publication. Let's all work together for the good of each other.



Special Millwork Number

A SUBJECT which is of vital interest to every carpenter and builder is millwork. It is that material which puts the finishing touches upon every building, filling the openings, rounding out the interior and very often causing premature gray hair by the rapidity with which it is delivered. We have therefore decided to devote the greater part of an entire issue to this phase of the work, dwelling upon the various stages through which the lumber passes before it is ready to be used on buildings. The various interior finishes will also be fully described, bringing out the good and bad qualities of each, so that you will be better able to decide which to use in the future. For the purpose of giving our readers the fullest possible information along this line we have decided to set aside our January issue and designate it as a "Special Millwork Number." None of the regular departments will be neglected, but there will be many additional articles, all of which will be profusely illustrated with fine photographs, taken specially for this number. No one is barred from contributing any information relating to millwork and its manufacture, as it is our desire to bring as much information as possible to our large family of subscribers.



Our Special Representatives

MOST of you have undoubtedly noticed the series of articles which began last month on the methods of building in foreign countries. These are written by two of our representatives, who are touring around the world on wheels, and as they go from country to country they send us their impressions of the methods of building in vogue. This is interesting, as it puts us in touch with what is going on in other countries along our line; it is instructive, in that we may find some methods used which are better than ours, and we can profit thereby. It should be the ambition of every carpenter and builder to be in touch with what is going on in his line in every country in the world, comparing, criticising and profiting. Why is it that the teachers in our schools study the methods used in foreign countries, and our commercial men

their business methods? Not for the purpose of copying, but to find out why they do things differently and then go about and improve on what they have seen and read. That is what makes our educational and commercial systems the best in the world; we profit by the experiences of others. That is our object in publishing these articles. You may not get any new ideas or new methods, and if you don't you have the satisfaction of knowing that our methods of building, as well as every other line, lead the entire world.



Metal Lath for Exterior Plastering

THERE has been considerable discussion among the architectural profession of late as to the durability of iron or steel lath for exterior plastering, as it has been discovered that in several cases where repairs were necessary on houses that had been built seven or eight years ago, the metal lath had corroded in places so badly that it left practically nothing but a streak of rust. These instances having been brought to our attention we have taken careful pains to investigate the causes and find that in all cases the trouble was due to defective construction. It is a well known fact, accepted beyond dispute, that the best preservative of steel is Portland cement, so that the whole question resolves itself into a carefully executed job of exterior plastering.

The metal lath should be thoroughly imbedded and covered on both sides with Portland cement mortar. It being impracticable to plaster on metal lath to any extent with pure Portland cement and sand, owing to the lack of plasticity in this material, it is customary to mix a small portion of well haired lime mortar in the first coat of cement plaster for exterior purposes. This is a weak point in exterior plastering, as the temptation to make the job practically a lime mortar job is in many cases irresistible.

Again there is a tendency to cheapen the work and to employ a "cob-web" weight of lath instead of 24 gauge lath. It can readily be seen that the heavy gauge lath should always be employed; and to prevent oxidization in the early stages of the plastering, even the heavy gauge lath should be coated with a protective paint, preferably asphaltum.

The whole question resolves itself into this: An honest job at a fair price will always prove satisfactory and last forever. In this connection we would urge upon our readers the great importance of providing an air space between the interior face of the plastering and the decking of the house. No matter how carefully the plastering is applied, moisture will beat through during severe storms and if a warm air space is provided this moisture will be evaporated without damage to the plastered exterior. If this air space is not provided, moisture will rest in the plaster and evaporating slowly will have a tendency to corrode the metal. It is essential for good construction that all openings should be properly protected by flashings.

Winter in the American Forests

BY WALDON FAWCETT

THERE is probably no section in the United States where the rigors of winter compel a more complete suspension of activities on the part of the building trades than in our northern forests, yet it is an interesting coincidence that the snow-time period is the busiest season of the year for the lumbermen operating in these same forests. Whereas a temperature of from 10 to 40 degrees below zero and a mantle of snow that in many instances reaches to the second story windows of the houses, put a pretty effectual stop to building operations in general and even prevent "inside" work in unheated buildings, these conditions are but the expected characteristics of the harvest time of the loggers.

barrel tanks mounted on sleds and an arrangement of pipes directs the flow of water in front of the runners.

The activities mentioned characterize the actual season of lumber transportation, but an immense amount of preparatory work has been necessary ere the season really opened. In the autumn the roads are laid out and graded with all the care that would be bestowed upon a boulevard and wherever there is a brook or pond convenient to the road a pool is prepared that will serve as one of the miniature reservoirs for supplying water for flooding the road. Incidentally it may be explained that the replenishing of the water supply of these ingenious sprinklers is accomplished by means of the team of horses which are temporarily unhitched



The Woodsman's Harvest Time

In the lumber regions of Maine, the Adirondacks, northern Michigan, Wisconsin and other notable sources of timber supply the trees are, for the most part, felled in the late autumn or early winter and after being cut into log lengths are hauled on huge sleds over specially prepared ice logging-roads to the banks of the river or stream down which they are to be floated to the sawmills during the spring freshets.

The preparation and maintenance of the ice roads constituting the main arteries of traffic for a logging camp is a time-consuming and costly operation. One prominent lumberman who operates twelve camps in Minnesota employs one hundred men and an equal number of horses working night and day, hauling water and performing the other work necessary to keep the roads in condition. The water is hauled in eighty-

from the sled and set to work raising and lowering a huge bucket.

As successive layers of ice form as a result of the flooding of the highway the level of the road is gradually raised and then a rut-cutting machine is put to work cutting the narrow pathways for the runners of the log sleds, so that these vehicles actually travel in grooves. The loads of logs hauled over these ice roads never fail to excite the wonder of the lay visitor to a northern logging camp. The sleds used have, in most instances, a bunk or bed fourteen feet in width and the logs are piled to a height of twelve or fifteen feet, being held in place by chains around the whole mass. The outside bottom log on one side is fastened to the sled at each end by a short chain, caught with a grab-hook. When a load of logs reaches its destina-

tion these hooks are knocked out with an axe and this brings down the whole pile—a forceful example of simple and speedy unloading.

A sled load of five thousand feet of logs is accounted below the average in many a logging camp and yet, inasmuch as a thousand feet of logs weighs approximately about three tons it can be seen that such a load represents in the neighborhood of fifteen tons. There are well authenticated instances where as much as

item of expense, particularly if, as in one case, forty such bridges are required in a five mile stretch. Swampy or marshy tracts must be corduroyed with poles laid closely side by side, ere any ice is allowed to form. At each down grade on a logging road a man is stationed with sand or hay to check too headlong a descent by a log-laden sled, while at the foot of each incline an extra team is on hand to help each successive load up the grade.



Forest Dwelling in Winter

twenty thousand feet of logs of sixty tons have been loaded on a single sled. At some logging camps economical lumbermen have adopted a system known as "trailing," and are moving with the horse power formerly required for a single sled a train of three sleds, hitched one behind the other, and each loaded with eight thousand feet of logs—a total of seventy-two tons handled by one driver.

The average length of ice-paved logging roads is about four miles but highways of considerably greater length are to be found in some timber regions. The roads are at least twenty-five feet wide, and if streams are to be crossed they must be spanned by bridges of the staunchest construction in order to support the heavy loads. This bridge building is in itself a heavy

For all that to the average woodsman winter means long hours and hard work—a feverish activity to get out all the logs ere the first spring "thaw"—there are some pleasures thrown in, and one of the most picturesque celebrations of Christmas to be observed in the length and breadth of the land is that in a typical logging camp in the pine woods of the north.

The approach of Christmas is heralded in a logging camp by a series of contests in skidding, the hauling of logs and other phases of the work in which competition is possible. The losing crews in the various tests of woodcraft skill must buy oysters and beer and other delicacies for a Christmas treat for the victors. Very little work is done in a logging camp on the day before Christmas and during the day one team makes a trip

to the nearest store, which may be anywhere from five to twenty miles away, and comes home laden with holiday supplies, consisting principally of fresh butter, beans, fresh meats, sausage and perhaps turkey, together with smoking and chewing tobacco and the liquid refreshments for which provision has been made by the losers in the log rolling and other contests.

Yet another preparatory chore is the bringing in, on a big "bob" sled of a sufficient supply of wood to feed the big open fireplace in the "bunkhouse" during the

It is close to midnight when the head cook calls a halt on the revelry by extinguishing the flames of the oil lamps suspended from the ceiling. In recognition of the occasion the loggers do not arise on Christmas morning until 7 o'clock, or full two or three hours later than usual. Each woodsman dons his best clothes, including in many instances the multi-colored and picturesque Mackinaw coat.

Breakfast is omitted so as to sharpen all appetites for the "extra dinner" which is to be served about



A Forest Belle

ensuing forty-eight hours. There is plenty of fuel at hand—odds and ends from the logging operations sawed to fireplace size, that is, three or four feet in length, but an enormous supply is required, for the lumbermen maintain a high temperature in their rendezvous. Indeed, it is one of the surprises of woods life that these rugged loggers who are accustomed to working for hours at a time in a temperature far below zero insist upon maintaining a temperature of from 90 to 110 degrees in the common living room.

After supper on Christmas eve the lumber "jacks" proceed to "cut loose" in a boisterous jollification, of which a general "hoe-down" to the music of an old fiddle or two is almost invariably a prominent feature.

10:30 o'clock in the morning. Promptly at that hour a bugle call floats out from the "cook shanty," and all the men in camp stampede for the eating house. The men range themselves around the table—perhaps forty feet in length—without much ceremony, although the place of honor on this occasion is usually accorded to the captain of the logging team that came off victorious in the pre-Christmas contests. One of the men may be asked to say grace, and if he accedes to the request the phraseology of the blessing is likely to be something after the fashion of "O Lord, this is Christmas, and if you have forgotten it we haven't. We have got a good dinner and lots of it and we are awful glad. Amen."

To cook for a company of from eighty to one hundred husky lumbermen, either at Christmas or any other time is no light task. In the average camp the culinary department is in charge of a man and his wife (almost invariably Germans) who hire out as professional cooks and who have the help of two masculine assistants. They work over a range that is more than ten feet in length, and on top of which stands a coffee can that holds as much as a barrel; a meat pot that has a capacity of one hundred pounds of pork or beef, and a vessel in which there can be boiled a bushel of pota-

sidered a good load. Quite a contrast to a recent achievement wherein a single pair of horses hauled for a distance of more than three miles a load of nineteen thousand feet of logs—a dead weight with the sled of more than fifty-seven tons.

In the Adirondacks, in certain portions of Maine, in the lake region of northern Michigan, and other portions of the forest domain which are popular vacation and tourist Meccas in summer, there is another class of wilderness workers who are almost as busy as the lumbermen during the winter months. This contin-



Snowed In

toes. In the under part of this range are the ovens, in which there are baked every day from ten to fifteen square feet of biscuits.

The forest toilers of the present day are not working any longer hours than their prototypes of former periods—they could not very well increase the interval of labor, for the sixteen or eighteen hour working day has long been in vogue in the timber country—but they are accomplishing more by reason of improved methods. One of the most important of these is found in the operation of the ice roads such as have already been described. In the old days the logs were hauled directly over the snow and four thousand feet was con-

gent is made up of the contractors and builders whose occupation is the construction of the log cottages which are so popular with these transient residents for use as summer homes. Any carpenter who has had any experience in this class of work knows the wisdom of getting out his logs for cottages, breakwaters, rustic bridges, etc., in the winter, when they can be easily and economically moved over the snow to the points where they will be needed when actual building operations begin in the spring. This plan of assembling his material at a time when he could not otherwise be profitably employed is also an economical one for the builder.



Short Talks With Our Subscribers.

WHILE we aim to make every issue of the AMERICAN CARPENTER AND BUILDER a "special" one, and we try to make each surpass the one previous, yet from time to time we put forth extraordinary efforts and publish a number in which we thoroughly cover some topic of particular interest to our "great family" of subscribers. Our January number will be one of these. It will be devoted particularly to millwork and descriptions will be given of many interesting matters in relation thereto. This January issue will be known as our "Special Millwork Number"—it will consist of at least 150 pages and will be fully illustrated with some of the finest photographs we have yet published.

We will not attempt to enumerate the many interesting articles which have been prepared expressly for this big number, but will mention only one as an example. "Giant Log Rafts of the Pacific Coast" will be given the most prominent location, as it is profusely illustrated with some excellent photographs, and gives a vivid description of this remarkable feature of lumbering. It illustrates and describes the building of rafts containing 8,000,000 feet of lumber, drawing twenty-two and a half feet of water and valued at \$60,000.

Many of our readers are undoubtedly not familiar with this and other processes connected with the production of the raw material which they use in their every-day work, and these articles will be found both interesting and instructive.

The Best Ever

While a great amount of space will be given over to "millwork," in all that the term implies, yet none of the regular departments will be neglected. Every one of the departments contained in this number will have special articles and the magazine will in every way be far better than any previously published. This is a broad statement, when some of the beautiful numbers we have issued in the past are considered, but we assure you when you see the magazine next month you will agree with us. You may think it impossible to surpass our "Special Carpenters' Number," issued in October, and we were inclined to think so ourselves at the time, but our plans are now so far progressed that we feel confident we will surprise you next month.

This "Special Millwork Number" will start the year 1907, and it will be followed by some very interesting

issues. We have made some big plans for the year—plans which to some it would seem impossible to carry out, but we are not easily discouraged. We are bound to improve every month, and each month will give you a little idea of what may be expected the following month.

Our New Offices

Now we want to tell you a most important piece of news. We have outgrown our present quarters and must move. We have secured an entire floor in one of Chicago's largest office buildings, containing 8,000 square feet of floor space. This is now being fitted up for us, and will be ready for occupancy January 1. We are sparing no expense in making it one of the finest offices in Chicago—one to which we will be proud to welcome our friends and the members of our "great family."

One important feature is to be a large reception room where we can entertain our subscribers and friends when they come to Chicago. This room has a large fireplace and is to be fitted up with suitable furniture for the purpose for which it is intended. Subscribers from out of town can write their friends to meet them at "The reception room of the AMERICAN CARPENTER AND BUILDER;" they can have their mail addressed in our care—we will be pleased to look after it, and if any comes after they leave the city we will forward it to their home address. Writing materials will be at their disposal and we will at all times be ready to give information on any subject, and will be glad to direct them to any part of the city.

You Are Always Welcome

Many of you have already taken advantage of our invitation, and we feel sure that those who have, felt that they were entirely welcome. We want you to get personally acquainted with us and we want you to feel that whenever you come to Chicago the AMERICAN CARPENTER AND BUILDER will be one of the friends who will be glad to see you.

We will want all of our friends to see our new offices, as they will be particularly attractive. All of the interior finish will be mahogany, and all partitions will be of glass, so that an uninterrupted view can be had of all parts of the floor. In our February issue we hope to give a full description of our new home and to illustrate it with some fine photographs.

Building Construction in Great Britain

ALMOST UNIVERSAL USE OF STONE AND BRICK—SLATE AND THATCHED ROOFS—SMALL FIRE LOSS AND REASONS THEREFOR

THERE is one universal characteristic in the buildings of Great Britain—they are very seldom constructed of any materials but stone and brick. The most magnificent public buildings, city halls, palaces, art galleries, libraries, or the dwellings of the highest or lowest, they are all built of stone or brick. Of course there is no difficulty whatever in accounting for that fact, for it means simply that lumber is dear and scarce, and that these more substan-

larger blocks of stone in the construction of many of them, and they seem to have been built for all time.

Even during the course of construction this idea that everything must be solid and even permanent finds expression. The scaffolding which the Scotch or Irish builder uses receives a great deal of attention. He builds it carefully, solidly and often he spends three or four times as much time on making sure that it will be solid and serve its purpose, as an American



Slate Roof Used in Ireland

tial materials are in comparison easily obtainable. But it adds to the general impression of solidity and permanence that you gain as you travel throughout the islands. Everything everywhere, be it in city or country, gives the impression that it has been built for all time, built well. There is no sign of buildings hurriedly thrown together. Garden walls, sheds even, are substantially built of stone or brick. The buildings of one of the great cities do not appeal to the traveler in the same manner in which those of a great city in America do. They are lower always, and there are

would really consider necessary. In Edinburgh a number of men were at work cleaning the sides of an elaborate building modeled after the Renaissance style, and carrying a great deal of sculpture and small towers on its sides. A specially constructed scaffolding in the form of a moving tower was used. It was constructed of heavy beams, braced and bolted in a dozen different ways. There were never more than three men upon it at the same time and scaffolding constructed of much lighter material would have served the purpose equally as well, and would have

saved time and expense. But the Scottish workman insists that his scaffolds be strongly built.

In our journey through Northern and Eastern Ireland we saw a number of houses—usually of brick—under construction. Here again we saw that this idea of strong and perfectly secure scaffolds had its expression. It is very doubtful if workmen in the old countries here would consent to climb upon some of the lighter scaffolds which are commonly used in the construction of small frame dwelling houses in the States. These dwelling houses which we noticed were being built from scaffolds erected on poles on the exterior of the walls, thus differing from the common method of laying brick in the States, where the bricks are laid from scaffolds on the interior of the walls. These scaffolds were strongly built of heavy timbers, often heavy poles served as uprights, and the cross bars upon which the scaffolds themselves rested were bound into place with heavy ropes.

The stone cottages in the rural districts and small towns of Northern and Eastern Ireland aid in giving these districts a quaintness that is quite characteristic. Even the meanest huts here are usually of stone, which is plentiful in these parts. The walls on the exterior, and often on the interior as well, are whitewashed frequently, and there is a picturesqueness about the country that is greatly added to by these clean white cottages, nestled in among high green hills, or set off against the golden yellow of a ripened grain field. Usually these little cottages are of two rooms, one of them serving as the kitchen, dining room and general sitting room. There is always a huge fireplace or grate on which the cooking is done. Stoves are unknown. In the rural districts these cottages are about 20 feet by 12 feet in dimensions, and have but a single entrance, that in front. The doorway is low, hardly six feet in height. For that matter, it is seldom more than a matter of six feet from ground to "eaves." The door is usually of two pieces; the upper half opening and closing independently of the lower. There is seldom but one small window opening into each of the two rooms, one cut on either side of the doorway which always opens into the "kitchen."

In the country districts the roofing is always of thatch, and even in many of the towns in Ireland we saw long rows of thatched roofed buildings. This thatch is usually straw, the oat-straw that is so common being most frequently used. We were told by several farmers who inhabit these thatched roof buildings that the roof is a very satisfactory one, and one of them told us he preferred it even to slate, which is found occasionally in the poorer districts. He said that slate more readily permitted the entrance of moisture and wind than did thatch. Of course there is one serious objection that immediately presents itself, and that is the danger from fire. But even that is not as serious a danger as it seems at first hand, for it must be remembered that the climate of Ireland is a very damp and moist one. There are very frequent show-

ers of rain in almost any portion, and even in the country districts there is not any unusual danger from loss by fire.

In truth fire losses in even the larger cities seem to play a far less serious part than they do in American cities. In the city of Belfast, which is undoubtedly the commercial and industrial center of Ireland, we made an investigation as to the loss by fire there. We learned some very interesting facts. The boundaries of the city and county borough of Belfast are identical. In the year 1901 the area of this city was slightly in excess of twenty-six square miles. The population of this area was given at that time as 348,965. (It has only increased about 15,000 up to the present time.) In the same period the number of inhabited houses was reported as nearly sixty-seven thousand. During the year 1901 there were in all only 195 fire alarms in the city. Of these 195, nine were false alarms. The 186 "bona fide" fires, so to speak, were all in brick and stone buildings and with a very few exceptions the fires were all confined to the buildings in which they originated. The total fire loss in the city for the year was 36,507 pounds, or about \$180,000, a little less than half of which was covered by insurance. Of these fires 84 were in dwelling houses, 15 in stores and dwelling houses combined and 11 in stores. Nine of them occurred in wholesale establishments.

A loss for a whole year less than \$180,000 by fires in a city as large and as important as Milwaukee is a low figure indeed. From what we could learn in Belfast, this particular year for which we were able to obtain figures was by no means an exception, and may be taken as a fair example of what is the common state of things in Belfast. This immunity from fire losses of large magnitude is due entirely to a provision which, —although to the larger extent an involuntary one— is nevertheless a most effective one, the almost universal use of stone and brick as building material and the use of non-inflammable roofing. There are practically no wooden buildings in Belfast, a condition that is equally true of any large city in Scotland or Ireland, and the roofs are chiefly of slate. Corrugated iron or zinc roofing are gaining in popularity and are being very widely used at the present time, especially on large buildings and manufacturing plants. There is one more element that ought to be mentioned as a fact in holding down the fire losses, and that is the extreme carefulness that is exercised here in the matter of electric installation. Of the 186 fires reported in 1901, only one was reported as being due to defective electric wiring.

The effectiveness of universal brick and stone construction as a provision against fire losses is still further interestingly exhibited in a few facts and figures about the history of the fire department of the city of Glasgow. Glasgow is the second city in the United Kingdom, it is an enormous manufacturing city of over a million inhabitants and lies on two sides of a

(Continued on page 1038)

BUILDING CONSTRUCTION

J. A. F. Cardiff

Construction of Casement Windows

FULL DESCRIPTION OF ONE USED IN WELL CONSTRUCTED BUILDINGS OF THE MEDIUM CLASS—DETAILS OF WALL CONSTRUCTION GIVEN

PLATE XXXV illustrates the construction of an ordinary casement window opening out. The construction is quite simple, and is of the type commonly used in well constructed buildings of the medium class. The window is built in a frame wall.

The wall is constructed of 2 by 4 inch studs placed 16 inches on centers and doubled about sides, head and sill of each window opening. Where expanded metal or wire lath is used the studs should be placed not over 12 inches on centers.

The exterior of the wall is covered with matched sheathing boards, laid diagonally or horizontally, preferably the former way, and well nailed to every stud. Over this sheathing is placed a heavy building paper well lapped and tacked, and carried under outside architraves of windows. Over the sheathing paper the shingles, clapboards, or other final enclosing material is placed.

The course of shingles over window caps and in similar places is given the required cant by means of a cant strip tacked to the sheathing boards, as shown in Fig. 150. The shingles at jambs of windows butt against the outside architraves of same, which architraves should, for this reason, be at least one and one-quarter inches thick. The course of shingles under the window sills are fitted up in a groove on the underside of the sill, as shown in Fig. 152. Shingles should be well nailed with two galvanized nails to each shingle and any shingle over six inches should be split.

Fig. 150 is a vertical section taken through the head of the window. The head of the frame is rebated and extends from the outside architrave to the trim. The window cap is flashed with tin as shown, extending up under shingles about 6 inches. Copper is usually used for this flashing in the better class of cottages.

The trim is worked out of seven-eighths inch material, is blocked at the back (B), and has a seven-eighths inch back band. The back band has a feathered edge at "A" which is planed off to fit the unevenness of the plaster. Frequently a small mold is provided in the angle formed by the intersection of the back band with the plaster, and in such cases the

feathered edge is omitted as the small wall mold is pliable enough to fit the uneven surface of the plaster. Grounds (G) are set about all openings to give a nailing for the trim. The plastering between the grounds and the window frame should never be omitted as it makes the window wind-proof.

Fig. 151 is a horizontal section taken through the jamb of the window, and shows it rebated the same as the head. The inside stop bead is hollowed at "H" to form a channel down which any water which may beat in between sash and jamb will pass. The water passes out through a similar channel in the sill. The stop beads should be secured in place by means of round head brass screws and counter-sunk brass sockets, which will permit of adjusting the stop beads one way or the other by loosening the screw a little. These screws should, of course, be set equi-distant.

Fig. 152 is a vertical section taken through the sill of the window and shows it rebated for sash and ploughed for stool. Stool is molded and should have returned ends. Bed mold and apron should also have returned ends. Sash is grooved on the underside for a drip. Glass should be bedded in putty, sprigged and back puttied. Where plate glass is used wood beads should be used to hold the glass in position and putty should be used as a bed for the glass.

Where it is desired to have sashes light in appearance, that is, as little wood as possible, the stiles and rails are worked in cherry or other hard wood.

Fig. 153 is a section showing the construction of the meeting stiles of casements opening in two leaves. The joint is rebated one-half inch and edges are beaded as shown.

A somewhat better form of construction is shown in Fig. 154, which shows the sashes rebated and beaded as above described, but with an additional groove at "X" which serves as a conductor for any water which may beat in at the joint, discharging it on the sill outside of the sash.

Fig. 155 is a section showing the construction of a transom bar. A water nose is formed on the projecting part of bar by cutting a hollow, as a "W".

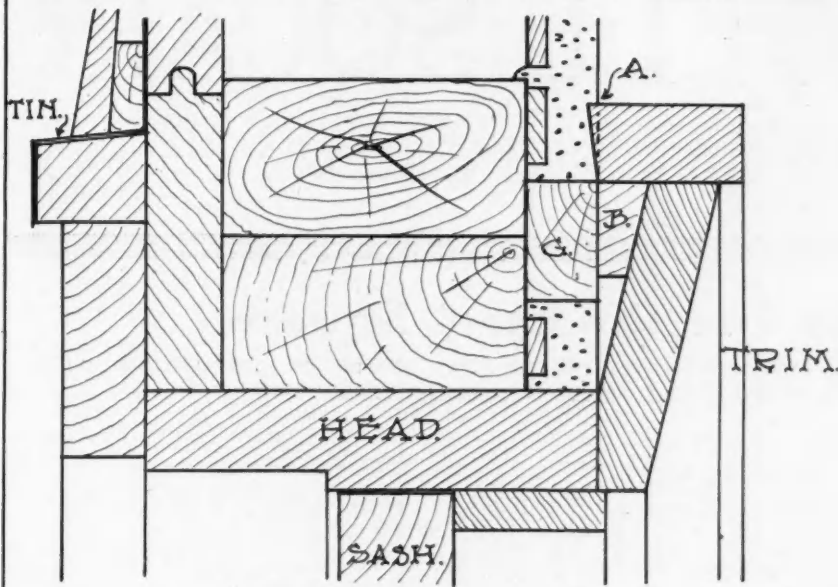


FIG. 150.

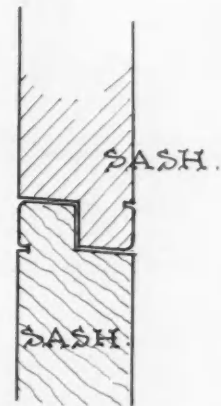


FIG. 153.

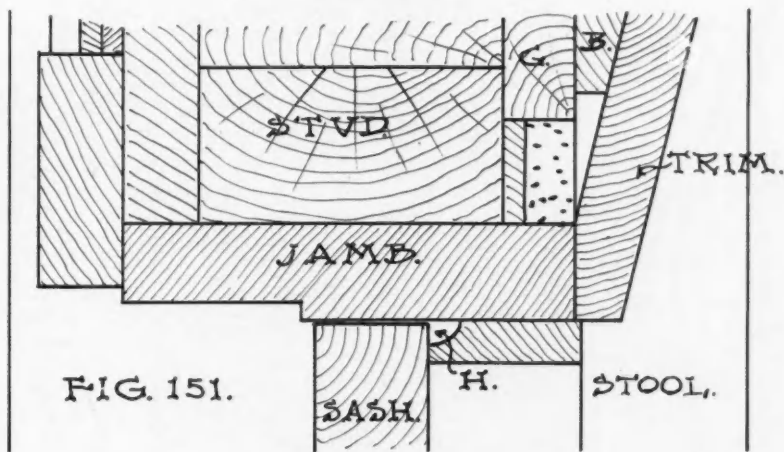


FIG. 151.

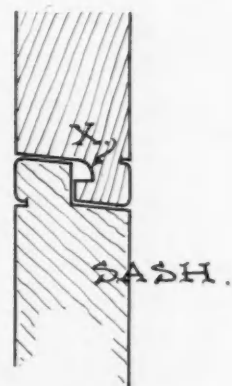


FIG. 154.

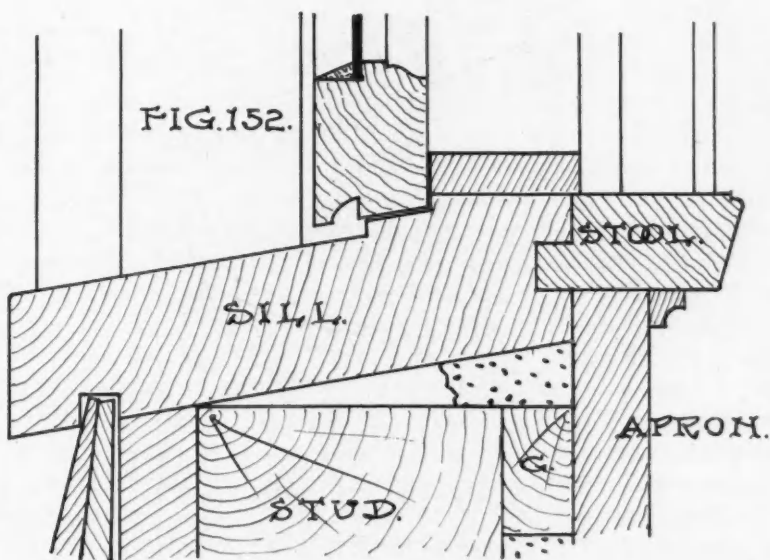


FIG. 152.

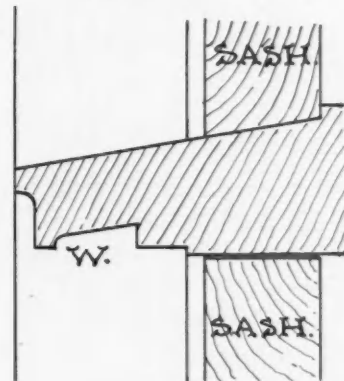
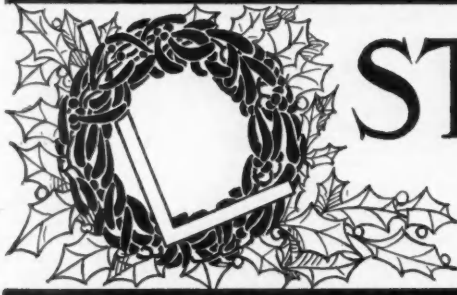


FIG. 155.

PLATE XXXV.

WINDOWS.



STEEL SQUARE

Alfred W. Woods

How to Use the Steel Square

SHOWING DIFFERENT WAYS OF ILLUSTRATING THE USE OF THE STEEL SQUARE, IN OBTAINING THE ANGLES, CUTS AND BEVELS FOR POLYGONAL SIDED BUILDINGS

IN our last illustration we showed the seat and plumb cuts of the hip for polygonal sided building from four to ten sides. We will now, in Fig. 94, show how the figures are obtained on the steel square for the side cuts of the hip, but in this we will only show those most commonly used, namely, the square,

set of figures on the steel square for the different sides. Therefore, the following pertains only to the regular pitched roofs. Later on we will take up the subject again, under irregular pitched roofs.

In this figure the starting point is at 12 on the tongue, from which lines are shown to the respective tangents on the blade. These lines represent the run

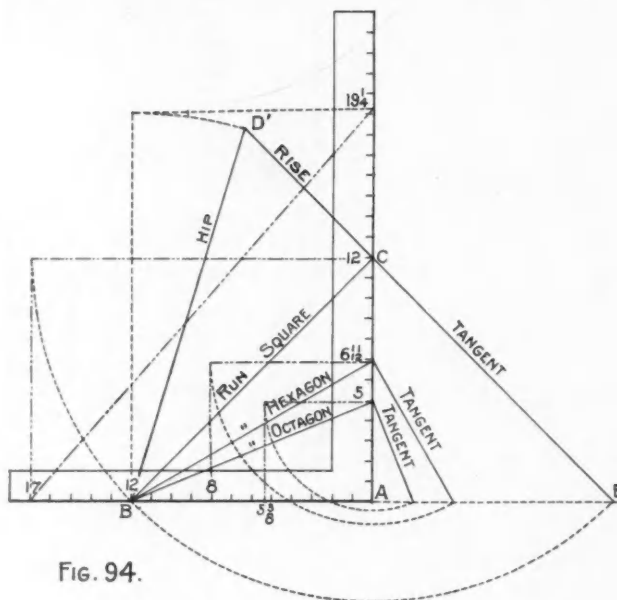


Fig. 94.

hexagon and octagon. The others are omitted to avoid complication of the many lines that would be required in the illustration. Even in this not all of the movements or lines are shown, except for the square, but the reader must bear in mind what is said of one polygon is true of all, no matter how many sides they may contain, provided they have sides of equal lengths and the roof lines radiate to the center. In other words, a building may have true polygonal corners, yet the roof may be irregular from the fact that part of the number of sides may be of a different length. When this is the case, the polygon is irregular and the illustrations here given do not apply, though the figures to use on the steel square are determined from the same standard of proportion, but the hips being of different lengths, the measurements necessarily partake of both and consequently it requires a different

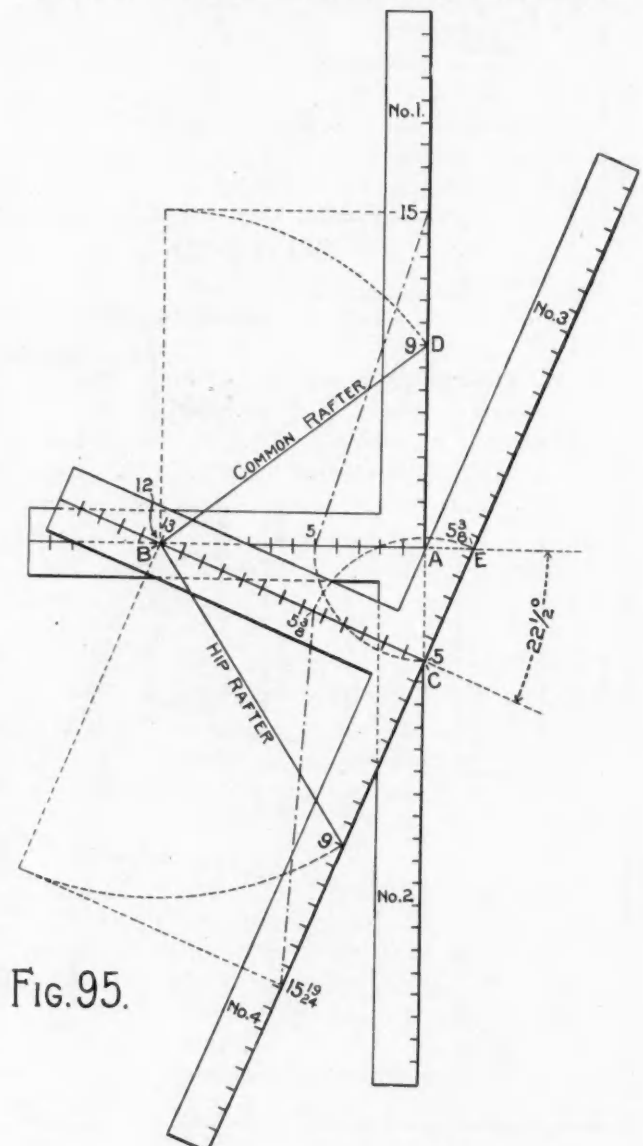


Fig. 95.

of the hip as compared for a one foot run of the common rafter. The figures shown on the blade, as we have said before, represent the tangents for the corresponding run of the common rafter. To find the same for the hip, it is only necessary to run from these figures, square out from the run lines, intersecting a continued line of the run of the common rafter, as at E on line B-A as shown for the square cornered build-

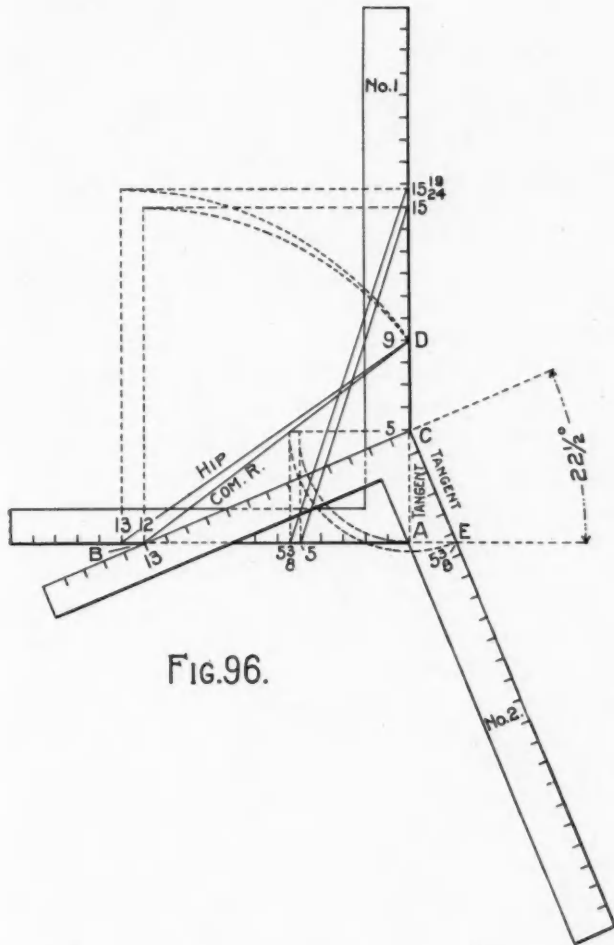


FIG. 96.

ing. The length of these lines represents the tangents and when transferred to the tongue, as shown by the dotted lines, represent the figures to use on that member for the side cut of the hip regardless of the pitch given the roof. But not so with those used on the blade, for the plumb cut, because they are regulated by the pitch given the roof. In this as in the previous illustrations, we have taken the nine-inch rise to the foot and, as will be seen, is simply a continued line of the tangent as C-D', then the line B-D' represents the length of the hip and this transferred to the blade represents the figures to use on that member. Then 17 on the tongue and 19 1/4 on the blade will give the side cut across the top of the unbacked hip. The blade giving the cut.

Note.—The length of the tangent for the square cornered building is equal to 17 inches, which is also the length of the corresponding run, as shown by the dotted circular line. For this reason it is generally

supposed that 17 is used on the tongue because it is equal the run. This is very misleading, as it does not apply to any of the other polygons, as will be seen in the case of the hexagon and octagon, which are shown to be 5 and 5 3/8 respectively.

Proceed in like manner to find the figures to use on the blade for the hexagon and octagon.

The octagon being more generally used than any of the other polygons, we will now take it up separately, showing the different figures to use on the steel square, but in this, the angles are shown on separate squares, as will be seen in Fig. 95, as follows:

12 and 9 on No. 1 gives the seat and plumb cuts

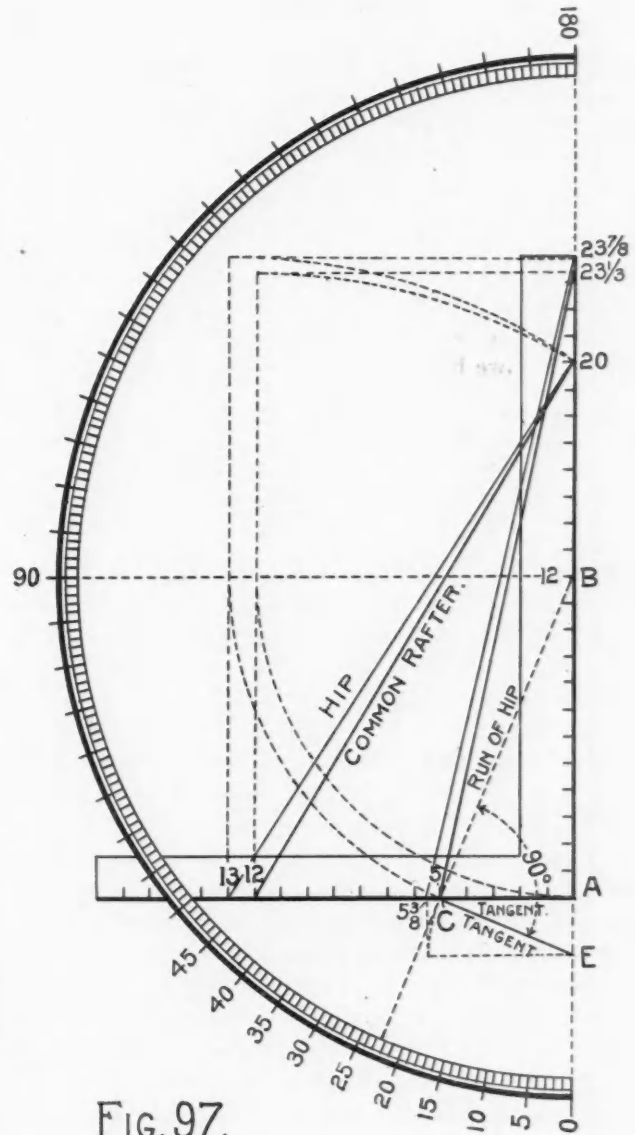


FIG. 97.

of the common rafter. The squares No. 2 and No. 3 are used to form the plan, as bounded by A, B and C. The intersection of the heel of No. 3 being at 4.97 on the blade of No. 2, which is as near 5 inches as can be worked to, and is therefore near enough for practical purposes, and with the tongue intersecting 12 on the tongue of No. 1 forms the plan, as above described, and happens to be at 13 on No. 3 and represents the

run of the hip. To this the square No. 4 is applied and on the blade the rise is taken to correspond with that shown on No. 1. Then 13 and 9 will give the seat and plumb cuts of the octagon hip. The tangent of the common rafter is equal to 5 inches as A-C on No. 2. This transferred to No. 1 and the length of the common rafter transferred to the blade will give the side cut of the octagon jack. The blade giving the cut. The tangent for the hip is equal to $5\frac{3}{8}$ inches, as shown at C-E on square No. 3, and this transferred to the tongue of square No. 4 and the length of the hip transferred to the blade will give the side cut across the unbacked hip, but as we said in case of the hexagon in Fig. 92, is not the best way to frame these rafters, because they would all run to a feather edge, as shown in Fig. 91.

Perhaps some may think that we use too many squares to illustrate the different angles. Very well, then we will try it with only two squares, as shown in Fig. 96. This is cutting the number down to one-half. Taking the same example as in the preceding figure all of the measurements are shown on the two squares. Like letters are used to represent the plan and the description given in the former applies to this illustration. The measurements shown on No. 2 are transferred to No. 1, and are the same as given on the squares in the preceding illustration. Yet we fancy we hear some one say, "Why use two squares? Why not show all of these cuts on one square?" Very well, we will try it again. This time we will not only show the figures to use to obtain the cuts, but will show why they are used.

In Fig. 97 is shown a semi-circle divided into the degree divisions, however, only one-fourth of the divisions, or the space covered by 45 degrees, are required for any of the polygonal angled corners above four, as will be seen later on.

In the illustration 12 on the blade is resting at the center of the circle and with the edge of the blade in line with the 180 degrees, as shown. Now, since the octagon has eight sides, we divide 180 by 8 and we find the quotient to be $22\frac{1}{2}$, which represents the angle in degrees of the run of the hip from that of the common rafter, and by drawing a line from 12 to the $22\frac{1}{2}$ division on the circle it will be seen that the line will pass at practically 5 inches on the tongue. From this point back to 12 represents the length of the run of the hip, while that from the heel to 12 represents the same for that of the common rafter. These lengths transferred to the tongue are found to be 13 and 12 respectively and are the points to use on that member for the seat cuts. (Bear in mind that these figures are fixed points and remain so, regardless of the pitch given the roof.) Consequently these figures also represent the starting point for the pitch of these rafters, which we will assume to be a 20-inch rise, or 5-6 pitch. Lines then from 12 and 13 to 20 represent their slope in the roof and their lengths transferred to the blade are shown to be 23 1-3

and $23\frac{7}{8}$ respectively. Here are all of the figures given on the square for the cuts as described in the previous figures, except in this, the pitch has been changed, but the operation remains the same.

In our mind's eye we see several illustrations that we would like to present, but time and space forbids. Next month we will take up the subject again for another year's work. With the hope of giving all of the patrons of the AMERICAN CARPENTER AND BUILDER a Square Deal, we close with a Merry Christmas and a Happy New Year.



Wall Papers in China

The use of colored papers for house decoration, which was scarcely known in China until quite recently, is now becoming general.

It is believed that these papers would find a good opening in the country, because, in certain towns like Shanghai, Hankow, and Tientsin, they would be used, not only in the houses built for Europeans, but also in those of the Chinese of the wealthy class who follow European customs and habits. The papers used in China are very varied in colors, qualities, patterns, and prices; it is therefore advisable to send the greatest possible variety of samples, and papers representing landscapes, scenes, and pictures of Teniers, tapestry, etc., would probably sell best. The frieze, which is placed immediately below the cornice, is generally of a greater depth than that common in European countries, and often measures as much as fifteen or sixteen inches. The best papers represent in these friezes landscapes, seascapes, borders of flowers, garlands, etc. The ceilings of houses are also covered with paper with a simple pattern on a high-colored ground. Manufacturers are recommended to send varied and detailed catalogues of papers for walls, ceilings, friezes, and borders, with samples at least 15 inches square. At the same time it is a good plan to send with the catalogues, which should be a duplicate, a small consignment of paper sufficient in quantity to decorate two or three rooms of ordinary dimensions—i. e., 16 by 20 feet.



Covers Building Trade

I know of no other book or paper that contains so much that is useful, especially to a beginner. Not alone in carpentry, but in other branches of the building trades. GEO. GROSSMAN, Cleveland, Ohio.



The great majority of errors are made through carelessness; learn to care; be exact; strive to have it absolutely right—making a mistake in business is like falling down in a foot race, it is a set-back.



Some men are like knives; in getting sharp they manage to lose more or less of their best metal.



The Building of a Porch

IMPORTANT PART THE PORCH PLAYS IN THE APPEARANCE OF THE HOUSE — GOOD METHOD OF CONSTRUCTION SHOWN

By Dwight L. Stoddard

WHILE the porch is a very necessary part of the house and enables one to spend many pleasant moments during the summer, yet it is not built entirely for the pleasure derived from it.

large and handsome columns in place of the studding, which if put in right will set off the entire front of the house, but if put in carelessly they will mar the appearance of the entire structure.

Fig. 1 illustrates a very common style of porch which is not at all hard to construct and one which makes a very fine appearance if built right. We have seen this style of porch many times and no doubt the readers have also, but where the columns are set back too far on the floor or when the mistake is made of setting them clear over the edge of the porch floor, then it is, and always will be as long as the porch stands, a disfigurement to the entire house. This is caused by

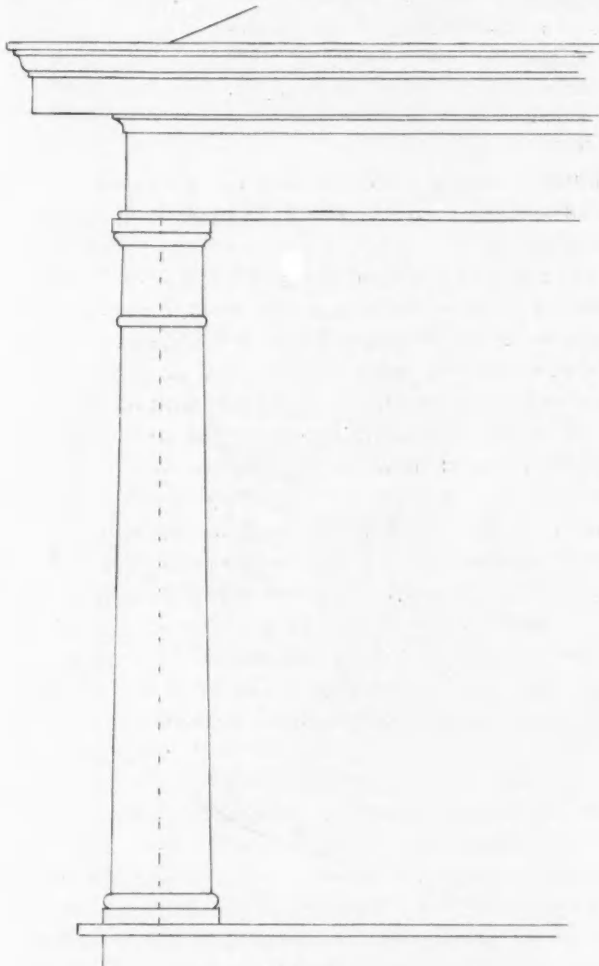


FIG. 1.

It is built largely to show off the house to the best advantage and should therefore be built ornamental as well as useful. The best porches are generally built by making the floor and then supporting the roof with temporary studding and after it is all completed, put

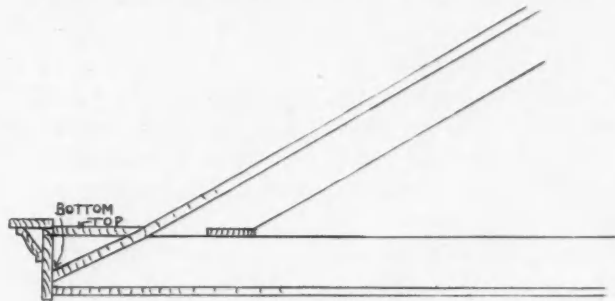


FIG. 2.

pure carelessness and nothing else. The mechanic just takes it for granted that he knows where the edge of the top and bottom block of the column will come and he does not measure accurately enough. The center of the column should be considered and careful and accurate measurements should be made. It is far better to spend a few moments time and be sure that you are right than to be in such a great hurry and makes a mistake which will stand out against you as long as the porch stands. Very often the carpenter puts up the roof in such haste that he does not know if the roof is exactly over the floor and then it takes up much unnecessary time and lumber in constructing the gutter.

Fig. 2 shows a style of gutter which answers very well for many porches. You will note that the ceiling joists just run over and form the cornice and the rafter

simply sets on a one by four. Let the high point in the gutter be right on the top of the joist and cut each one down just a little until it gets nearly to the bottom of the joist at the bottom of the gutter as illustrated. After cutting the ends of the joist off there is nothing more to do in forming the gutter except nailing on the roof boards. Of course those forming the gutter will nail down with a little twist or wind, but not enough to bother in nailing down.

Fig. 3 shows a style of rafter finished where the roof finishes up under the second floor windows. They should be allowed just enough under the window sill for the thickness of the roof boards and the shingles.

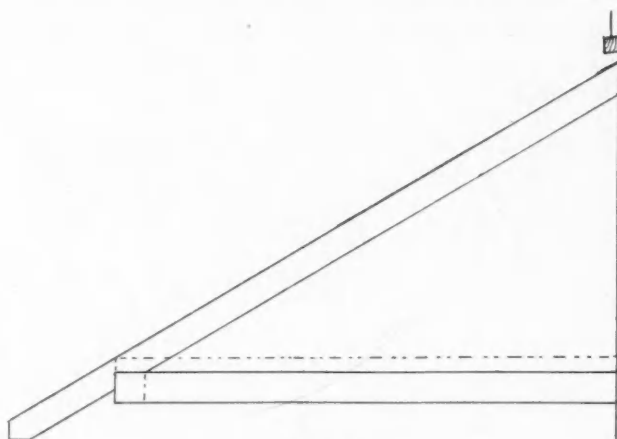


FIG 3

I have seen a good mechanic get the run and rise for this rafter and cut it in such haste that he forgot to take into consideration the heel of the rafter, and therefore got his rafter too long. Of course this was not a very serious mistake, as he could easily cut the rafter off, yet this mistake has occurred on short rafters and they have been cut off at the top, which made the bottom cut show to a great disadvantage and much to the detriment of the porch. There is no mistake about a house that shows up as badly as the one on the front porch, and if this article in any way calls the attention to the fact so that the readers will be more careful in the future and the porches are made better by it, I shall indeed be well paid for my time in writing it. I have found that "be sure and be right and then go ahead" is the safest way and at the end of the day more good work is accomplished than if you smash ahead without a thought of what you are doing until you find that you are in such trouble that you don't know how to get out of it. No man is perfect and we are all liable to make mistakes, but knowing this we should guard against them all the more. We should specially guard against these little daily mistakes which don't amount to much and we will then get into the habit of being careful and will then avoid the larger mistakes which cause so much trouble.



It is so much easier to hear of good people than it is to meet them.

Building Construction in Great Britain

(Continued from page 1031)

river. It has an enormous ship building industry, the largest in the world, and a large number of mechanical plants, including the largest locomotive shops in the world, and the largest sewing machine plant as well. But in Glasgow, as in all British cities, brick and stone construction is universal and the result is that a much less expensive organization is enabled to handle effectively all the fires in that city than is required in any other large city. The expenditure for the fire department in 1902 was 21,000 pounds, or a little over a hundred thousand dollars. In that year Glasgow had 152 firemen; Hamburg, with a population about equal to Glasgow, had 1,501 firemen; London, with a population of 4,600,000, had a brigade of 1,240, and Chicago, with a population of 1,885,999, had 1,175 firemen in its fire department.

Glasgow had one fireman to every 5,132.

London had one fireman to every 3,710.

Chicago had one fireman to every 1,604.

Hamburg had one fireman to every 1,600.

The cost per head of the population was:

Glasgow	12½¢
London	24¢
Hamburg	39¢
Chicago	84¢

London in that year had five times the number of fires and more than nine times the number of men that Glasgow had.

The low cost per head in Glasgow is not due to any tendency to economize in public work, for as has already been stated that city has a force large enough to deal effectively with all fires; and more than that, there is no city on the list in which more effort is directed to, and in which more money is spent per head of population, in obtaining the best of advantage and privileges for its citizens. It merely emphasizes how effectively brick and stone construction reduces the danger of loss by fire. Horses were not required for the department until 1873 and street fire alarms of electric pattern were first used in 1878. They were the first employed in Great Britain at that. The plant and equipment are the best that can be procured, and it is said the protection is ample, with the exception of river and riverside fires.

The calls for the services of the firemen in Glasgow are so comparatively infrequent that the staff is made up mostly of tradesmen. They keep the stations in repair and construct all running plants except steam engines. The electric street fire alarms, as well as all the fittings for the quick hitching harness, are made and fixed up by the staff. The necessary helmets, belts and boots are likewise made within their own workshop. The staff also undertakes the inspection of all means of egress in buildings being constructed under the Factory and Workshop Acts.

GEORGE E. HOLT.

LESTER R. CREUTZ.

Frames for Brick Veneered Buildings

SECTIONS THROUGH A FRAME BUILDING SHOWN - INTERIOR MILL WORK DESIGNATED AS AN AID TO SELECTING SAME

By I. P. Hicks

FIGURE 1 shows a horizontal section through a frame building veneered with a four-inch brick wall. Fig. 2 shows a vertical section. Referring to Fig. 1 No. 8441 is the brick mold which is nailed to a wide blind stop. The blind stop being wide, it laps over on the sheathing when the frame is set and the space between the sheathing and the brick forms a dead air space and makes the very best kind of construction for a brick veneered job. The brick should be anchored to the frame by using either metal wall ties made especially for this purpose, or by using good sized spikes driven into the frame work and projecting out half-way into the mortar joint when the brick are laid up. The spikes make just as good a bond for this kind of work as any and are much cheaper. They should be put as often as one every sixteen inches, every sixth course of brick.

Fig. 2 shows an end section of the stone sill. The sill should be just wide enough to set snug against the sheathing. This will give the wood sill one inch

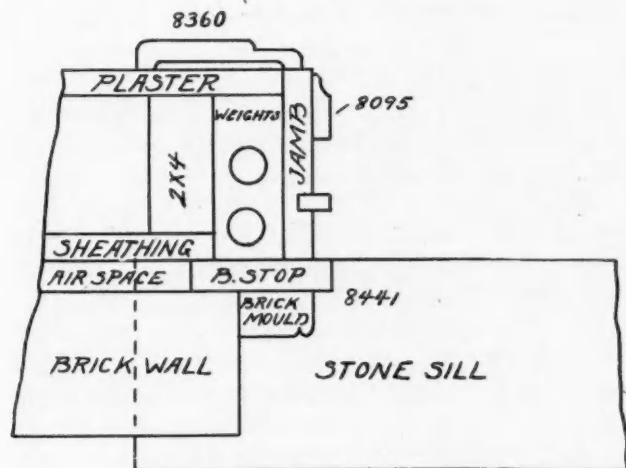


FIG. 1.

lap over the stone sill and insures a good job. The numbers designating the interior mill work are taken from the Universal Molding Book, which is the same all over the United States. In the selection of mill work it is policy to select a plain stock pattern and the design that will look the best when finished in the building. The numbers selected for this article are not the plainest, yet they have no heads or sharp indentations to form dirt and dust catchers.

No. 8393 is the molded cap. No. 8394 is a plain head casing and No. 8395 is called a filled mold and is merely rounded on the face edge. No. 8360 is the side casing and makes a very neat finish. No. 8095 is the inside stop. No. 8267 is the window stool and is plain, having only the edges slightly rounded. No. 8377 is the apron and is similar in design to the side casings,

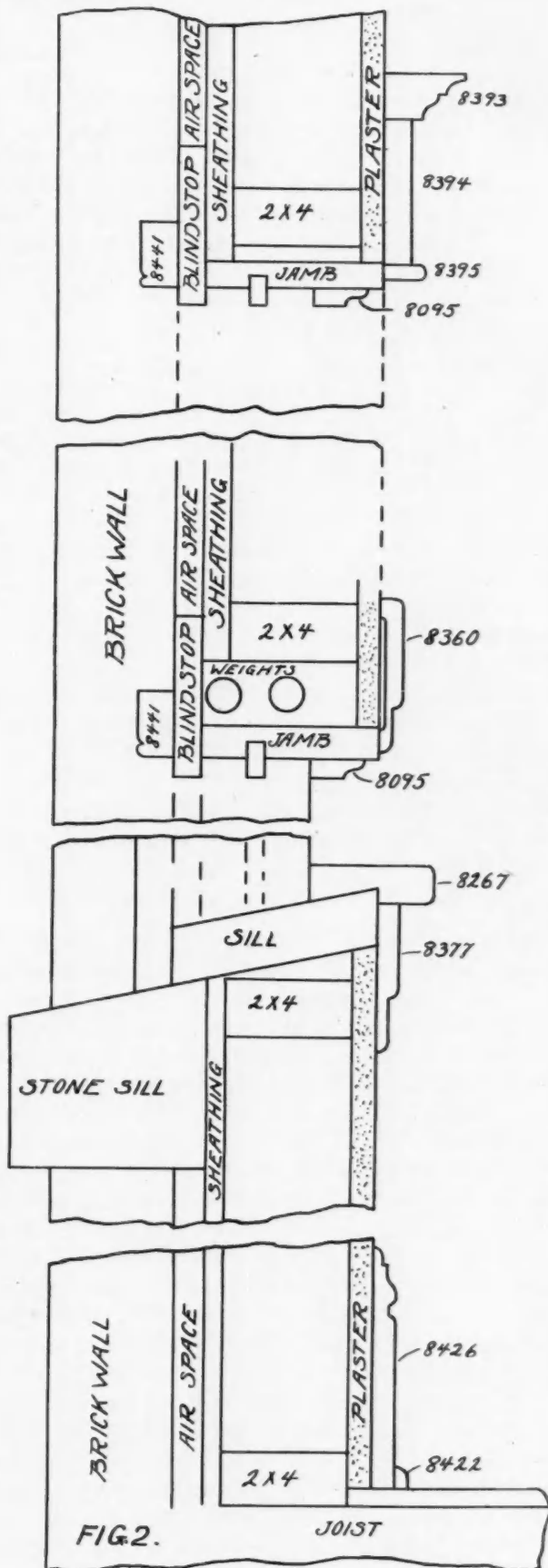


FIG. 2.

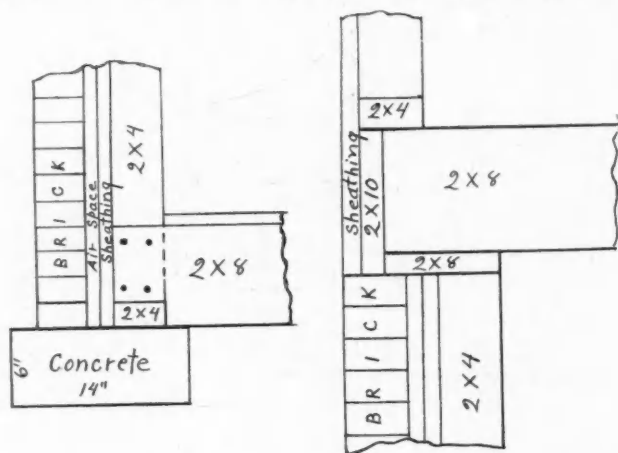
the only difference being that the edge fitting the stool is left square. No. 8426 is the base finish and No. 8922 is the floor mold, which is used in place of a

quarter round and makes a much nicer finish, as it does not project so far out into the room as the old fashioned quarter round.

Constructing a Basement House

METHOD OF CONSTRUCTING THE WALL TO INSURE DRY AND HEALTHY ROOMS — REDUCES COST CONSIDERABLY

THE drawing which accompanies this article illustrates a new method of constructing a basement house. This method has several good points in its favor, which we will explain. In constructing a basement which is to be used for a dining room, kitchen, etc., as in the ordinary residence, one important item to consider is to construct it in a manner that will insure dry walls. Another important matter is the expense. In the method we are presenting we are positively sure of having a dry wall, one that will make the rooms as dry and healthy as is possible. As to expense, this method will actually save about 15 to 20 per cent over the method of building a solid wall and stripping it before plastering. By



our plan we only use half the brick that a solid wall would require, and we save the furring on the inside, because we can lath and plaster directly on the studding. We do not claim to save the cost of the brick we use, because in their place we use studding and sheathing, but the studding and sheathing and carpenter labor will not cost as much as the brick laid in the wall. Then again, if bricklayers are not to be had or if they want the whole earth for laying a few brick, which is the case at present in many parts of the country, a carpenter who is a handy man can easily veneer the frame and get a good job. Carpenters or anyone who desires to build a basement house for themselves can build easily by this method and besides getting a good job they will find that they can save some money.

A concrete footing 6 by 4 inches is first put in and made level on top, then a 2 by 4 plate is laid on top of footing and the frame is studded up the first story and finished with a 2 by 8 plate and a 2 by 10, making a kind of box sill for the second story joists. The basement walls are sheathed tight with shiplap and

an inch air space is left between the sheathing and the brick. The brick are to be laid up so that the second story will bear both on the brick and on the frame, thus making a good and strong job.



This House One Huge Joke

John Baxter of Monrovia, Cal., is building a new house on the site of an old house and building the new house out of the material of the old house and living in the old house while the new one is being built. Once when a new jail was wanted in Dublin an Irishman proposed some such bull on the floor of the British Parliament and it was considered a bull and his bill was laughed down.

Baxter is taking advantage of an extra ten feet of land on the avenue side of his livery stable to build the outside wall of his new building, and as this wall goes up the rafters of the old structure are to be pieced out to the new wall and the boards in the old wall are used in making partitions. When the front wall is built in of brick the old wooden wall will be taken down. The livery stable will be used right along, although an extra guard will be placed over the stock.



A Winter Tragedy*

The wind blew o'er the cottage roof;
The valley shrugged its hip;
The window with a shock and pane
Can see the weather strip.

While these same panes are on the square,
The openings are bevel;
The blind is groaning, for it sees
Its slats are far from level.

The weather vane in vain flies 'round,
Its pinions wildly flung;
North, East, West, South, it tells the news—
The parlor door is hung.

The parlor draws its mantel close
(We saw its grief was grate);
With hands before its awe-struck face
The hall clock dropped its weight.

The steps they rise and run up stairs;
The wall is mortarfied;
The bit braced up and with one sweep
Made every hanger slide.

E. L. H.

*We faithfully promise that there will never be another attack of this character on the good nature of our subscribers.

PLANING MILL WORK

J. Crow Taylor

The Secret of Quality

REASONS WHY SOME MEN CAN PRODUCE BETTER WORK THAN OTHERS FROM SAME MACHINE—CORRECTLY OPERATING A PLANER

YOU have probably noticed the different mills with apparently the same grade of equipment will turn out mill work that differs as to quality, and, coming closer home and following the same idea down to details, you have probably also found that different men will turn out work different in quality on the same machines. Probably you have wondered why this is, and what the secret of it is. But, whether you have or not, one of the most important things to give attention to these days is quality in mill work. What the majority of people desire and won't be satisfied without, is more of the element of quality in their mill work. It does not matter how simple a piece of work may be, the simpler the better, in many instances. It should be done well, should have a strong element of quality in it, to win lasting favor. This point, however, is pretty generally understood and does not require any impressive argument at the present time, and what we want to get at is wherein lies the secret of quality. Where can a man turn, and what steps should he take to improve the quality of his mill work?

The secret of quality, like the secret of success, is to be found where it is generally lost sight of by those who fail to retain it, and that is, in the very small details which make up the different steps of manufacture. It's the varying degree of attention to these small details that make up the difference between quality of work between different mills and between different men in the same mill. Here we sometimes make a mistake and get off on the wrong track in following up this question, in following without dissecting the idea that poor mill work is due to lack of mechanical skill and ignorance on the part of operators. What is more, mill men frequently bewail the lack of competent skilled workmen, especially at country points.

Now, then, take a stand of judgment on the ground that we should judge a workman by his chips, and the tree by its fruits, and this idea of lack of mechanical skill and knowledge is borne out and supported by facts that seem undisputable. But, what we need to do is to get down off of this stand of abstract judgment and diagnose and analyze the trouble. When we do this we will find that it's not so much ignorance of mechanical principles as neglect of their application in detail that makes poor workmanship in the mill. I

have had occasion to point this out heretofore in regard to the manufacture of flooring in the yellow pine woods. In this it was pointed out that any man who knows enough to set up the cutter heads on a flooring machine has mechanical sense enough to know that the flooring should match even and lay smoothly. Moreover, he knows how to do it, and his failure to look after these things is not due to ignorance so much as neglect. This same idea applies in the doing of all kinds of mill work. A man who knows enough to set up a machine knows when his machine is doing good work, and generally knows how to make it do it. But he falls into such a habit of letting this go, thinking "that's good enough," until by and by he loses materially in the grade of his workmanship and incidentally lets go his grip on the secret of quality. What we need is attention to every detail. Not nagging attention, but studious and analytical attention, and a thorough awakening to the fact that it is ignorance, ignorance developed through neglect, of the importance of these little details rather than ignorance of the mechanical principles that contributes most to poor workmanship at the mill.

Neglect of Small Details

May be you don't know it, and may be it is not so in your case, but if you will investigate carefully, there is a chance to find that this neglect of small details begins right with the management itself. May be you've got a good crew that know their business thoroughly and you concern yourself only with the making of estimates, giving out the orders to the mill and collecting the bills after deliveries are made. This is good as far as it goes, but it does not go far enough. What you need more of is personal attention to the work as it is going through the mill. If you can not give it this attention with all your other duties, it will pay to get some one to take part of your duties off your hands or else to look after the work. And, then, no matter how good men you may have and how good the work they are doing is, be with them as much as possible while they are doing the work. Be there early in the morning, late in the evening, and all through the day. If you are there in the right spirit it will be good for the good workmen. They will be glad to have you there to show off the quality of their work, and have you

thoroughly understand and appreciate what they are doing. Then, those workmen who are inclined to be a little lax and lag in their traces when the boss is not around will be kept keyed up to a better pitch, and not only give better attention so that they will do more work, but so they will do work of a better quality. There are different ways of doing this, of course; different ways to be present about the shop. If you are present in a nagging spirit it becomes irritating, but if you are present in the true co-operative spirit it is conducive to good and will do more toward helping the men find the secret of quality by careful attention to the details of their work than any other one thing.

It is not intended from all this that you should get the idea that personality and personal attention of one kind and another is the whole thing, for it is not. It is not complete in itself, but it is the first essential. And, then, following this in regular order comes the analytical study of the different steps in the process of the work. Say you've got a planer that is not doing as smooth work as it should. Your presence there won't make this planer straighten up and behave itself properly, but it will put you in line to make, and encourage on the part of the operator, a study of its ailments and the details that make toward its correction.

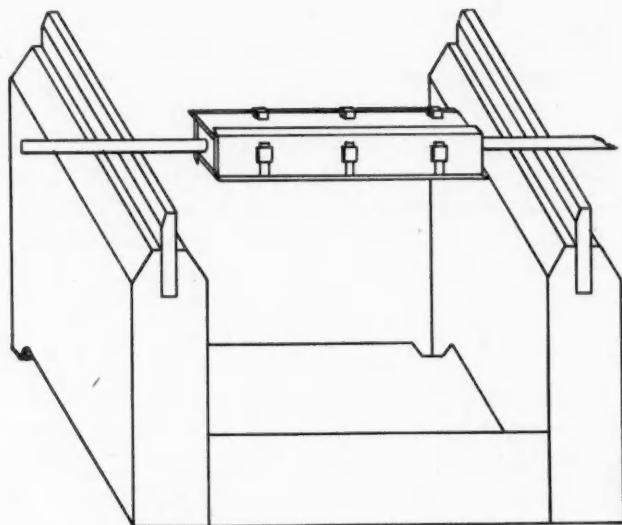
Operation of Planers

In the operation of planers, as has been pointed out heretofore, the cause of more trouble and more poor work than any other one thing is a lack of balance in the cutter head. Practically every planing mill man understands the necessity of carefully balancing the knives of the cutter head, but sometimes even when this work is carefully done the head does not behave itself as it should. The final test for balance then is to take out the cutter head with the knives on it and test the whole thing for balance by supporting it on two level V runways and rolling it over to see if it has a heavy side, see if there is any one point it will turn itself without being aided. There are several methods of making devices for this work, the main factor being to have a pair of level smooth edges carefully aligned to rest the journals on while turning the head over. Sometimes one can stand a couple of steel squares on a planer bed where the cutter head is light and make the test in a few moments without going to the trouble of making special devices, but a specially made device convenient to the work bench that can be carefully leveled up and adjusted is more inspiration to make the test as well as more conducive to accuracy in the work.

Producing Smooth Work

Balancing is the first essential to smooth work on the cutter head, and generally more troubles and lack of good work is due to improper balance than any other one thing, but still, the entire secret of quality in planing mill work is not found in this one detail. It carries on through the others. I had this question of smooth work with planers up with no less an authority than Mr. Perkins, of the S. A. Woods Machine

Co., recently. It was at the starting of a new plant which had been equipped with some of their machines, and when I asked him about it he took me into the office where there was some fresh ceiling from a yellow pine mill. He showed me two kinds of faults in the work. One was the tearing out of the cross grain spots and the other was in the surface, which showed a series of small waves. The tearing out of cross grain stuff he said was a comparatively easy and simple matter to correct, as it had to do merely with the shape of knives and adjustment of pressure bars, etc., but the most difficult fault to correct in the work of the planer is the series of small waves which may be ob-



served on the surface of lumber. These waves represent a measurement of speed of stock through the machine marked off by revolutions of the cutter head just as one prominent corner in a circular mill saw will mark off the movement of the carriage during each revolution so that one can pick up a board and tell what rate of feed per revolution is being used. These marks are well known and pretty well understood by the saw mill men, but the application of the same idea to planer work brought up this point: That in ordinary practice even though there are four knives on the cutter head, it's only one knife that leaves the final mark on the stock. This is a point that is the subject of some pretty warm discussion in the columns of the wood working papers to-day, some contend that they can set the knives so that all will cut equally, and some contend that it is impossible. Both sides are rather positive in their assertions, but probably if they will consider it right they are not so wide apart in their ideas as they think they are. The point made by Mr. Perkins is that it is impracticable to get an absolute microscopic adjustment on the knives so that each one will cut equally. They may be set so that they will all do some work, but some one knife generally extends enough more than the others when the machine is in operation to leave this final mark on the lumber, just like some one tooth in a circular mill saw leaves a telltale mark

on the lumber. It is not the purpose here to enter into any lengthy argument about the how and wherefore of this, whether it is due to imperfections in appliances for setting up knives, or whether it is due to variations in set produced by the cutter head in motion, but what is desired here is merely to set forth the fact that where one knife leaves its mark this way in a series of waves, if some way can be devised to reduce that knife so that it reaches no further out in cutting than the other three the waves will be shortened in to one-fourth their length and reduce correspondingly in depth and prominence. It's the same idea that applies in the theory of polishing. Polishing is merely a series of fine lines or scratches, and the finer you get them the finer the polish and the smoother the face. That is the way it is in planer work, the more knives you can keep cutting the smaller the waves and the smoother the face of the stock. But the main question is, how to get it?

The way smoothness was obtained in the instance referred to, was by carefully setting the knives in the machine and then jointing them off with a special device, while they were in motion. It did the work, too, made the waves disappear. They were simply cut into four small waves instead of one, which was prominent enough to be seen, and the result was the face looked perfectly smooth, notwithstanding the fact that the stock went through the machine at the rate of 90 lineal feet per minute. That is faster than stock goes through the average planing machine. It's about double the average speed, in fact. And that special jointing device is something that every planing machine doesn't have, either, but all this need not prevent us from getting an idea and using it to advantage. The first use to make of the idea is, to get it firmly fixed in one's mind that too much care can not be exercised in the setting of knives, for even with the finest adjustment possible to-day there will be enough variation that one knife will leave its ear-marks on the stock. Then, following close attention to the setting of knives, comes the question of what can be done in the way of truing them up after they are on the machine. Some day, when our planing mill practice has gone through enough of the process of evolution, there will probably be attached to every modern planer some appliances for carefully jointing off the planer knives after they are ground and fastened to the cutter head, jointing them off while the cutter head is in motion to insure absolute accuracy in their adjustment. This jointing off will not improve the cutting qualities of the knife edge. That goes without saying, and the less jointing off it is necessary to do the better, but it is conducive to smooth work and that's one of the important things we are after. If a set of planer knives could be ground, then, before whetting, on the machine, and carefully jointed off like one joints a saw while in motion, very lightly, just enough to touch them all around, and then gone over and whetted to an edge under the guidance of this jointing, there would be a

marked improvement in the work. This will probably be a part of the practice in the future. Meantime here is a thought to let sink home: Why not have your knives rather soft, not too soft, but soft enough so you can whet and file them with some satisfaction? Grind them with some concave, just how much can be determined with a little experimenting. Put them on the machine carefully and run them awhile. After the knives have run awhile the one that extends furthest will probably show it in the wear and in the brightening of the edge. Filing and whetting, being guided by this evidence of wear, which in some measure takes the place of jointing, if the work is carefully done should lead to smoother work after this filing and whetting than when first put on, and the longer you can keep the knives on the machine, filing and whetting them under this guidance and under the evidence of wear the better work they will do. In short, they wear to the joint and if you can get knives soft enough to file and grind in concave enough so that you don't have to take them off too frequently, you may by careful attention considerably improve the quality of the work they will do. Think over this idea—and then try it once.



Jefferson as an Architect

It is, perhaps, not generally known that Thomas Jefferson, the author of the Declaration of Independence, and twice President of the United States, in addition to serving as one of the leading architects for planning and building a great and free republic, was likewise an architect in the conventional sense of the word. Poplar Forest, in Bedford county, Va., was at one time the home of Mr. Jefferson, the estate coming to him through his wife. Jefferson built the house himself, after plans of his own drawing.

This old-time mansion, which is very spacious, containing twelve large rooms, is octagonal in form. The rooms are all very high for the time when the structure was erected, and excellently well lighted. The dining room and parlor are each twenty-eight feet long, with an open fireplace at either end. Like all southern residences of the time, and largely of the present for that matter, the front and rear are provided with long porches, or "galleries," which add decidedly to the architectural beauty of the house, while increasing its convenience and comfort. Every part of the 1,100 acres which comprise the estate can be seen from the residence, which demonstrates the wisdom of the great statesman in selecting its site. Poplar Forest is today one of the finest places in Virginia.



And it's almost as difficult to keep up appearances as it is to keep down expenses.



It is easier to make mistakes than to make good.

A Modern Church Building

CONTAINING ALL MODERN IMPROVEMENTS—BEST POSSIBLE ARRANGEMENT OF ROOMS, WHICH TOGETHER WITH EXCELLENT ACOUSTICS MAKE IT POSSIBLE TO BE HEARD IN ANY PART OF BUILDING

WE are this month illustrating the perspective and floor plans of the Baptist Church built in Berwyn, Ill., and designed by Mr. G. W. Ashby, architect. It is located on the southeast corner in the midst of the residence portion of the town and it adds a dignity and elegance to the entire vicinity. It is constructed of white random range rubble stone and the roof is of slate. The two porches on the north and west side are supported by large stone pillars and constructed of the same stone as the main building, and the floor is of cement. The doors which lead from the porches into the vestibules have long glass panels, which is a good feature, but seldom seen in churches. It prevents all confusion in entering and leaving the building, as those on either side can readily see each other. The vestibules have the square ceramic tile floors laid upon a concrete base. The main auditorium is 46 by 56 feet and has a seating capacity of 350. The pews are arranged in a semi-circle and the floor is pitched. On one side of the pulpit is the large pipe organ and place for the choir, and on the other side is the baptistry. The baptistry is constructed of white glazed tile which extends 8 inches above the pulpit floor, forming an open curb. To produce a harmonious effect with the pipe organ there is an ornamental archway over the baptistry. Dividing the main auditorium from the Sunday School room is a rolling partition hung on cast iron counter weights. This partition is covered with canvas and decorated to correspond with the rest of the interior finish. The main auditorium is supported by two large exposed trusses, from which are also suspended the chandeliers for illuminating the building. The Sunday School room is 40 by 56 feet, and has a seating capacity of 250. There are no pews in this department, but chairs are arranged in circular order to enable the teacher to group the class and thus get their undivided attention. At one end of the room is a raised platform which is divided off from the main room by another rolling partition. On this platform, which is 19 by 40 feet, the primary classes are heard on special occasions such as Christmas, Easter, etc., and can be used for exercises of all kinds. In the rear of the pulpit are two dressing rooms, the pastor's study and a room for a telephone booth. This is an innovation which others might do well to follow, for there are numerous occasions when a telephone is an absolute necessity. The pastor's study is very artistically arranged, having a large open fireplace, well-filled bookcases, a writing desk and the walls are covered with appropriate pictures. The church is heated by steam heat. The boilers are underneath the primary department and are placed in a large steel tank. This is necessary, as they are below the sewer

level. To fully appreciate the beauty of the building, with its white stone and beautifully colored windows, it must be seen, and it is without doubt an ideal house of worship.



"The Other Man"

BY W. D. NESBIT.

"Who is he that wins success?
Is he one of those who press
On and on from day to day,
Keeping toil's appointed way;
Starting, stopping at the note
From the whistle's iron throat,
Battering his thoughts and time
That another man may climb?"

"Is it he who may but feel
As a cog in some great wheel
That goes turning, turning on
Heeding not the ones who come
Or the ones worn out and gone—
He whose heart and hands are numb
With the worker's weariness,
For another man's success?"

Who, then, are the men who fail?
Are they he who drives a nail
So that the resisting oak
Knows the certain masterstroke;
Or the man who guides the plow
Knowing every why and how;
Or the man whose one thought is
That the work he does is his?"

He who makes his work his own
Stands out from the ruck, alone;
Though he dig a ditch, or plan
Streets and structures of a town,
Pale in schools, or gather tan
Where the sun scorched mountains frown—
Though he has no dream of fame,
On each task he sets his name.

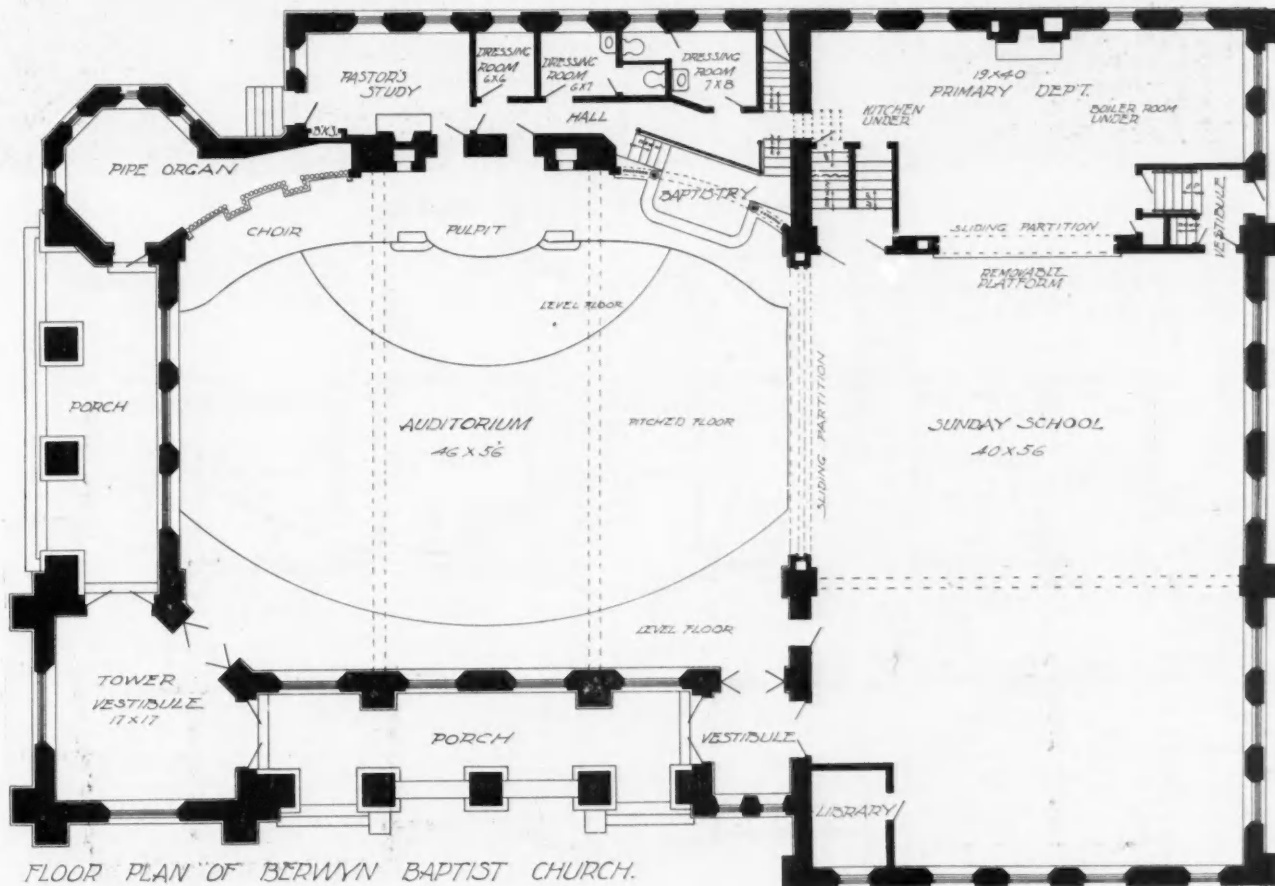
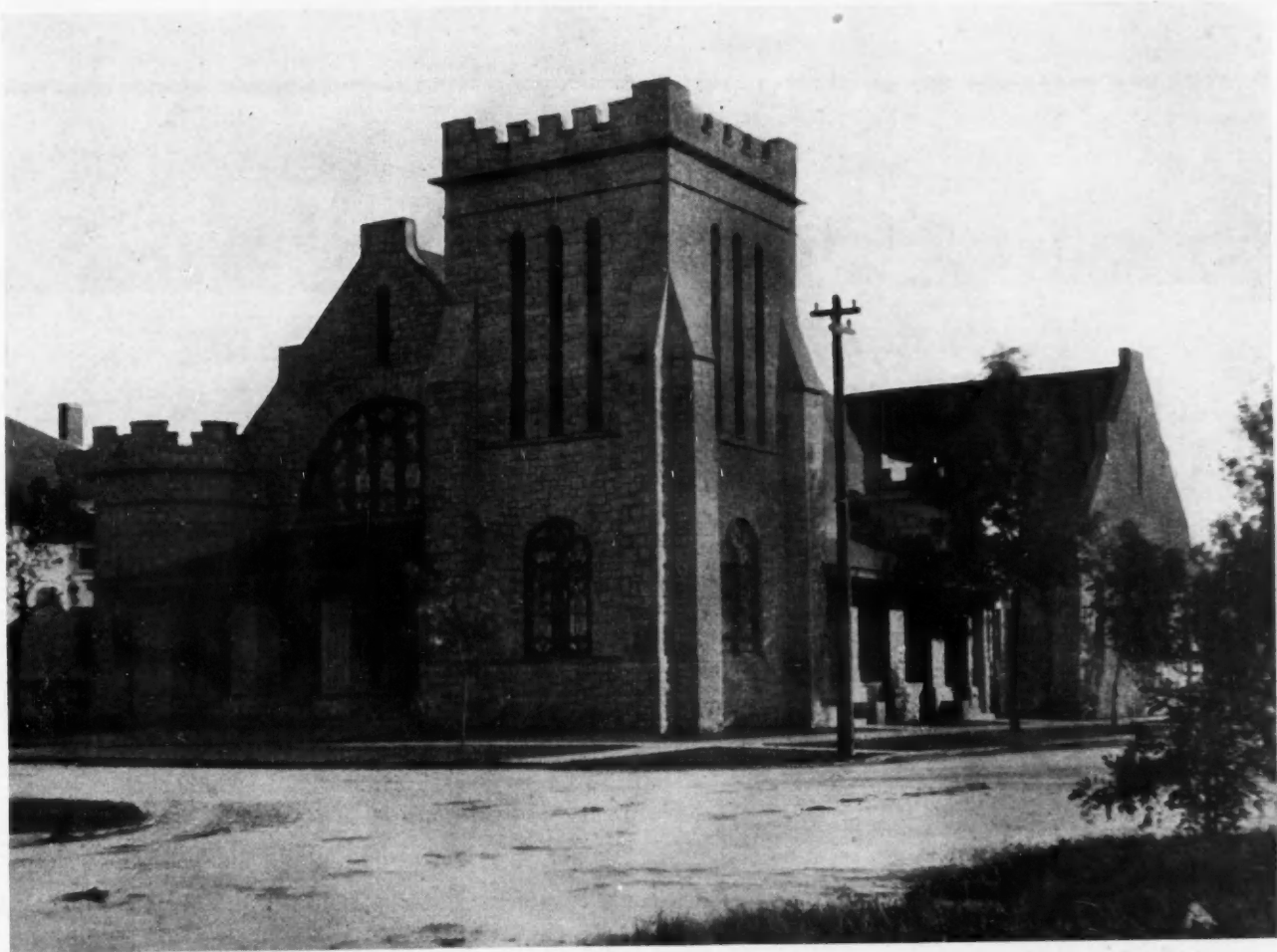
Cogs are cogs, and wheels are wheels,
But the finished work reveals
If the cog its duty found
Or, unhelping, went around.
If the work be fair and fine,
Then he may say: "This is mine"—
Furrowed field or finished plan—
Who, then, is "the other man?"



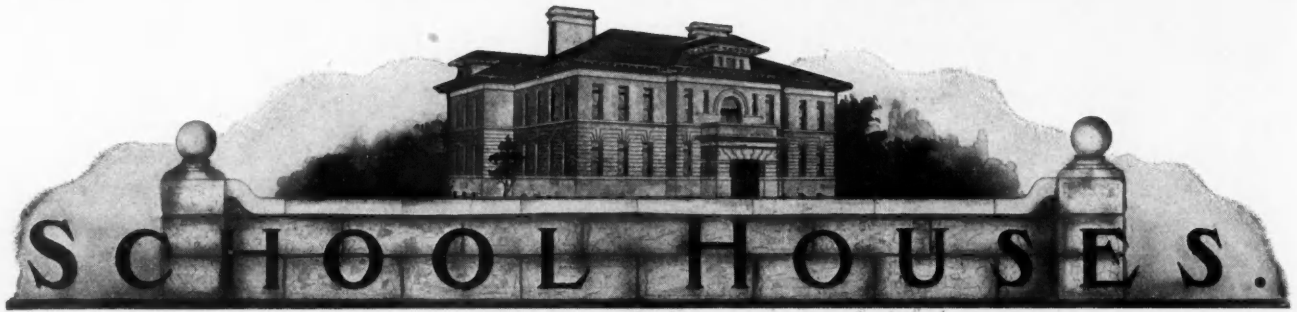
Good Adviser to Builders

I would certainly miss your valuable paper very much, as it is a good adviser to any one in the building business, no matter what his trade may be. A man can not always keep posted on new ideas without such a friend, and he can not have a better one than the AMERICAN CARPENTER AND BUILDER.

GEORGE CLUSE, Brooklyn, N. Y.



FLOOR PLAN OF BERWYN BAPTIST CHURCH.

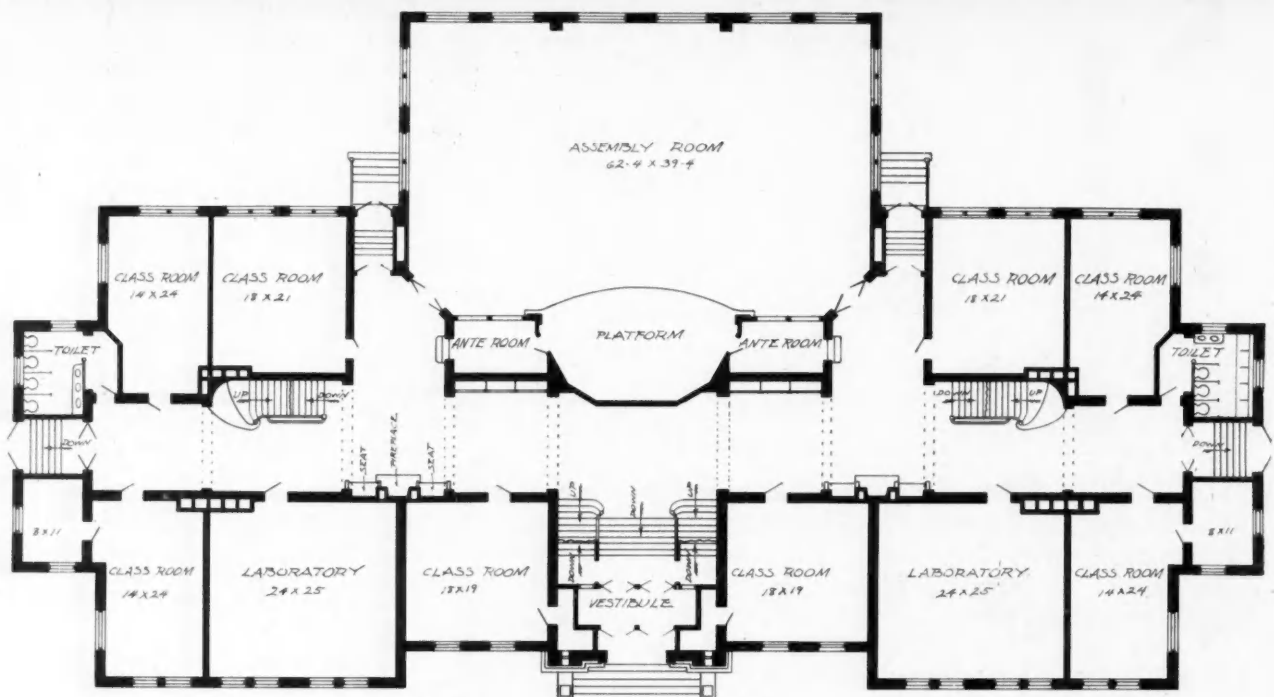
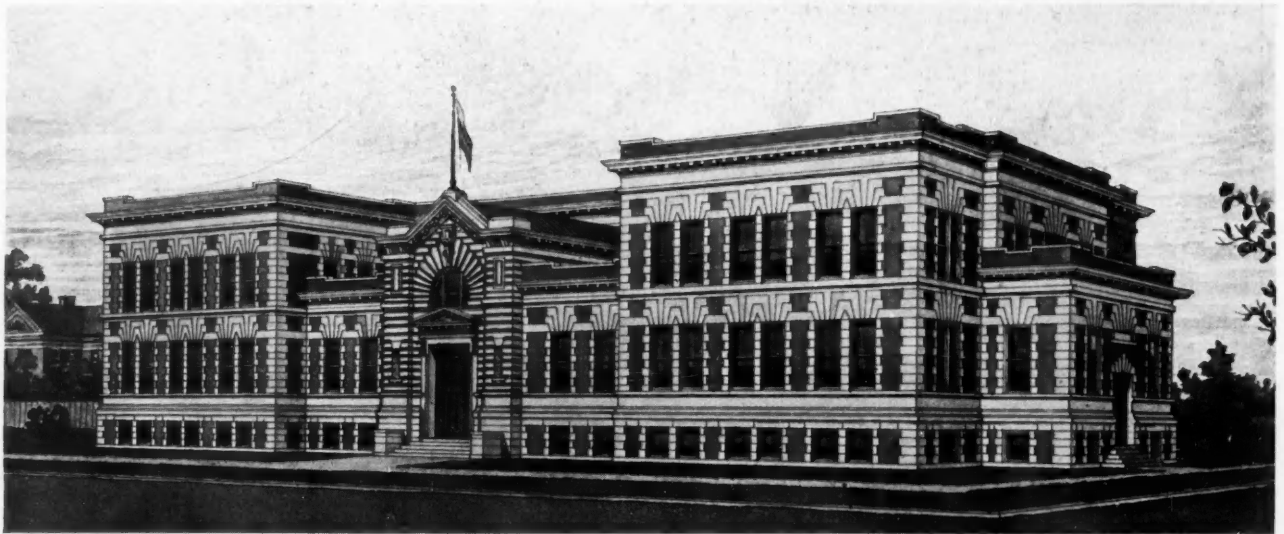


A Complete High School Building

PERSPECTIVE AND FLOOR PLANS SHOWING THE ARRANGEMENT OF THE ROOMS—SOME OF THE GOOD FEATURES POINTED OUT

WE are this month illustrating a large and well equipped high school which will be appropriate for any good-sized town. The building is constructed of red brick with stone trimming and is covered with a composition roof. The

floor plans show the division of the building into rooms, and one of the special features to note is the large assembly room. This room is located on the first floor, and has also a gallery which is entered from the second floor. It is an exceptionally good feature,

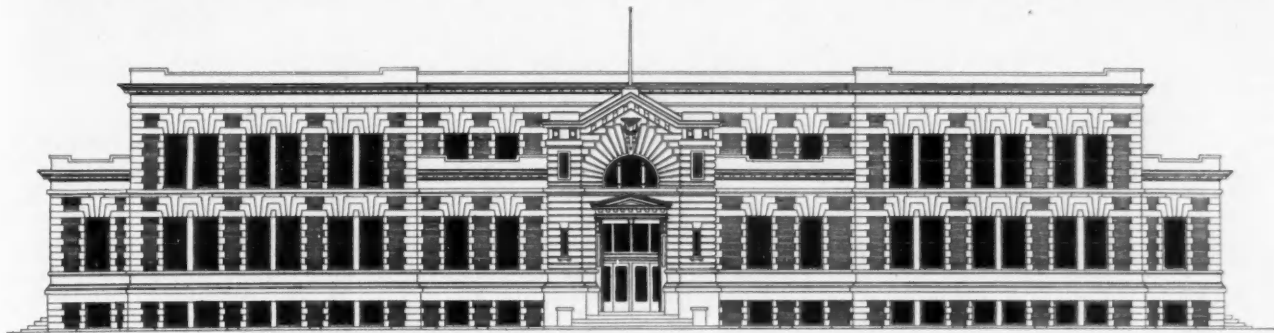


FIRST FLOOR PLAN

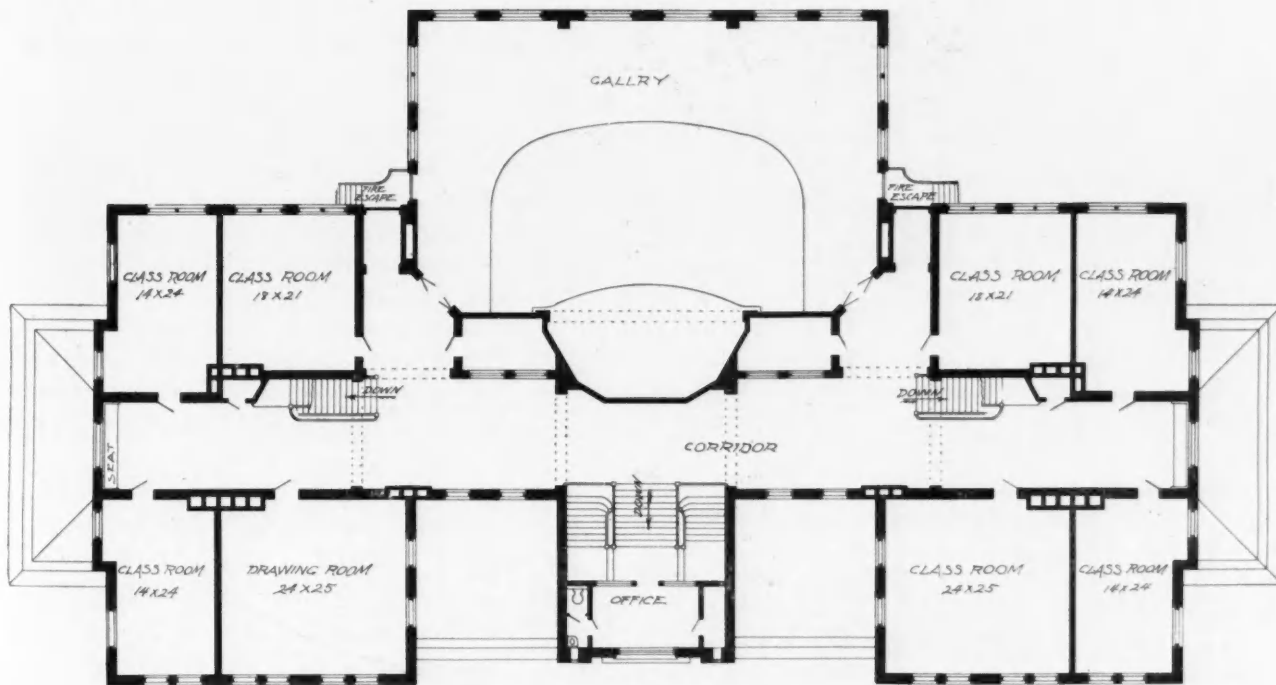
as it makes this room especially useful for lectures and other entertainments. Some of the rooms can be used for laboratories, and as in a school of this nature many of the higher studies will be taken, these laboratories are very essential. On the first floor it would be a good plan to have the physical laboratory where the various apparatus used in physics can be set up and also the various experiments can be there per-

formed. The other laboratory on the first floor can be devoted to botany and zoology. It is well to devote an entire room to these studies, as they necessitate having numerous jars, and also a tank filled with running water. In the corridor of the first floor are two large fireplaces, which add very much to the

made which will cause disagreeable odors and loud explosions. It is therefore essential that all these be confined to one room. There are five exits to this building, and this is an exceptionally good feature, as a building of this size with its large number of students would otherwise be unsafe. There is a basement extending under the entire building, which is divided into a furnace room, fuel room, toilet rooms and a gymnasium. The gymnasium is located directly under the assembly room and the windows which are on three sides of the gymnasium are arranged close to the ceiling. This will necessitate excavating a little deeper for the gymnasium, but this is quite frequently done and has proven very satis-



FRONT ELEVATION



SECOND FLOOR PLAN

appearance of the building. Almost opposite these fireplaces are several glass cases, where exhibits of the scholars may be shown, for example, some of the things done in botany, etc. One of the large class rooms on the second floor can be devoted to the chemical laboratory. This study also requires the use of an entire room, as many experiments will be

factory. The entire building is exceptionally well arranged, and is a credit to G. W. Ashby, Architect.



Don't pay any attention to the religious talk of an able-bodied man whose wife takes in washing to support him.

PLUMBING

Wm. R. Marshall

Water Supply Tanks for Country Homes

BEST KIND OF TANKS TO USE—HOW TO REGULATE THE SUPPLY—RULES TO FOLLOW WHEN INSTALLING SUCH A SYSTEM

IN view of the many inquiries sent to the AMERICAN CARPENTER AND BUILDER regarding water supply systems, storage tanks, etc., we believe this article will be timely, proving both interesting and instructive. House tanks or storage tanks should be placed in the attic of a building and should be located at least ten feet above the level of the highest fixture from which water is to be drawn. There are two kinds of tanks generally used, wooden tanks and iron tanks. Wooden tanks unlined are subject to decay

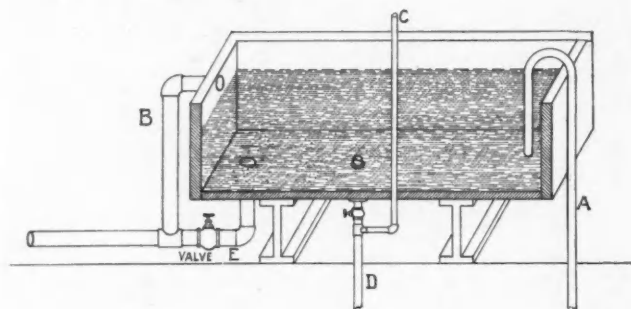
filled with sawdust will answer very nicely for this purpose.

Connections

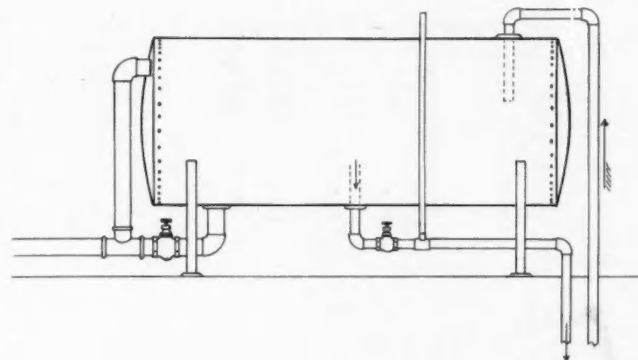
The essential number of pipe connections for an open top house storage tank is four—namely, the supply pipe, the outlet, the tell-tale or overflow pipe and the blow-off or clean-out drain pipe. In Fig. 1 the general arrangement of these pipe connections to a house storage tank is shown, as follows:

A, the supply pipe from pump, is shown as being bent over the top of tank and extending down into the tank to prevent splashing and unnecessary noise when tank is filling. Care should be taken, however, that the pipe does not reach near enough to the bottom of the tank to stir up the sediment.

B, overflow pipe, should be connected near the top of the tank, and should be of sufficient capacity to safely carry off the maximum amount of water the supply pipe can deliver. A safe rule to follow for arriving at the proper size pipe for an overflow pipe is to double the size of the supply, which allows for four times the capacity of the supply pipe. The overflow pipe should discharge upon the roof whenever practical. Then in case of overflow the water will run back into the cistern, avoiding unnecessary waste of water. Where conditions render it impossible to



along the line about which the water varies. Unlined wooden tanks are not desirable for domestic water supply, as they can not be thoroughly cleaned. Lead lined wooden tanks have been used extensively, but owing to the liability of being attacked by some kinds of water are not to be recommended and should not be used, particularly where the water is soft. Tinned copper for lining wooden tanks is the most desirable. A tank made of wrought iron or steel plates is now being used most generally for storage tanks and if the owner be over-particular a galvanized steel storage tank is the best, as it will resist rust and consequently last a longer period of time. When a steel or iron tanks is used in an unheated attic provisions for protection against freezing should be made. Iron or steel conducts the heat of the water rapidly to the outer air, and consequently the liability of the water in the tank freezing is a chance that will justify extra expenditure. A wood box built around the tank and



do so the overflow pipe should run down inside of the walls and discharge into an open sink, properly trapped and provided with water supply.

C, the house supply pipe, should extend a few inches

NOTE.—It has been the purpose of the author in writing these articles to provide to the non-technical reader a source of information, on the subject of plumbing and sewerage, the principles and designs, as free as possible from the set phrases of the craft and sanitary engineers.

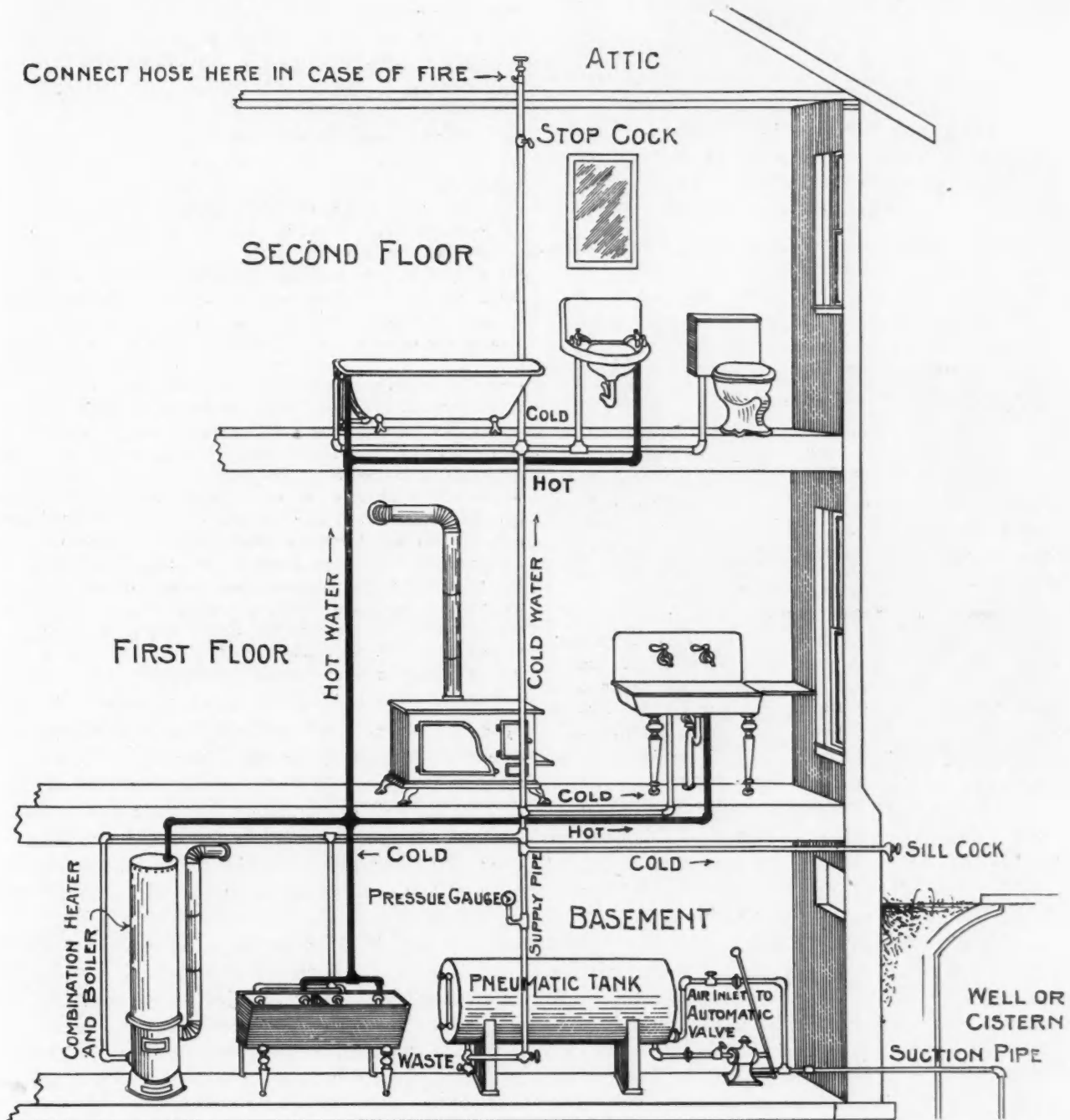
above the bottom of the tank to prevent sediment entering the pipe.

D. Placing a valve on the house supply pipe directly under the tank permits shutting off the supply when it is necessary or desirable to make repairs of any fixtures.

C, the relief or vent pipe, connected to the house supply pipe, permits air to enter the house supply pipe and permits it to empty when valve is closed.

use where the water supply is furnished by hand pump.

When a storage tank is supplied direct from street main (and it is often necessary to get the direct supply from the street main where the pumping facilities are inadequate with a storage tank which will fill during the night when consumption is light) the tank supply should be controlled by a ball cock and copper float. In operation when the water is below the desired point



E, the valved blow-off or emptying pipe, must be connected so as to drain all of the water from the tank to permit the sediment on the bottom of tank to be completely washed out. This pipe should be the same size as the overflow pipe.

These two types of tanks and connections are for

in the tank (just under the point of overflow) the copper ball float drops and opens the ball cock, permitting water to flow into the tank; as the tank fills, the water floats the copper ball until it completely closes the cock and stops the supply. In this way a certain quantity of water is always had in reserve without waste. When

a storage tank is supplied from an outside tower tank and delivers water to the storage tank by gravity, the supply pipe in the storage tank should always be equipped with a ball cock and copper float.

Capacity

It is a safe rule to figure fifty gallons per capita for twenty-four hours' consumption.

Rule to ascertain size of tank desired: If cylindrical, multiply the area in inches by the length in inches which will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a U. S. gallon in inches) and the product is the capacity in gallons.

Rule to find the area of a cylinder: An easy way is to multiply one-half of the diameter by one-half the circumference.

Rule to find the circumference: Multiply the diameter by 3.1416.

Question. What is the capacity of a cylindrical tank 22 inches in diameter and 5 feet long?

Example:

22 inches = diameter $\div 2 = 11$ inches or one-half diameter, 22 inches = diameter $\times 3.1416 = 69.1152 \div 2 = 34.557 =$ one-half circumference, $34.557 \times 11 = 380.127 =$ Area.

5 feet = 60 inches $\times 380.127 = 22807.620$ cubic inches, $22807.620 \div 231 = 98\frac{1}{2}$ gallons—Capacity.

If rectangular in shape—Multiply the length by the width and the product by the height = cubical contents in inches divided by (231 cubic inches U. S. gallon) will give capacity of tank in gallons.

Pneumatic Water Supply System

To the Editor:

Hardwick, Minn.

I would like to know how large a tank I would have to have for about 75 head of cattle and about 20 head of horses and about 150 to 200 head of hogs to supply them water to be pumped by a windmill, and whether it would be practical to put in a plant of this kind on a farm. C. G. MATTHIENEN.

Answer: In reply to your inquiry regarding a pneumatic water supply system such as will have sufficient capacity to take care of all your wants as enumerated, would say that you will desire a steel tank five feet in diameter by twenty feet long. A tank of this size has a total capacity of 2,938 gallons, allowing at least one-third of the total capacity for space occupied by air. This tank will give you 1,960 gallons of water in storage. In addition to the tank you will desire one air pressure gauge and three special connection valves. In regard to this tank, it must be absolutely air tight, and will cost more to manufacture than a tank ordinarily used for storage purposes. When considering the cost due consideration must be given to the difference in manufacturing and the care necessarily required in manufacturing. If the water from the well or cistern is to be pumped into this tank by a windmill, some means must be provided to prevent pumping to excess pressure and bursting the pipe and fixtures. All provided for this emergency, the windmill pump should be provided with a pressure cylinder which will throw

the windmill out of gear when the pressure reaches a given point and start it again when the pressure goes down by means of a counter weight. The attachment must be adjusted to operate at any pressure desired. It should generally be set so as to throw the mill out of gear at a pressure of about 50 pounds. Another attachment that should always be installed in connection with the windmill pumping water into the pneumatic tank is a water relief valve, which in a storm will throw the windmill out of gear. This relief valve will open and will allow water to go through it instead of into the tank. We show herewith a sketch of a windmill pump with attachment referred to.

Water Supply for Country Home

To the Editor:

Evans City, Pa.

I wish to inquire about a water system which will have to supply both house and stable. The house has about six to eight occupants, and the stable contains four head of hogs, two cows, two horses and about thirty chickens. The stable is eighty-five feet from the house and has a fall one-half inch to the foot. There will be two bath rooms on the second floor, just a partition between. The bath room consists of one tub, one wash stand, one closet and a stiz. in each. One sink in the kitchen directly below the bath room. Laundry directly under bath room, in cellar. There are three wash trays in the laundry. There must be hot water all through the house and the water will be heated by gas. I want to heat the water in the cellar if it possibly can be done, and if it can not be raised to the second story will use an automatic heater for hot water to supply bath rooms. The water will be soft water only and will be forced to the third supply tank by a windmill. This water will come from a well about one hundred feet from the house. We will have to figure supply plenty as this is a summer home and there will be at intervals more people there than has been described. In case the wind is low, how would the supply be pumped to the third story? The water supply for all will go through one service line, from the house it goes to the stable.

WM. L. MILLER.

Answer: In reply to the above letter would suggest that in the first place the windmill be erected over the cistern and the water pumped to a storage tank in the windmill tower above the level of the tank in the attic of the house. Run a 1-inch galvanized pipe from the bottom of the tower supply tank down to the ground and under the ground (the distance of 100 feet) to the house and up to the tank in the attic. This attic tank should be provided with a ball cock which will close and stop the water when the tank is filled to a certain depth. This is regulated by adjusting the copper ball float which operates the ball cock. The operation would be, when the water in the attic tank is below the desired point, the copper ball cock would drop, opening the ball cock and permitting the water from the windmill tank to run in by gravity. As the attic tank is filled, the copper ball would be floated until the desired capacity was reached and then shut off the ball cock, stopping the flow until water was drawn from it. In this way a positive supply for the house would be assured at all times, taking it for granted, of course, that the tower tank is filled, or partially filled.

The tower tank should be provided with a return or overflow pipe from the top of the tank back into the cistern. The attic tank should also be provided with an overflow pipe to insure against overflow and consequent damage, if for any reason the tank ball cock stuck or in any way became inoperative.

The supply for the barn could be taken off of the same pipe, running to the house from tower and the fixtures or openings in the barn or barnyard should be equipped with self-closing faucets to prevent unnecessary loss of water through carelessness in leaving faucets open. Capacity 75 gallons per capita is considered ample for domestic purposes, and it is doubtful if that amount will be used. However, in a proposition of this kind I would recommend that the tower supply tank capacity be figured at 100 gallons per capita, which will be sufficiently over the amount required for household consumption to take care of the barn requirements. This is what is known as the gravity system.

Another way to take care of a proposition of this kind and one that is finding favor with a great many architects and builders is known as the Pneumatic Water Supply System. In an installation of this kind the water is pumped into an air tight steel tank buried in the ground below the frost line, or placed in the cellar, and is delivered by compressed air. The tank is perfectly air-tight and has two openings in the bottom, one for the inlet and one for the outlet. The water can be pumped into the tank by means of a windmill, gas engine, hot air engine or hand force pump. As water is pumped into the bottom of the tank the air above it, having no outlet, is compressed. This pressure is maintained by an automatic air valve. A good average pressure is forty pounds, which will deliver water to points 85 feet above the tank.

If a windmill is employed for pumping purposes, automatic arrangements can be attached to the windmill for throwing the mill in and out of sail at any pressure desired.

In regard to heating the water for the bath room, kitchen and laundry, you can install a gas water heater in the basement, with either system. The pressure in the pipes will force the hot water up to any point in the house where you may desire to use it.

We refer you to sketch shown here in answer to any other inquiry of like nature, which will give you an idea of the installation.

A Traveling Window

In the field of advertising and display, it might seem that up-to-date merchants had exhausted the possibilities in the way of electric light, signs, etc. It remained, however, for an ingenious and enterprising Cleveland merchant to discover a way of multiplying his available window display space by four—a seeming impossibility.

This is how he did it.

The window floor was arranged so that it revolved

like an endless chain over two drums at either end; the window floor extending back into the store the



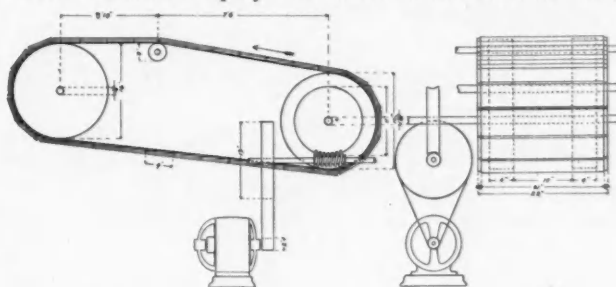
depth of the window and being separated by a black velvet cloth.

The different aluminum articles—some 200 in number—were wired to the moving window floor, and



thus produced such a unique and striking effect as to challenge the attention of large numbers of pedestrians.

This enterprising merchant has "blazed a new trail" in the window display line which merchants in many



other lines of business may find it to their advantage to employ.

The device was home-made, simple in design, inexpensive, and driven by a small electric motor concealed below the floor.

RESIDENCES

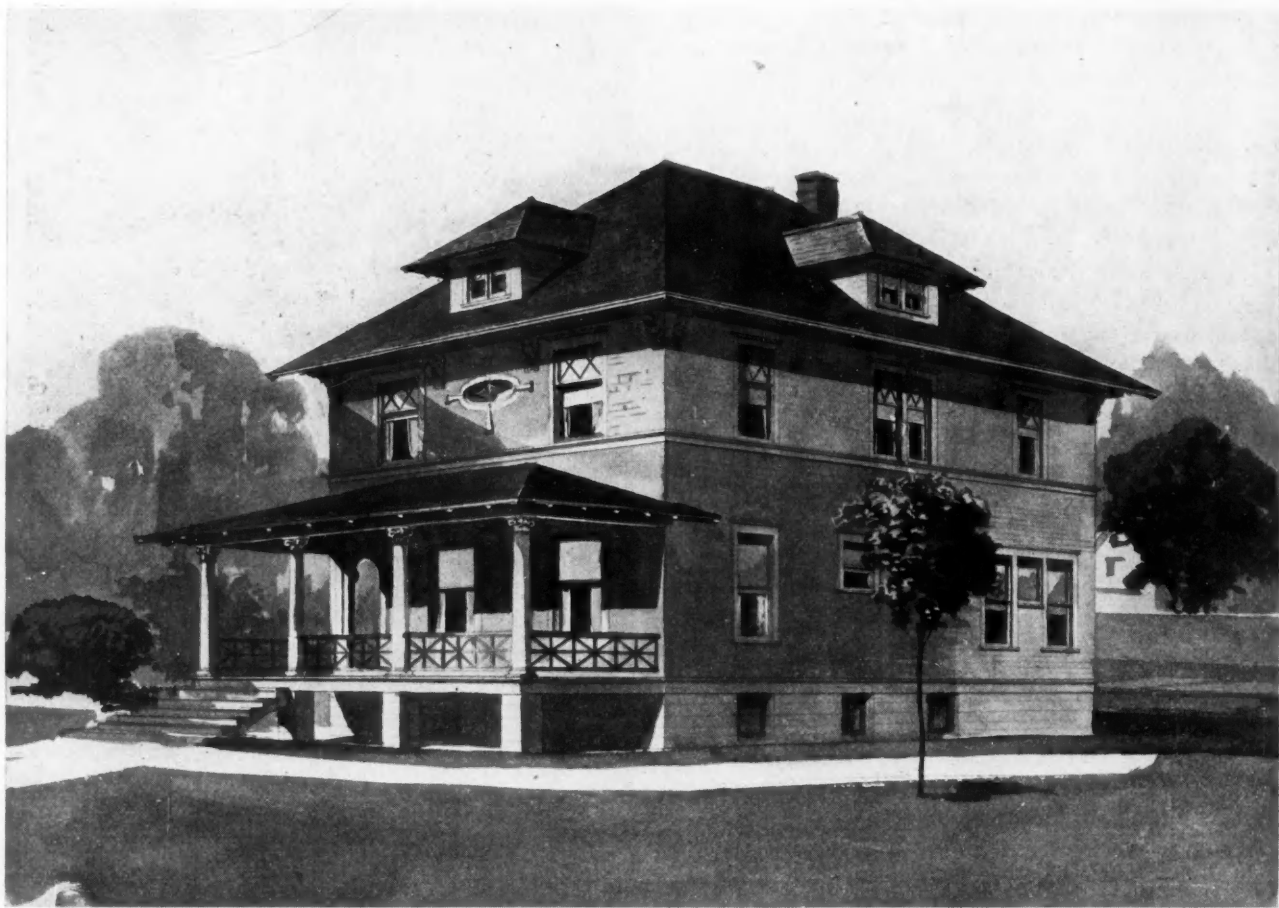


Two Attractive House Designs

SHOWING PLANS AND PERSPECTIVES TOGETHER WITH A DESCRIPTION OF THE SAME—COMPLETE DETAILS OF ONE DESIGN OWING TO ITS MERIT

THE house shown on this page is that of Mr. Thomas Daly, cashier of the Commercial National Bank, one of the oldest and best banks in Oshkosh, Wis. It was designed by Simon Fluor of that city, and speaks well for his architectural ability. It is a large, roomy house and completely equipped with all modern conveniences. The entire foundation

very appropriately, the siding being white, the dimension shingles brown and the roof shingles moss green. The basement is divided into a store room, wood and coal room, furnace room, wash room and the cistern. The cistern is surrounded by a stone wall and is located right near the furnace room, thus preventing the water from freezing



is constructed of stone as are also the posts underneath the porch. The sides of the house up to the second story windows are covered with four-inch siding. Above this to the eaves, dimension shingles are used. The roof is covered with shingles and the hips are all protected with galvanized iron. The house is painted

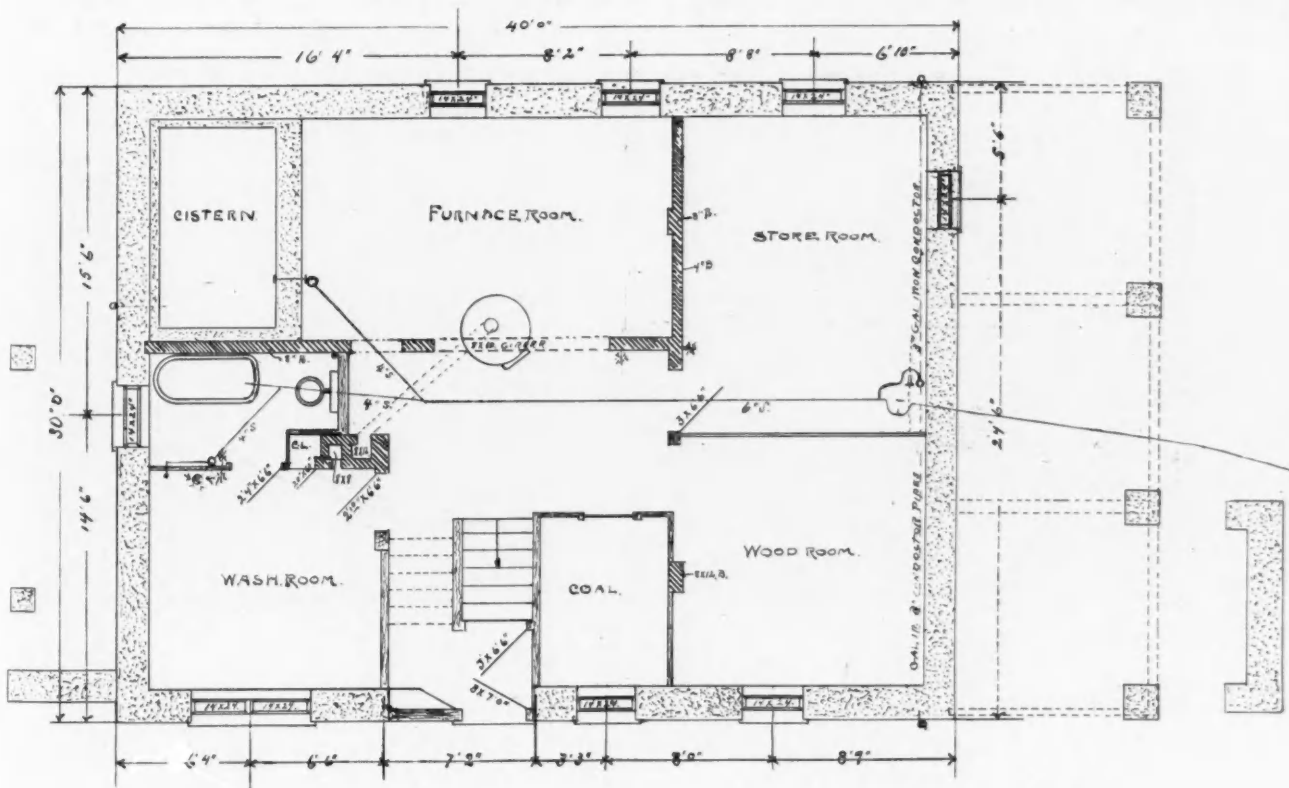
during the winter months. The furnace is located near the center of the house, so that the heat will be equally distributed. This should always be considered, as the heat is very materially retarded by long horizontal pipes and numerous sharp curves. The wash room is a very good feature, as it does away



NORTH WEST SIDE ELEVATION.

with the disorder which naturally accompanies wash day. The store room is conveniently located and vegetables and other things can be here stored and kept

in good condition during the winter. In case it becomes too cold, the door leading to it can be opened and the heat from the furnace will moderate the tem-



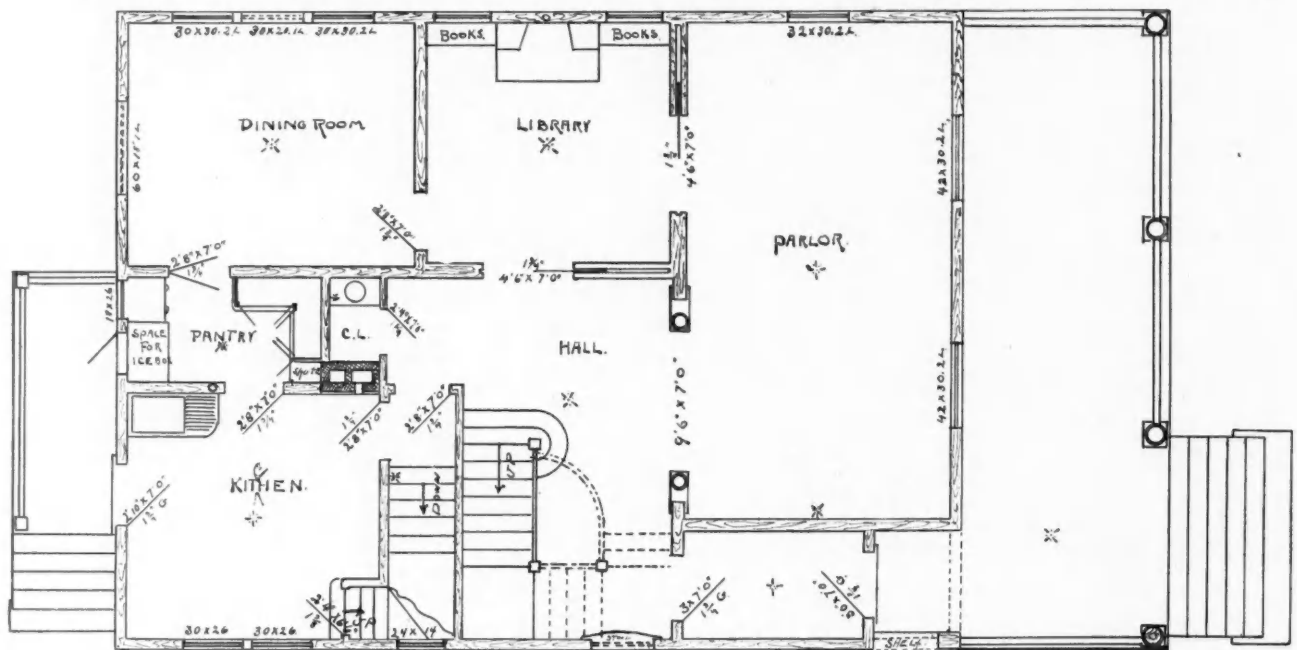
FOUNDATION PLAN.



S EAST ELEVATION

perature, while on the other hand the thick foundation wall will make this a cool spot during the summer months. The first floor is divided into a parlor, library, dining room and kitchen. The parlor is the largest room in the house and extends almost across the

entire front. It is divided from the hall by a large open doorway, which is ornamented by two columns, and from the library by a sliding door. The library is one of the pleasantest rooms in the entire house, and is made more so by the large open fireplace which is lo-



FIRST FLOOR PLAN

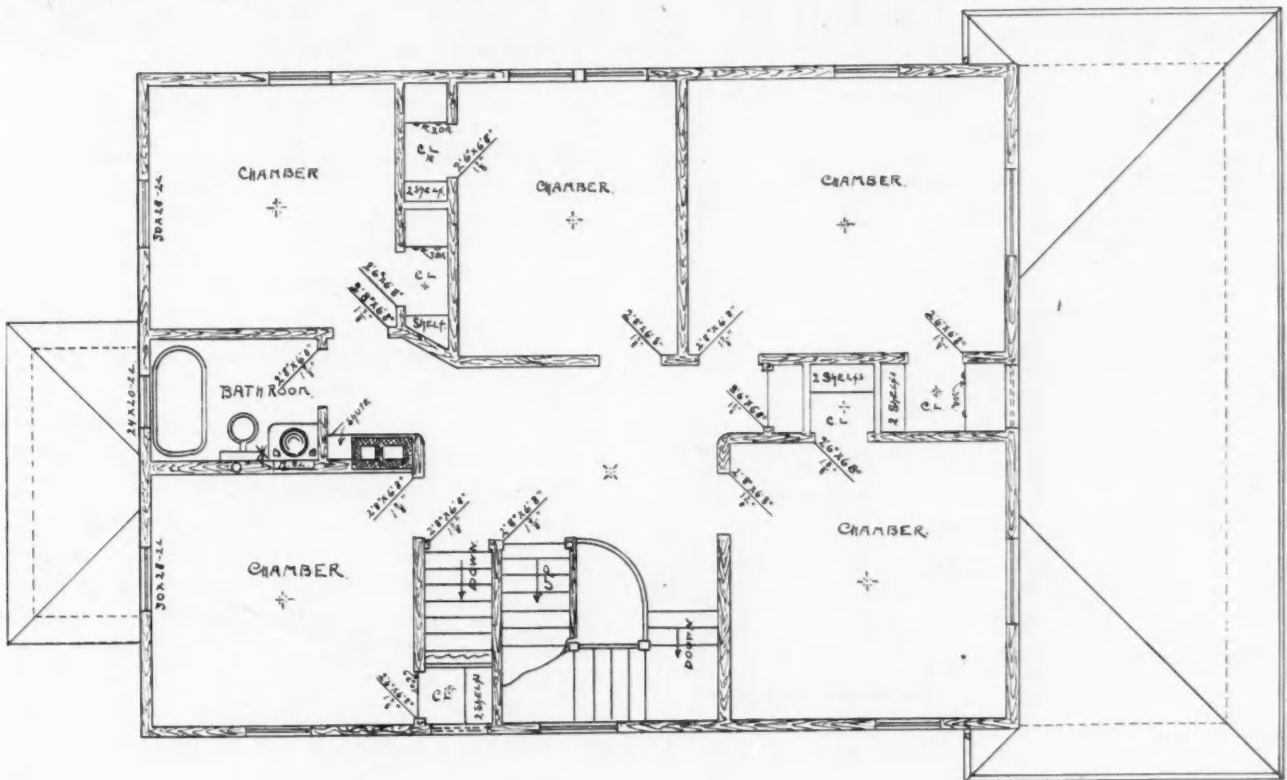
cated against the outside wall. On either side of this fireplace are bookcases, which extend to the wall, and above these book-cases are two half-windows. This makes an ideal study or reading room and shows the

one from the kitchen. The basement is also entered from a small hall directly off the kitchen. The second floor is divided into five bedrooms and the bath room. The bedrooms are all equipped with closets, and these



characteristics of the owner probably more than any other room in the house. Another feature to which attention should be called is the pantry, which is located between the kitchen and the dining room. Space is left here for the ice box, which can be filled from the back porch. This is a very good feature, as it does

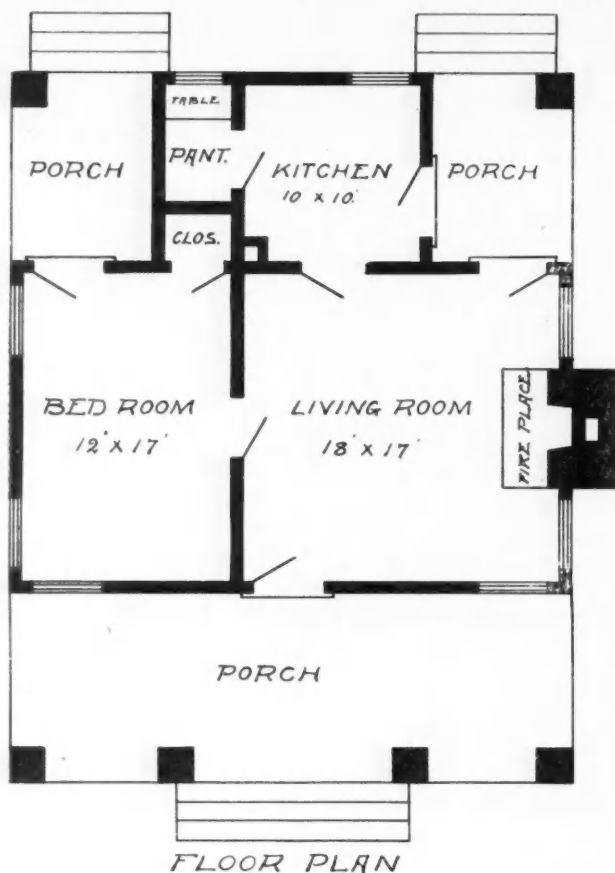
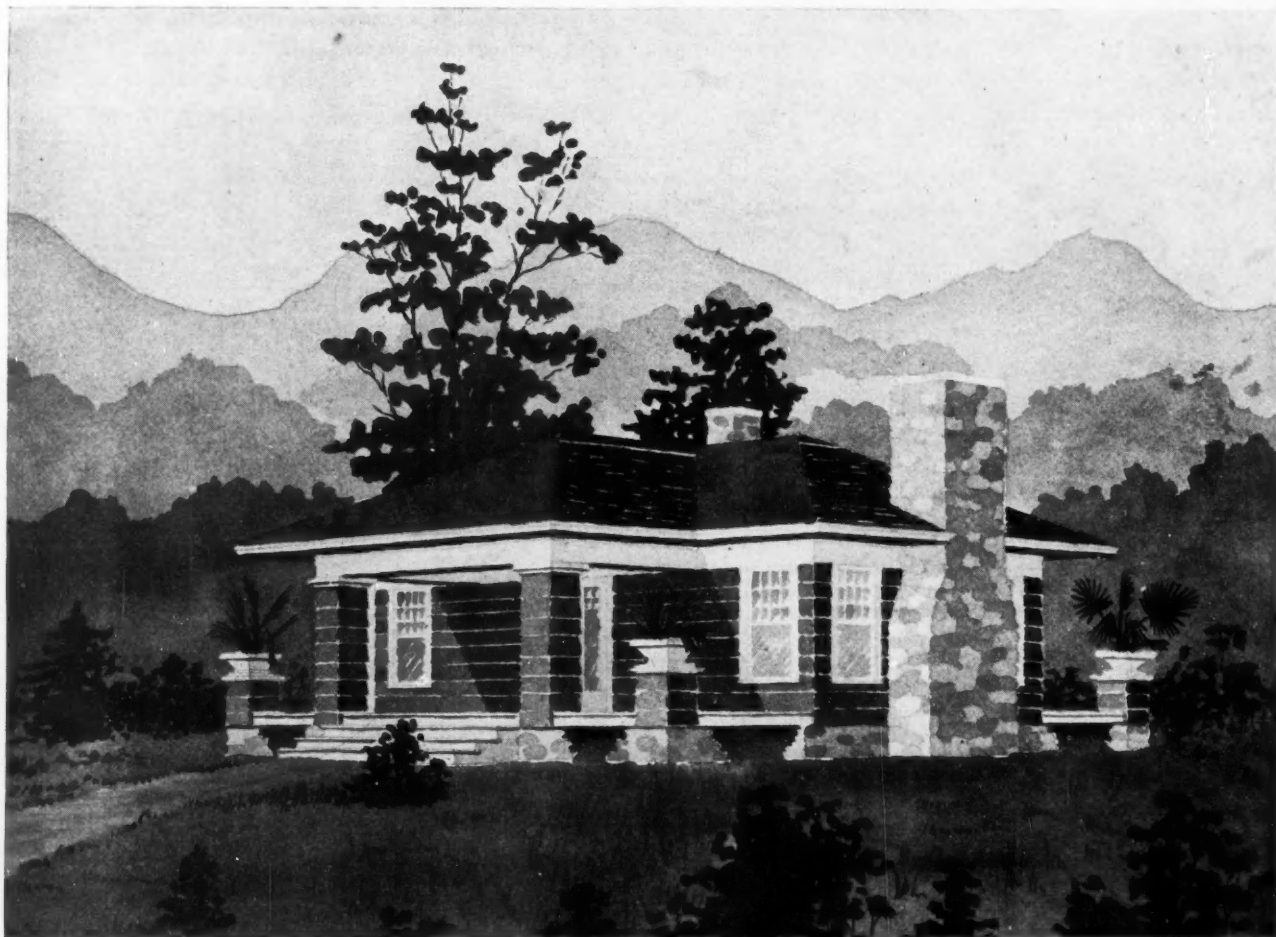
closets are equipped with shelves and other conveniences. This is a feature not often found in a private residence. Four bedrooms have windows on two sides and are thus splendidly located for ventilating purposes. The beds can be so placed as to avoid a draft and the windows be kept open during the entire



SECOND FLOOR PLAN.

away with the dirt and inconvenience of having the ice dragged through the kitchen or being obliged to go down into the cellar. There are two stairways leading to the second floor, one from the front hall and

night. The bath room is equipped with all modern conveniences and conveniently located at the end of the hall. The third floor can be divided into several fine rooms to be used by the maid. It is a pleasure



looking over a plan of this kind, as it shows how a home can be made thoroughly enjoyable by giving it a little thought, and arranging the rooms so that all possible comfort can be had from them.

A Mountain Home

On this page we are illustrating a small home which can be used for a summer home, a mountain retreat or for a small family. It is very artistically designed and is as conveniently arranged as is possible with the limited amount of floor space. The large exposed chimney produces a very fine effect, and with a good combination of colors on the roof and siding, it will have an exceptionally home-like appearance. The porch, which extends across the entire front of the house, gives ample space for a number of chairs and settees, and can be made one of the most delightful parts of the house. The interior is divided into a living room, bedroom and a kitchen. There is a large open fireplace in the living room which is a very good feature, as the evenings are liable to become cold and this is the only means of heating the house with the exception of the kitchen stove. There are no more rooms than are absolutely necessary, and this is appreciated by the women, as when they are on an outing trip they do not wish to do any more housework than they can possibly help.

Hollow Terra Cotta Block Construction

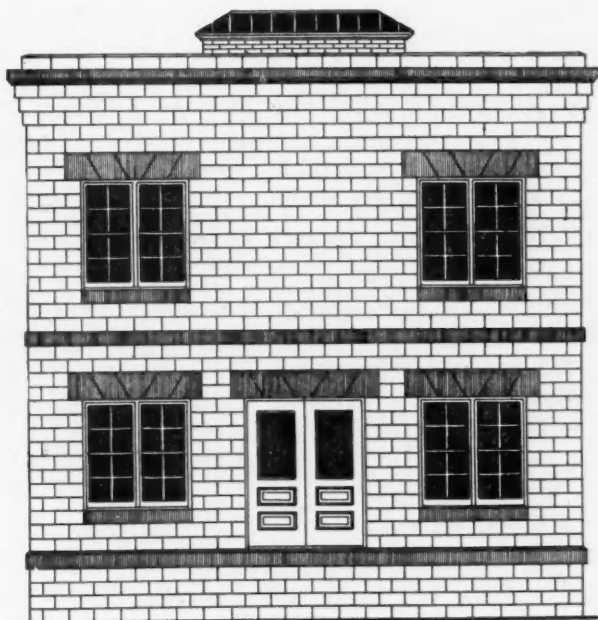
ADVANTAGES IN FACTORY CONSTRUCTION AS IT REDUCES FIRE RISK—FULL DETAILS GIVEN SHOWING THEIR ARRANGEMENT IN THE WALL

By George E. Walsh

THE difficulty of attaching machinery and shafting to fireproof work, and the tendency to vibration where heavy machinery is installed, have been factors of considerable importance in rendering buildings of this character somewhat unpopular even when first cost is not considered. In small factories, however, where the work is light and machinery vibration not great, the objections offered are entirely removed, and the lessened cost of insurance and great-

er durability of the structures make a better investment and surer returns. The insurance risk in a factory is always high, and the common practice of carrying insurance on only a part of the building and stock is a constant invitation to great loss.

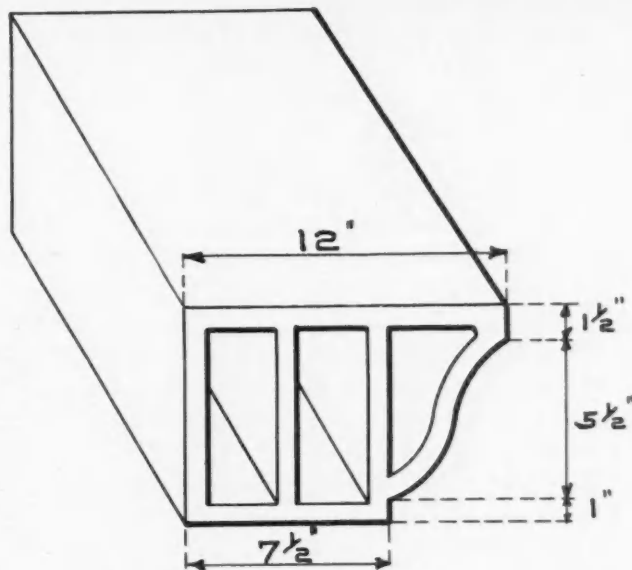
volves technical difficulties that are not always easily overcome. Hollow terra cotta building blocks are admittedly the best fire-resisting materials manufactured, and walls, floors and partitions constructed of them must secure for a factory the maximum of protection from a fire. The question of their value in walls for carrying the floor loads of a small factory is one not so generally recognized. The salt-glazed blocks when used for foundations offer the best resistance to the action of frost, moisture and atmospheric changes. They withstand the disintegrating effects of wet soils better than any other material. As a great many factories must be designed to occupy sites near river fronts where the soil is wet and spongy for a good part of the year, the need of materials for the foundations, which will be impervious to moisture, is very apparent. Salt-glazed foundation blocks, 8 by 16 inches, carried down to a depth of four feet below the grade, and laid on concrete footings, furnish sufficient strength and rigidity for all the needs of the modern small factory. The walls are built entirely of 8-inch blocks, but through the middle of the building iron columns are used. The wall foundations are made of the ordinary blocks, with the first two courses 24 by 24 inches. As shown in the cross section of the wall construction the blocks are laid in alternate layers, so that the thickness of the foundations equals one



Small Factory of Terra Cotta Hollow Brick.

er durability of the structures make a better investment and surer returns. The insurance risk in a factory is always high, and the common practice of carrying insurance on only a part of the building and stock is a constant invitation to great loss.

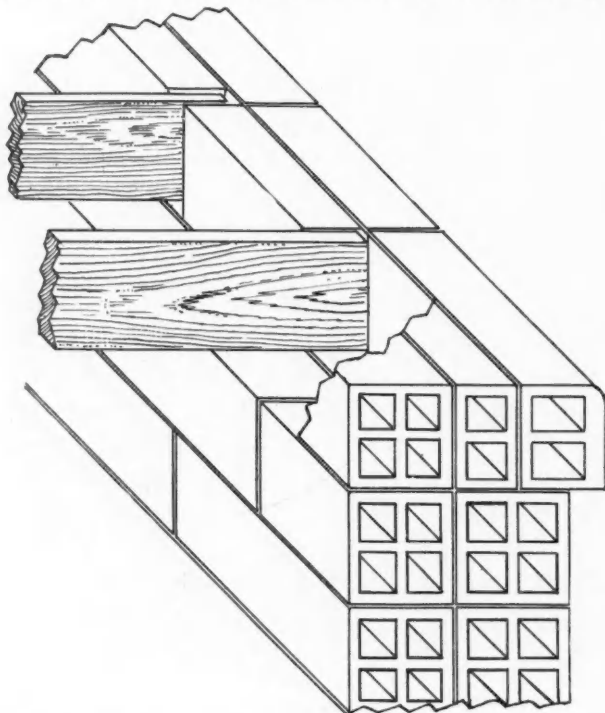
The combustible nature of the material which accumulates in a factory, and the constant tendency to overload the floors in the rush of business, makes the factory problem one of the most difficult to meet. To eliminate both of these dangers is to secure a measure of success rarely attained in the average factory. The first problem can be solved only by making every part of the interior absolutely fireproof, so that a fire starting in one room among combustible material cannot possibly destroy walls, floors and partitions. The second danger is securely avoided by designing piers, columns, and floor beams to carry a load far in excess of the ordinary requirements, so that any unusual load of stock material cannot cause trouble. But to secure perfectly safe floors and walls for any load that are absolutely fireproof within and without in-



length and width of the blocks. Above the second course the thickness of the walls is 16 inches or the full length of a single block.

The foundation piers for the iron columns are much thicker and heavier. They are 32 by 32 inches, or as thick as the full length of two blocks. This width

is carried up three courses, and then it is decreased to 24 inches made by a full length and width of blocks laid alternately as shown in detail. On top of the seventh course the iron pier or column is laid. The webs of the foundation salt-glazed blocks are three-quarters of an inch thick. With the openings running vertical the ultimate strength of these foundation blocks is 1,969 pounds per square inch on gross area, or 6,000 pounds per square inch on net area. The total weight



of each block is only 34 pounds, and with a double air space between the walls are made proof against moisture and temperature.

In calculating on the strength of a factory it is customary to figure upon the foundations carrying from 3,000 to 4,000 pounds per square foot. The strength of the foundation of hollow blocks is thus far greater than any requirements for safe loads.

So far as possible each step of a manufacturing process should be housed in a separate room with fireproof partitions. In the best designs of factories today this is strictly observed. The separation of the rooms by fireproof partitions must follow plans which will make convenience of handling the goods simple and efficient. The rooms must be laid out so that work enters one door and goes through another opposite, thus avoiding all trucking in opposite directions. Where material is unusually heavy and bulky a separate storage warehouse is usually provided, but in a factory for light work the second story can be used for stock and material storage. This requires a fireproof story which can be shut off from all the rest of the building. Fire creeping up from below must be effectually checked before it can reach the stock room. Insurance rates on stock held in the ordinary factory are almost prohibitive, but in a fireproof structure where every floor, wall and partition is composed of

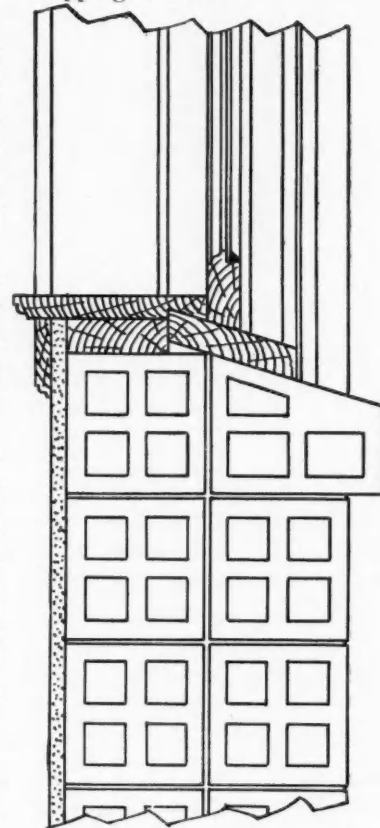
hollow terra cotta blocks or lined with porous terra cotta the cost of insurance is cut in half.

The exterior walls on all sides are carried up to the roof with two vertical courses of ordinary 8 by 16 blocks. The water table is formed by the top course of the foundation wall. The floor support consists of iron girders laid on the walls and carried to the center piers. The iron columns are clothed with porous terra cotta blocks so that every part of the metal is protected. Square columns are encased in square partition blocks set breaking joints. Round columns have circular blocks made to fit them with an air space between. The covering blocks should be at least two inches thick. Straight vertical joints should be avoided in setting, but if it is impossible to break joints the blocks must be bound together with metal clips. This, however, is rarely necessary, for the mason can avoid straight vertical joints in almost any kind of work. The insurance companies give the lowest rate of insurance when the columns are covered with at least two inches of hollow porous terra cotta blocks properly cemented together at the joints and not held together by any metal clips or wrapping of wire.

For a small factory the exterior walls should be of double thickness. That is, the 8 by 16-inch block should be laid lengthwise in two thicknesses, with hollow spaces made vertical. Very thin joints should be made both between the vertical and horizontal courses.

All windows and doors should have rock-faced or tool-faced lintel blocks and sills. Jamb tiles and window sills come in full and half sizes, so that any fit can be made. The weight of former is only from 16 to 32 pounds, and of sills 30 to 31 pounds.

Lintel blocks are in full and half sizes, 4 by 8 and 8 by 8, and weigh per lineal foot 15 and 16 pounds respectively. With window sills and all lintels of rock-faced or tool-faced blocks, the exterior finish of the factory offers a pleasing effect. This is further enhanced by a band course of similar facing. This course is formed of special blocks 8 by 10, giving a two-inch projection, or by band course blocks set up on edge with a half size one inside. The beams are laid di-



rectly on the top course, and are inclosed by the band course blocks as shown in detail. This method of construction secures a rigid bonding of the beams in the walls and produces a pleasing exterior finish.

The long span tile floor arch is used in the factory, with a terra cotta protection above and below the iron beams. The spacing of the latter must be apportioned according to the load the floor must carry. The surface of the floor should be finished with one or two inches of cement so that machinery can be placed directly on it. The placing of the machinery is a matter of detail which each separate problem must determine, but so far as possible it should be located where the greatest weight will fall upon the iron columns. But for ordinary machinery used in a small factory any part of the floor surface should be strong enough to take up vibrations and poundings.

The Johnson system of long span tile arch for the floors gives the best service in a small factory of this nature. It surpasses all other arch systems by virtue of its lightness, cost and its positive strength. The floor when finished is ready to receive a wood surface, tile or mosaic, gravel or other suitable material. Safe working loads can be easily calculated for any span desired. The spans run from 5 to 25 feet for light floors, but for stores, warehouses and factories a twenty or more foot span requires unusually thick floors to secure sufficient weight. A long span, for a small factory of 15 feet gives an ultimate strength of 1,500 pounds per square foot with 12-inch tiles, and when a two-inch floor surface of Portland cement is added an ultimate strength of 2,240 pounds to the square foot is obtained. If smaller tiles are used and shorter spans greater strength may be secured at less cost. A ten-foot span with 8-inch blocks will yield a strength of 1,100 pounds, and with a two-inch surface of Portland cement for the floor 2,500 pounds. On short spans of 6 feet, with a floor surface of one inch Portland cement, an ultimate strength of 8,083 pounds to the square foot can be secured.

Such a rigid floor is an economy in the end and absolutely fireproof. The cost of construction varies from 25 to 45 cents per square foot, according to relative thickness and finish. For a small factory a floor with a safe working factor should approximate 35 cents per square foot. When finished the floor is a solid monolithic structure, stretching from girder to girder, and capable of withstanding any amount of vibration and shock without weakening the supports. Its durability is so great that it is almost indestructible. No fire could possibly pass through it, and when the partitions and side walls are joined closely at the corners, the spaces above and below are tightly sealed from each other. Neither moisture, air nor fire could find a vent hole.

The supporting roof of the factory is of the same long span tile formation and is carried on the girders as below. The iron columns are carried to the roof

plates, and one end of the beams rest on the exterior walls of terra cotta blocks. The cornice tiles are laid flat on the upper course, and extended from four to six inches beyond. A great variety of cornice tile is furnished, and combinations may be made with them to suit almost any needs. The roof is finished off with gravel, slate or metal, or simply left with exposed roofing tiles. As fireproof conditions are the chief thing desired, a tile roof or corrugated iron roof probably answers the purpose best. The exposure hazard from outside flames would thus be materially reduced. The weakening of a structure through the employment of combustible material on the roof would make a bad finish of the job.

Partitions of the ordinary porous and semi-porous terra cotta blocks should be constructed in the usual way. Wood or channel-iron bucks are placed in all doorway openings. A factory partition of hollow blocks is safer when reinforced with truss wire in the horizontal joints. Even then six-inch partitions should be used in preference to the 2 or 4-inch. All partitions are bonded where meeting and anchored to wooden bucks or tile walls with tenpenny nails at each second joint. This gives a rigid partition wall and prevents any displacement of the parts due to heavy vibration of machinery. In the ordinary factory it may not be desirable to plaster walls and ceilings, and all inside blocks should be smooth and not furred to receive plastering. If plastering is to be used the furred-surface blocks must of course be employed. In the ordinary factory the exposed smooth surface of the tiles offers a clean and sanitary wall and ceiling which is more desirable than any other material. Smoke, grease and dirt which may accumulate on the walls can easily be removed, and the tiles do not become permanently discolored by fumes and acids. Moreover, none of these injure the tile surface in the slightest, and the cost of repairs of walls and ceilings will thus be materially reduced. There is little danger of chipping the tiles by heavy articles falling on them, but where such accidents happen the injured blocks can be removed and new ones put in without tearing down any more of the partitions. If the partition blocks are composed of alternate layers of semi-porous and full porous blocks, nails can be driven securely for supporting wood work, brackets or closets. The nature of the work intended for each room should be considered in advance, and then the design should call for such an arrangement of full porous blocks that will meet the demands.

The exterior walls of the factory being sixteen inches thick, the cost of construction should be from 45 to 52 cents per square foot of exterior surface with no openings to be deducted. The tiles are to be laid up in good strong Portland cement mortar, and with depressions made in the end of each to receive the mortar, very thin joints should be made. This gives a close, homogeneous effect to the wall, and practically

bonds it together in one solid piece of masonry. No part of the wall can vibrate or work loose. A shock communicated to any part of it must be taken up and received by the whole structure. The regular buff building blocks present a finished exterior for a small factory, but if for artistic effects it is desirable to give a finish of stucco work or a thin veneer of pressed bricks the improvement can be made at little extra expense. The blocks are ready to receive the rough casting without further preparation, and the brick veneer can be applied when the wall is being erected by using galvanized iron bonds to hold the two together.

The economical points of factory construction with terra cotta hollow tiles are, besides the fireproof qualities mentioned, a perfect exterior finish which requires no painting or treatment with stains or preservatives, an interior finish that demands no plastering or other application, absolutely rigid walls and floors which cannot be shaken or destroyed without affecting the whole structure, perfectly moisture and air-proof walls and floors, and clean, wholesome surroundings which

cannot absorb and retain chemical stains and acids to the detriment of the health of the operatives or injury to the building. The first cost of construction is slightly in excess of the so-called slow-burning mill building, but the greater durability more than compensates for this increase in price, and the saving in insurance and repair items within a few years wipes out the small difference. The terra cotta lintels are far superior to the cast-iron lintels, and if wire-glass is used for the windows in good metal frames a great amount of light can be admitted without increasing the fire hazard. The doors should be of metal and equipped with fusible link, automatic-closing devices which will operate at a given temperature. Stairways and elevator shafts should be enclosed in tile wells or partitions, shut off from the rest of the building by metal doors held back by fusible links. Equipped with such devices the factory is so nearly fireproof that insurance could be left off the building entirely. A small insurance for the combustible stock carried in a single room should be all that the case demands.

The Coming Season's Wall Papers

SOME OF THE NOVELTIES THAT WILL BE OFFERED—MORE REFINEMENT IN TASTE SHOWN IN THE NEW DESIGNS—COLOR SCHEMES THAT WILL PREDOMINATE

By Edward Hurst Brown

WHEN the property owner is shown the newest wall papers, as they are offered by the decorators and retail wall paper dealers for the spring trade, few of them realize that these new patterns and colorings have been an old story to the wholesale wall paper dealers for several months back, and that the manufacturers began to plan them at least a year beforehand, yet this is the case. Early in the spring of this year the wall paper manufacturers were busy preparing for the new wall papers of the following winter and spring. The designs were selected that the artists had been working on perhaps months before. And the public does not know that in many factories three or four designs are bought and elaborated for every one that finally finds its way to the block cutters. Making the rolls or blocks used in printing the paper occupies several months, and it is often not until June or July that they are ready for sampling. Then the factory superintendents and color mixers get to work and each different set of blocks is tried out in a number of different "ways," or combinations of color or effects of metal, embossing or the like. Some are immediately rejected as impossible. Others meet with enough favor to pass the first test, and a few rolls (perhaps fifty or a hundred) of each are printed. When all the patterns have been tested in as many ways as may be thought desirable, a council of factory superintendents and sales managers is held, and every coloring passes critical inspection, all those deemed unsalable being rejected. Those that

are finally accepted are sampled; as many sets of sample books being made as may be needed for the factory's salesmen.

Early in August the sales departments of almost every wall paper factory in the United States gather in New York City, by tacit consent, at some three or four hotels that have come to be looked upon as wall paper headquarters, and there wait the buyers of the large jobbing houses, who come to place their orders for the ensuing season. Not until after this advance show are any of the patterns put on the machines for actual manufacturing, and some of the colorings and perhaps even some of the patterns exhibited at the advance show are never printed, because sufficient orders were not received to justify it.

This year showed a decided advance in merit and artistic character on the part of almost every manufacturer. The influence of the popular periodicals that have devoted so much space to the art of home decorating seems to be widely felt, and wall paper manufacturers are but following the general trend of the times in catering to the demand for better and more original effects in decoration. The freak wall papers of a few years ago, that were novel and startling rather than artistic, seem to have lost favor and few designs of this character are shown. Particularly noticeable is the large number of independent side walls, ceilings and friezes shown, and the number of ornamental borders for panel effects and of architectural decorations intended to be used in forming elaborate

designs for lodge rooms and other semi-public places.

A number of new cloth and fabric effects were shown this season, intended for dadoes or panel fillings. Among these, probably the most novel was an imitation of rag carpet that was both decorative and original. Curious effects were obtained by the use of gold and colored metal grounds, with an overprint in colors, giving a satinlike sheen or luster. These papers are known as tekkoes, and are quite expensive. An engraved paper gives the effect of a stippled wall, both in colors and metals. Many papers are shown with linen effects, gold or white thread lines being introduced in some of them. The chambray effects are included in this class, and many of these are made both in the plain color and also with a lacework or embroidered design printed in white on the chambray ground, the figured paper being used for the upper third or the panel, while the plain paper is employed for the lower wall or the stiling. Japanese matting, grass cloths, burlaps and leather effects are all imitated both in plain and figured wall papers.

One of the novelties introduced by one manufacturer is a line of duplex papers (having a double face) printed with a stain instead of a pigment with a glue binder that can, if necessary, be washed off with a clean sponge or damp cloth. The advantage of this is at once apparent in the western cities where soft coal is burned.

While there is a certain class of trade that continues to demand set figures and pronounced stripes, broken by conventional patterns, or rococo parlor papers with more or less gold, the tendency is toward freer and more decorative treatments, either in two-toned effects or harmonious blendings of soft colors. Many beautiful floral treatments appear in every line shown, and there is also a marked tendency toward the Art Nouveau shown in a large number of the new papers.

One firm exhibited an entirely new form of machine made wall paper decorations, in which the pattern continues without any repeat from cornice to baseboard, being arranged so it can be cut off at the base to any length in order to accommodate varying ceiling heights. The same firm shows a striking scenic frieze representing the "Cliff House and Seal Rocks" of San Francisco, with an extension representing rocks and waves, so that the title picture appears but once in the room.

There seems to be no one predominating color in the new wall papers. The browns and tans that caught the popular fancy during the past season are missing in the new papers. Some beautiful effects in old rose are shown, although strong reds do not appear to be very popular. Gray tones are shown in beautiful effects. Strong and vivid contrasts of color are generally avoided, and there seems to be a softening down of color tones. In short, both in design and coloring, next season's wall papers show a marked evidence of refinement in taste.

Buildings Cast of Concrete

Whole houses molded in a single casting out of solid concrete, which will provide homes for workmen at a cost of from \$500 to \$600 is the goal which Thomas A. Edison is striving to reach. He is confident of success. Combined with economy of construction and maintenance the inventor aims to embody architectural beauty and practical indestructibility.

Mr. Edison intends to make his first practical experiments next year in his new village in Warren county, N. J. One of the big Edison industrial establishments is situated there and he purposes to erect the homes by the new process for the families of the hundreds of employes of the plant. If he succeeds in demonstrating the practicability of the scheme he will introduce it generally.

Describing the plan in detail Edison said:

"The first step will be to employ an architect to design, say, a dozen dwelling houses of different patterns. I purpose to have metallic molds made to correspond. The mold for each house will be made in detachable parts. There will be separate plates and small molds that can be screwed together easily to form one mold for an entire house. That a fine finish may be obtained, the inside surfaces of the parts will be nickel plated.

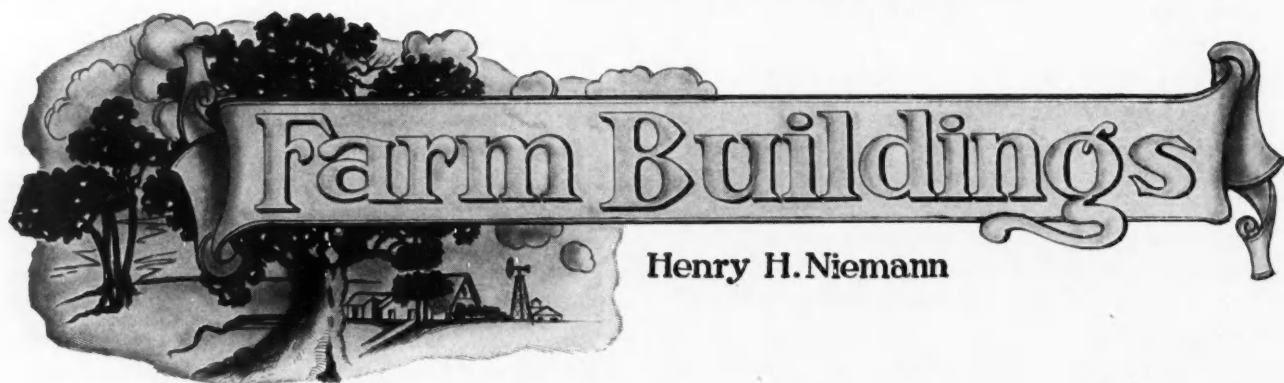
"After the mold for the whole house is set up it will be a simple matter to pump the concrete into every nook and cranny. After four days the parts of the mold will be unscrewed and taken off and the solid concrete house will remain."

Edison says the plan will be carried out in such detail that dormer windows, chimneys, spouts, and ornamental designs will be molded with the whole, and that inside cupboards, fireplaces, stairways with ornamental banisters, mantel pieces, and even bath tubs will be formed in the cast in which the house proper will be made.

The house will be so complete that when the mold is removed the installation of electric wires, window sashes, etc., will be all that will be necessary before the furnishers and carpet layers may go to work. Even the plumbing and gas piping will be of concrete and molded in the original cast.

As a practical demonstration of what may be accomplished by the process Edison has built a complete chicken house in his back yard, molded in one solid piece out of concrete. It has many compartments and doorways and decorated cornices of intricate design.

The original cost of each mold, with all its component parts the inventor estimates at \$25,000. From each mold, however, he says an unlimited number of houses may be produced. Because the parts of the mold are to be detachable it will be portable and one mold may be sent with little difficulty from town to town. About ninety houses could be built in one year by the use of a single mold, at a cost of from \$500 to \$600 apiece.



A Suburban Barn

PERSPECTIVE AND FLOOR PLANS OF A SUBURBAN RESIDENCE BARN—CONSTRUCTION OF THE VARIOUS PARTS AND MATERIALS USED

THIS stable is designed for a suburban residence stable, and accommodates four horses, three carriages and all the necessary accompaniments, such as harness and tool room, carriage, wash and man's room. On the second floor there is storage room for hay and straw and bins for grain and feed.

The arrangement of this stable is very compact, and all space is well utilized. The exterior is of a very attractive design and free from all unnecessary ornamentation. The foundation is of a 12-inch concrete wall run 8 inches above the grade. The carriage room floor, including carriage wash and center driveway, is of cement, all other floors are constructed of 2 by 10 inch joist floored with 1 $\frac{3}{4}$ by 6-inch dressed and matched flooring. The stalls have an extra floor 1 $\frac{3}{4}$ inches thick, slightly pitched to iron gutter, and joints coated with hot tar. The building above foundation is of frame construction, walls consisting of 2 by 6-inch studding with 6-inch drop siding on outside and floored inside after studding are covered with tar paper.

The stone archway at entrance adds greatly to the appearance and the spire ventilator gives it a finishing touch. The roof is of shingles stained moss green, and the side walls are painted a light grey and white trimmings.

How Moisture Affects Wood

The Forest Service of the United States Government has made a study of this during the past three years, and in a recently issued bulletin says: The relation of moisture to strength follows a definite law, which can be graphically expressed. Proper drying very greatly increases the strength of all kinds of wood, the amount of increase in strength depending upon the species and the dryness. The increased strength given to green wood by thoroughly drying it is so great that it may surprise many. For example, the strength of a piece of unseasoned red spruce may be increased over 400 per cent by a thorough drying at the temperature of boiling water. Strength decreases again, however, as the wood reabsorbs moisture. Air-dried wood, protected from the weather, and

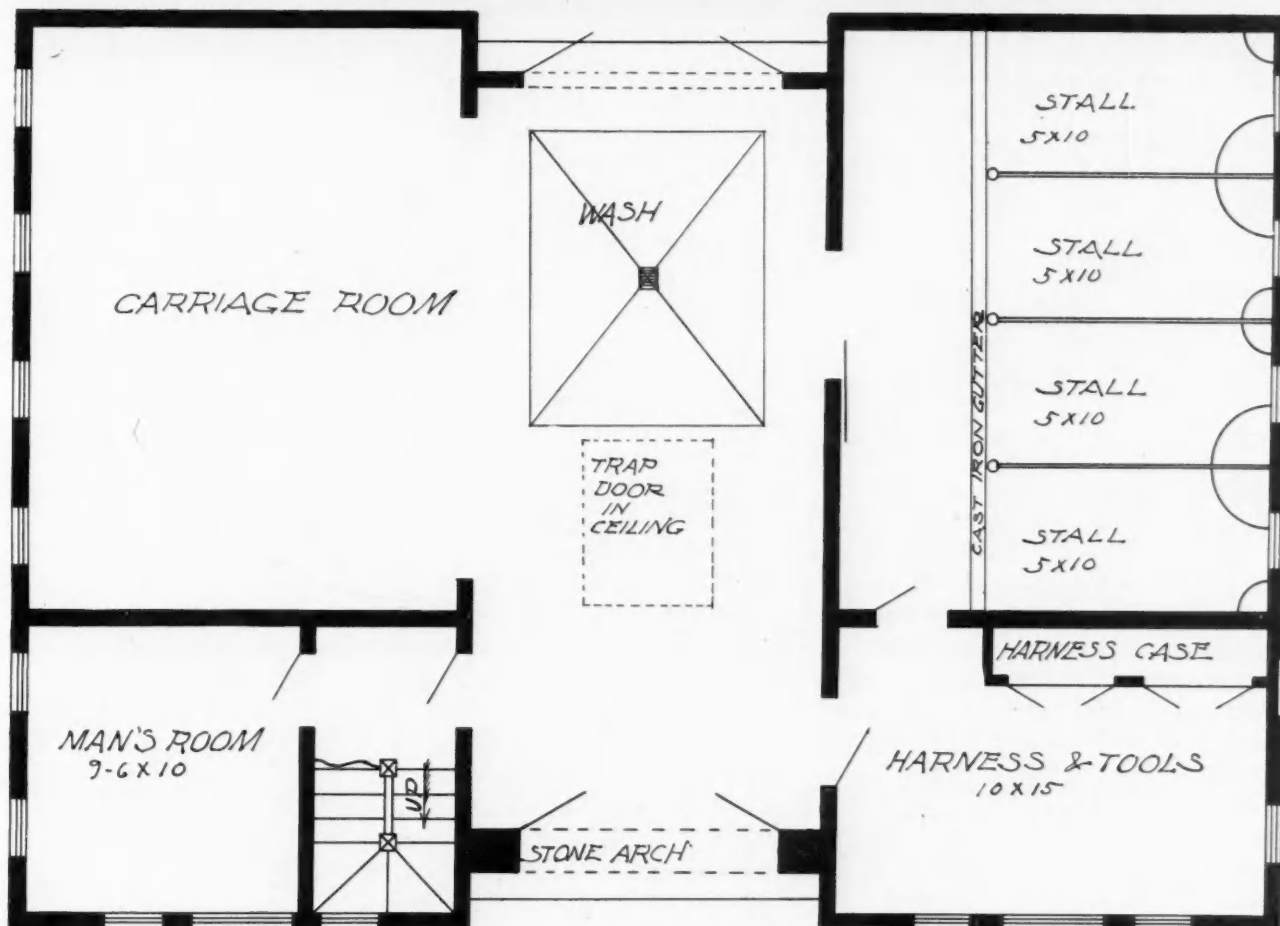
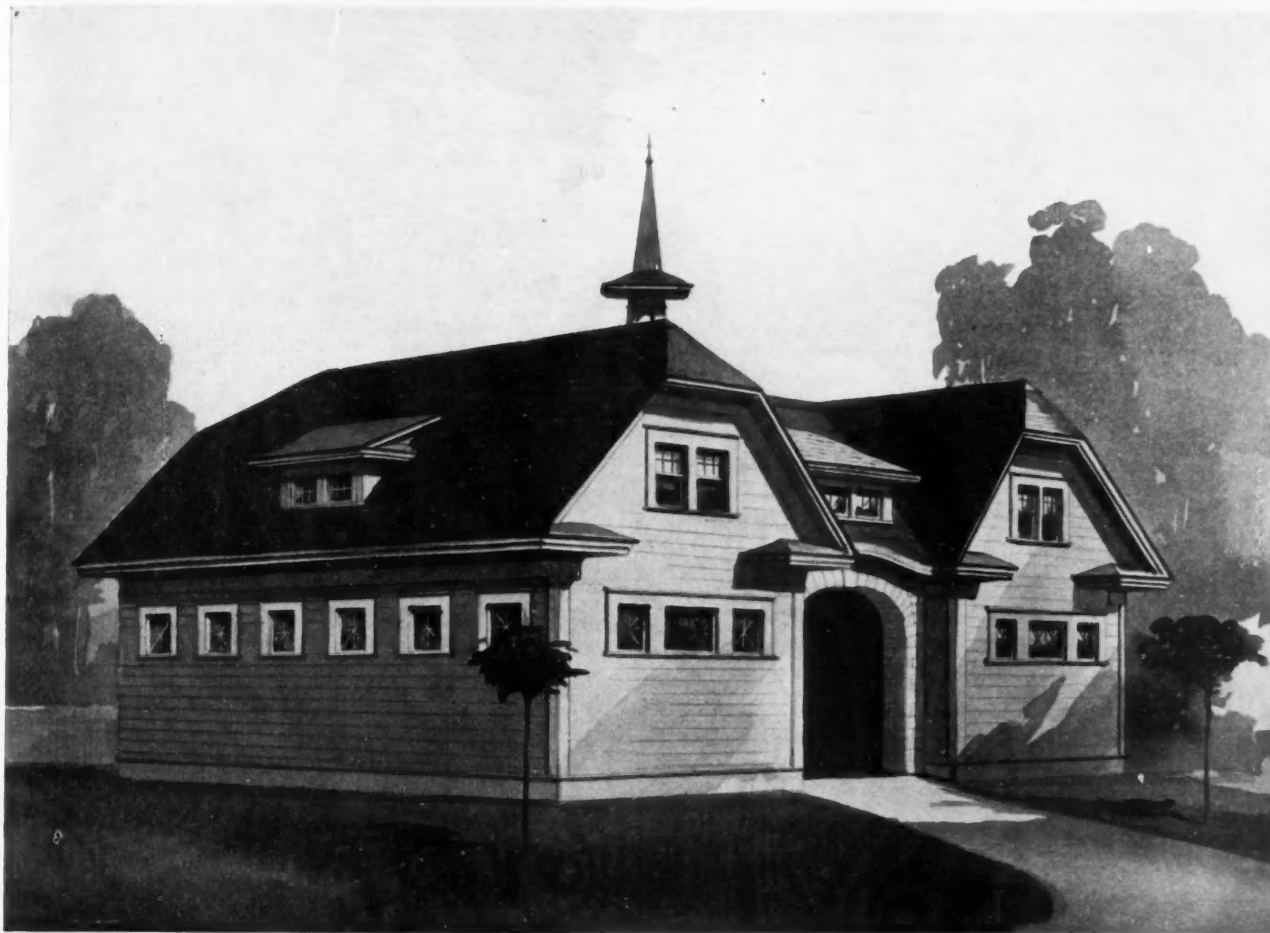
containing 12 per cent of moisture, is from 1.7 to 2.4 times stronger than when green, varying with the species. Stiffness is also increased by drying. These conclusions, however, are drawn from small-sized pieces not exceeding 4 by 4 inches in cross-section, such as are used in vehicle work, tools, etc. Large timbers require years of drying before the moisture is reduced to the point where strength begins to increase. It must also be taken into consideration that more or less checking always occurs when large timbers dry; and if this checking is excessive it may cause weakness to counterbalance, partially or entirely, the strength gained in drying, consequently it is not safe to assume that the average strength of large so-called seasoned timbers is much greater than that of green or wet ones.

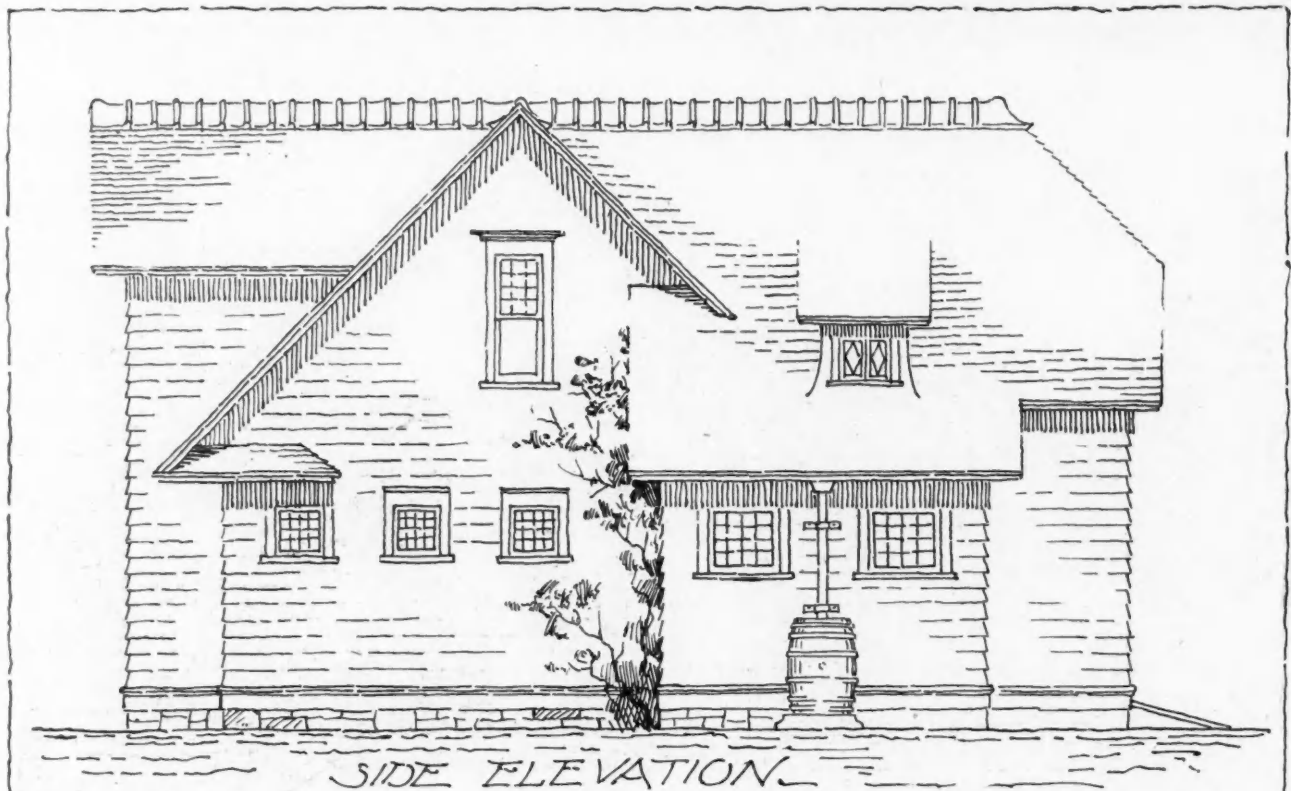
Red Hickory Strong as White

The Forest Service of the United States Government recently conducted a series of vehicle wood tests at Purdue University, Lafayette, Ind. The results from the spoke tests show more than 50 per cent error in the present grading system, which is largely due to the traditional prejudice and consequent discrimination against red hickory. No red spokes are now allowed in the "A" and "B" grades, yet these tests show that a large proportion of the red spokes now included in the lower grades should be, because of their strength and toughness, included in the highest grades. The resilience factor, which is determined by maximum load and toughness, varies directly with the weight, showing that the best criterion for judging the utility of spokes is the weight. It is also shown by the tests that, weight for weight, the red and mixed spokes are fully as strong as the white ones.

The person who can teach others how to do a difficult class of work is more valuable than the man who merely knows how to do it himself, even though industrious enough to stay evenings and do it.

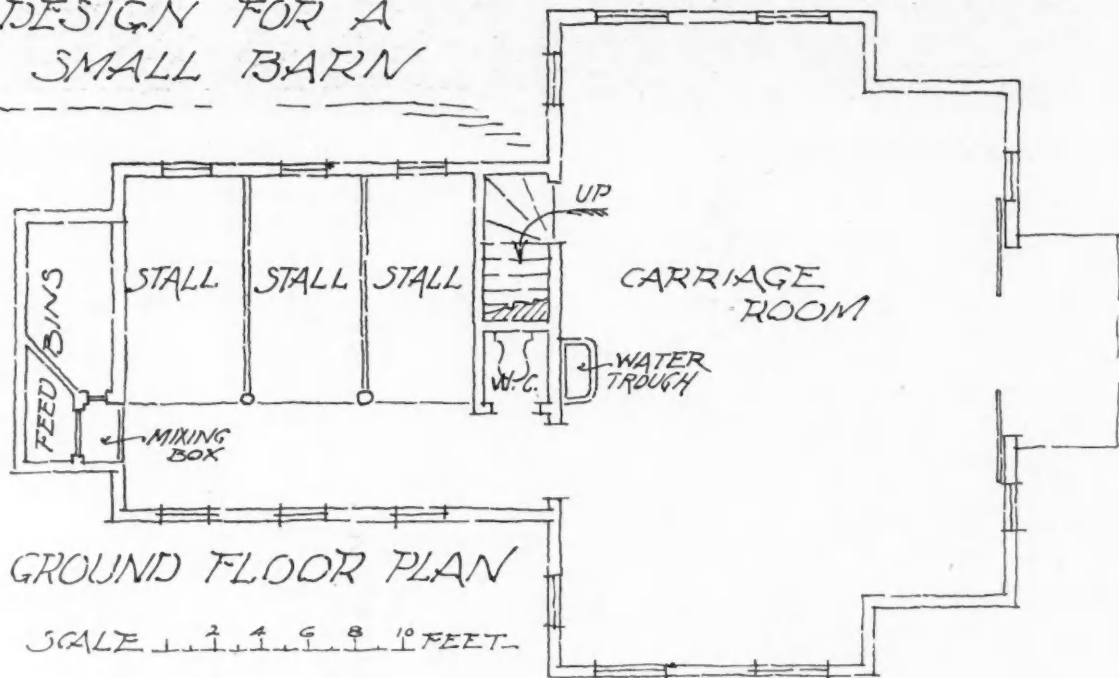
It's useless to have an aim in life if you are too lazy to pull the trigger.





SIDE ELEVATION

DESIGN FOR A
SMALL BARN



GROUND FLOOR PLAN

SCALE 1 2 4 6 8 10 FEET.

THIS BARN IS OF ENGLISH ARCHITECTURE, BUILT OF FRAME ON A STONE FOUNDATION AND WILL ACCOMMODATE THREE HORSES AND THREE VEHICLES. THE OUTSIDE DIMENSIONS ARE 28'-0" BY 43'-0" THE EXTERIOR WALLS ARE OF 2"X4" STUDDING COVERED WITH 1"X10" ROUGH BOARDS LAPPED AND STAINED BROWN. ROOF IS COVERED WITH MOSS-GREEN SHINGLES AND TILE RIDGES. CARRIAGE ROOM FLOOR IS OF CEMENT AND STABLE FLOOR OF 1 $\frac{3}{4}$ " MATCHED PINE.

PAINTING



Edward Hurst Brown

Painting the New House

CLEAR, SIMPLE AND COMPLETE DISCUSSION ON THE SELECTION AND MANNER OF USING MATERIALS
IN PAINTING

SO far in these articles we have assumed that it is always possible to obtain the services of the practical painter who is a skilled mechanic, and the thought has been mainly to put the builder in possession of such knowledge as would enable him—or the owner or architect—to determine which were the best methods to select and the proper materials to use and to enable him to judge whether the work was done as it should be done. But it has been suggested that as there are numerous localities where there are no regular painters and where the painting is largely done by carpenters and handy men—using mixed paints because they lack the necessary knowledge to enable them to mix tints—that it would be well to devote at least one article to practical suggestions which will enable these men to do better work and give greater satisfaction to their employers. In this article, therefore, we shall endeavor to answer some questions along these lines which have been asked the AMERICAN CARPENTER AND BUILDER, and would suggest that if the ground is not sufficiently covered, we would be glad to receive any suggestions from our readers in regard to any particular points that they desire to have explained more fully.

Materials for Outside Painting

The carpenter, who does not understand the mixing of colors, will naturally employ mixed paints, on account of the saving in labor which they afford to him; and because they come to hand practically ready for use. Now, there are many really satisfactory and high class mixed paints on the market, while on the other hand there is much stuff sold as paint that is not worthy of the name, and which is composed of a large percentage of practically worthless pigment, a small quantity of zinc white, the necessary coloring matter of an inferior grade, mixed with a poor quality of linseed oil, with a considerable percentage of cheap mineral oil, or rosin oil, and benzine or even water. Such stuff is sold at low prices, as a tempting bait to trap the unwary, but it takes more of this inferior material to cover, and moreover it is sure to cause dissatisfaction by premature cracking and peeling. A good

mixed paint should be composed, in the main, of white lead, zinc white and the necessary coloring matter, thinned with pure raw linseed oil, of good quality, with the addition of such pure turpentine and driers as may be necessary. It is not to be expected that the average carpenter possesses the needful knowledge of chemistry to enable him to determine the composition of the paint he buys, but there are some things which he should consider. The best quality mixed paints always bear the name of some reputable paint manufacturer. If paints are offered at a reduced price, bearing the name of a fake manufacturer, it is well to look upon them with suspicion. Good quality mixed paints command a good price and are worth it, and the saving effected by buying cheap paints is so small in proportion to the labor cost of doing the work, that it is no economy to use any but the very best that can be bought. White lead, zinc white, linseed oil and turpentine are all selling for much higher prices than a year or so back, and a good paint made from these materials can not be sold for a low price. The best thing to do, in selecting a mixed paint, is to look carefully at houses that have been painted with it for several years and note whether the paint is scaling off in blotches, or is cracking and peeling badly. If a paint has been found to give good service, it is then safe to use it.

Some mixed paint manufacturers make special paint for priming. This is often an inferior grade of ochre, which is objectionable because it has a tendency to throw off the subsequent coats of paint. While the regular mixed paints may be used for a priming coat on new wood, by adding from one-half to an equal volume of pure raw linseed oil, as a rule, it would be very much better to prime with pure white lead and linseed oil, using the mixed paint on the second and third coats. If the mixed paint is found to be too thick, pure raw linseed oil should be used in thinning. Boiled oil should not be used.

Pure white lead can be readily used for the priming coat, as it needs no special knowledge of color mixing to prepare it. For one hundred pounds of white lead

in oil it would be necessary to use four gallons of raw linseed oil, half-gallon of pure turpentine and one pint best liquid driers to thin it. A twenty-five pound keg would require one-fourth of these quantities and would make about $2\frac{1}{2}$ gallons of paint. In breaking up and thinning down the lead, it should first be put into a keg or tub large enough to contain the lead and all the thinners. The driers should be mixed in with the oil, and the oil added gradually to the paste lead, stirring and working it up thoroughly by means of a wooden paddle. After the lead and oil have been thor-

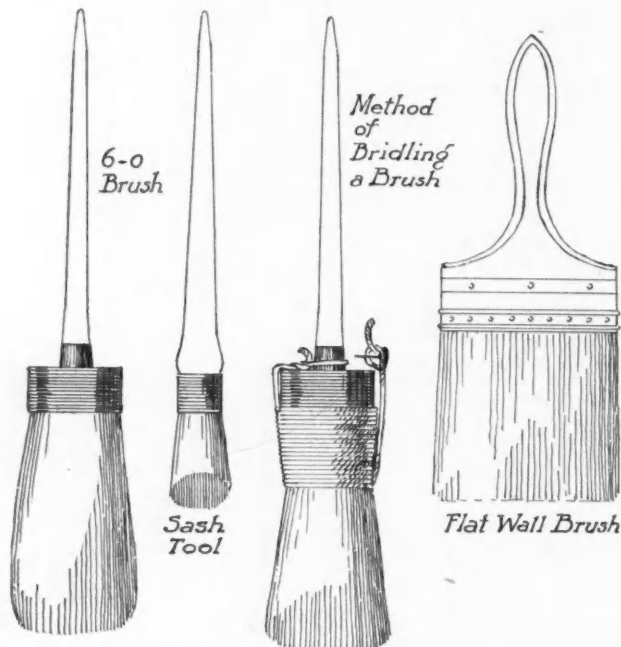
best season of the year for painting, because the paint dries slower than in summer time and the sun is not sufficiently hot to cause blisters, good painting can be done at any time of the year, provided due care is used.

The following precautions must be employed at any season.

No painting should be done on a damp surface, and if there has been rain, dew or frost, work should not be begun until the sun has thoroughly dried off all moisture. If the air is dry and the surface to be painted is dry, a good job can be done in very cold weather.

Ample time must be allowed between coats for the undercoats to thoroughly dry. At least 48 hours and preferably a week should be given.

In using mixed paints in cold weather it is well to add half a gallon of turpentine to five gallons of mixed paint on the first coat and one quart of turpentine to five gallons of paint on the last coat. If necessary, a small quantity of best liquid driers may be added, but as a rule mixed paints contain enough driers to make this unnecessary. The paint requires to be brushed out thoroughly in cold weather.



The Kind of Brushes to Use

The best brush to use for outside painting is the "6-0" (six-naught) round or oval brush—also known as the "pound brush"—for the body color, and the "5-0" brush for the trimming colors. Two "sash tools" are also needed, one for the trim color and one for the sash color.

The 6-0 brush is recommended because it is the only shaped brush which has sufficient elasticity to thoroughly brush the paint out into a thin film. A good brush and plenty of elbow grease will produce a reasonably good and durable job, even where the paint may be comparatively inferior—although the best materials are always necessary to produce a first-class job. In some sections of the country, especially throughout the West, the four-inch flat wall brush has come to be largely used for painting weather-boarding and for trimming also. This is due to the fact that these brushes are cheaper in first cost and are easier to work with, but the results are far inferior. It is impossible to get into the corners as well with a flat as with a round brush, nor can the color be rubbed out so thoroughly.

Good brushes are an expensive item in painting, and it is economy here to buy none but the best. The price has been steadily upward in the past few years, due to unsettled conditions in Russia and China, from which countries all the best bristles are imported. A good 6-0 brush will cost about \$3, while a 4-inch wall brush of fair quality can be bought from \$1.75 to \$2.00. It is safe to count that the wear on brushes will amount to at least 10 cents per day for each man employed on the work—and that assumes that the brushes shall be used with reasonable care and kept properly clean. Brushes made from white

oughly incorporated, the turpentine should be added. The addition of a very little lamp black in oil, say not over a half to one pound to one hundred pounds of white lead, will tint the priming a light lead color and aid in covering up any discolorations in the wood due to sap or weather stains. After the lead and oil have been mixed as above directed the paint should be strained through a fine wire sieve to remove any skins or lumps. The paint should be mixed the day before using, if possible, and should the house be a large one, requiring a good deal of paint, it is well to mix only half the quantity required. This will avoid any loss from the paint skinning over if bad weather comes up to delay the work when it is partially completed.

Before the work is primed all knots and sappy places should be coated with strong orange shellac varnish.

After the work has been primed, all nail holes and cracks should be thoroughly puttied up with pure whitening and linseed oil putty. This should be well worked in with a putty knife, and any excess of putty scraped off the surface to prevent a lump. Pure putty is difficult to obtain, but it can be bought. It will cost probably three cents or more per pound, but is far superior in every way to the cheaper grades that can be bought for as low as one and a half cents.

Although the autumn is usually considered to be the

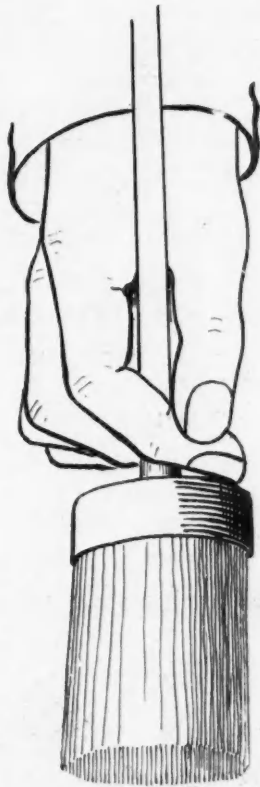
bristles command a somewhat higher price than those made from gray or black bristles of the same quality, although there is no reason why the darker brushes should not be just as good. A round brush made with an open or hollow center is more elastic than one made with a solid center and therefore is preferable. The bristles are set in cement and firmly bound by being wrapped with wire in the round brushes or by being enclosed in metal in the flat brushes.

Brushes of an excellent quality are made in which the bristles are set in rubber and then bound in a hard rubber ferrule. These are somewhat more expensive than the ordinary brushes, but are said to wear longer.

Besides the brushes already mentioned, the painter wants a "duster," which is used for removing any surface dust or loose dirt from the wood before painting.

The wall brush is generally used just as it is made, while the round brush is usually "bridled" or bound with twine or with a metal or patent bridle, which serves to shorten the working length of the bristles and make them more elastic. The patent bridles, of course, are easier applied than the twine bridle, although the latter, in the hands of the man who has learned to properly bridle a brush, is probably better than the metal or rubber bridle. The ordinary way of making a twine bridle is shown by the illustration. The cord is first tied round the brush handle, then carried down over the edge of the brush and wrapped firmly, but not too tightly, round the brush for about one-third of its length, when it is looped and carried up on the opposite side of the brush, and is generally secured by driving a tack into the handle, first slipping it through a knot in the twine. Brushes are also made with two wire hooks, on opposite sides, for fastening the brush bridle. This is a very great convenience. Care must be taken not to bridle the brush too tight or it will get it badly out of shape.

The proper way to hold a paint brush is shown in the illustration. It will be noted that the handle of the brush is held between the first and middle fingers, while the first joints of these two fingers act as a sort of brace against the top of the brush. The thumb folds over the handle to meet the forefinger, giving a firmer grip. A house painter will almost invariably have a callous place on the inside of his middle finger.



In using the round brush it must be kept in one position in the hands and not turned round. The object of this is that it may wear down to a flat, chisel edge and not to a point, as would happen if the brush were turned frequently.

Sash tools are generally made with a chisel edge—but not always. They are intended for painting the muntins of the sash, for cutting in chamfers, and the edges of the trim and other places where a small brush is needed.

The "man-help" is a convenient little tool that is used for fastening a brush to the end of a broomstick or long pole, for reaching peaks of gables, flag staffs and other inaccessible places. It is made of malleable iron and is adjustable to any angle.

Care of Brushes

After the day's work is done, the brushes must first be drained of color, as much as possible, by wiping them out against the side of the pot. Sometimes they are drawn back and forth against a board to bring them to the proper chisel edge. They should then be either laid flat upon a board or should be hung up by passing a small piece of wire, bent to form a hook, through the hole that is usually found drilled through the handle and suspending them either in a pot of color or in water. The brush must not be allowed to stand in the pot, resting on the bottom, or it will bend the bristles and destroy the shape of the brush, nor must it be suspended in water so as to cover the twine bridle, as this would shrink the cord and twist the bristles out of shape.

A good idea is to stretch a wire cross the pot, as shown in the illustration. This will serve to hang the brushes on and it may also be used to drain the brush against, in taking it from the pot, instead of against the edge of the pot. This will prevent the paint from running over the outside of the pot, in the careless fashion so often seen.

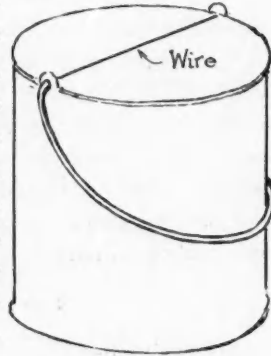
When the job is finished the brushes should be thoroughly washed out with benzine or naphtha. Turpentine would be better, but the present cost is practically prohibitive. If the brushes are to be laid away and not used at once a strong soap suds or lather made with some of the soap powders, such as Gold Dust or Pearline should be well worked into the brush, which should be carefully pressed into proper shape, taking care not to squeeze out this lather, and laid away flat on a shelf. When the brush is to be used again it should first be washed out, to get rid of all the soap, before using it.

Some Hints About Painting

When working on a ladder, the pot is generally suspended from the rung of the ladder just below the workman's hands by means of a pot hook. The object, of course, is to leave both hands free and not to require the hands to travel far in going from the pot to the work.

If the body of the building is a light color, the trim being much darker, it is well to carry the body color over trim and all on the second coat, using the trim color on the last coat only. As you come down the house the cornice will be painted with the trim color, cutting in panels with the body color if this is required. On the next shift down, the body color is first painted, and then the trims, as corners and round windows, and this process is repeated at each shift as you go down the building, whether you are working on a swing staging or from extension ladders, or from a plank carried by scaffold brackets on two ladders.

If the trim is lighter in color than the body the trim



must be carried through the second coat in its proper color as well as through the third coat.

One special word of caution. Be very careful not to drop paint from your brush down the sides of the building. The way to avoid this is to drain the brush of superfluous color before you take it from the pot, and for this the wire stretched across the middle of the pot will be valuable. Drops of paint, of a different color, splashed against the side of a house, can not be perfectly removed in any way. If you attempt to rub them out they will always show.

Outside blinds should be taken off and laid upon trestles to paint. This should never be done in a cellar or in any other damp place. Better results will be obtained if this work is done on the second floor than in a room without a cellar underneath.

The paint should frequently be stirred up in the pots. The pigment being heavy has a tendency to settle to the bottom, and unless it is kept in suspension by frequent stirring the house will be streaky.

The Decoration of the Den

PERSONALITY OF OWNER SHOULD BE DEPICTED IN WALL DECORATIONS—SEVERAL APPROPRIATE DESIGNS SUGGESTED

By Sidney Phillips

WHEN an architect draws a plan, nowadays, he almost invariably indicates one room as being the "den." Indeed, no modern house is regarded as complete without such an apartment,

and if the man of the house has no particular hankering to go off and sit by himself, like a bear in his "den," his wife feels that she might as well be out of the world as out of the fashion, and insists that the

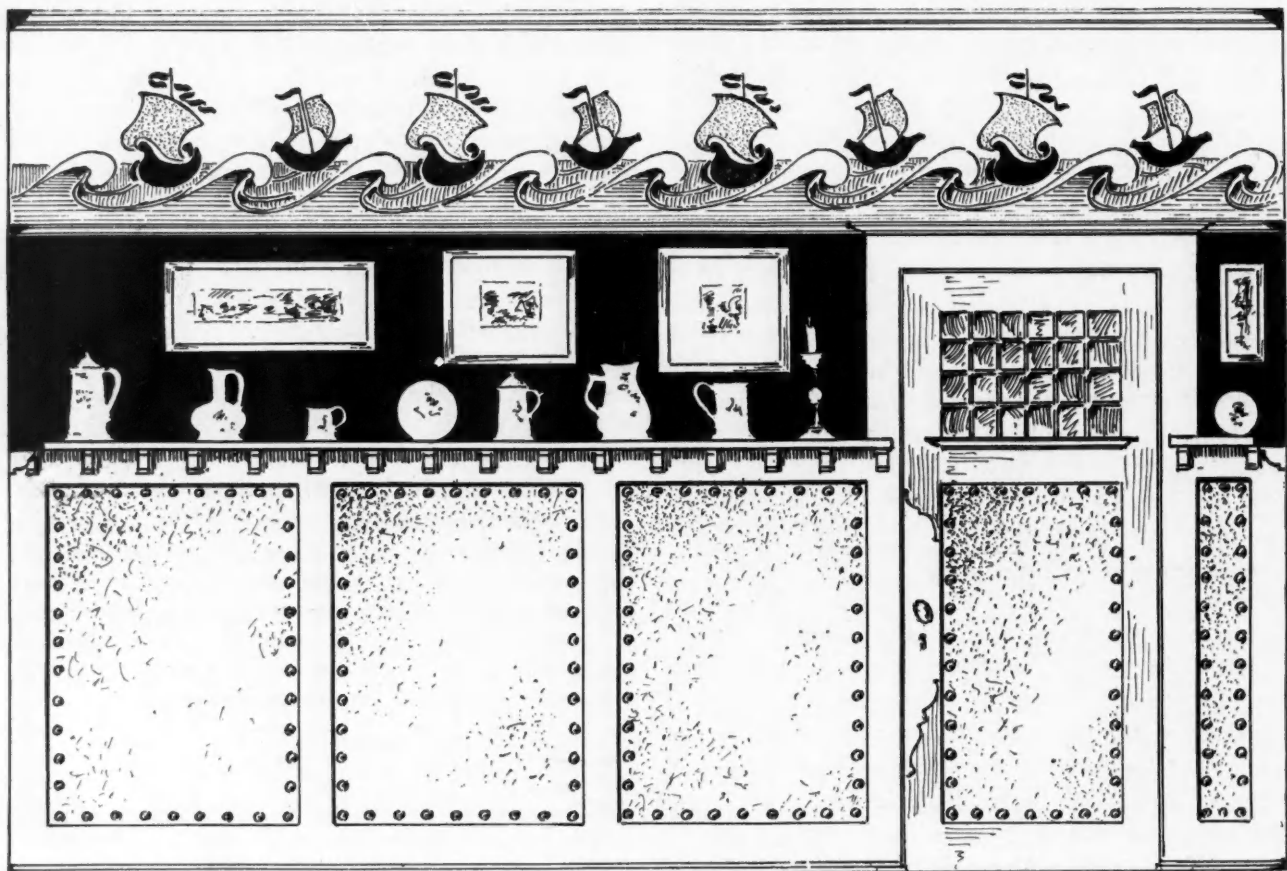


FIG. 1

"den" is necessary. When dens first became a part of the recognized household economy, they were looked upon more as smoking rooms than as apartments intended to serve any other purpose, and as the Oriental nations are more prone to the enjoyment of the pipe than those of the West, it seemed appropriate that the den should be decorated in the Oriental style. Even now a large number of dens are hung

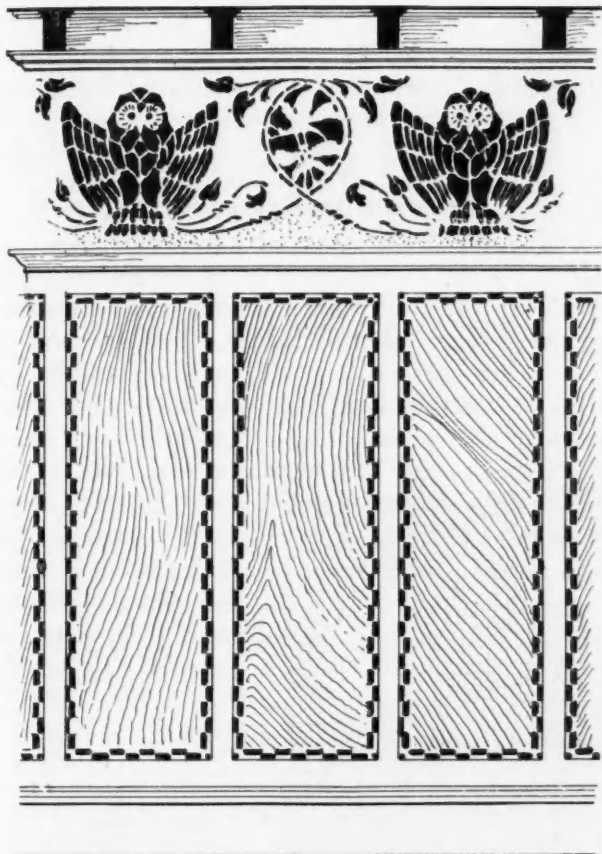


FIG. 2

with Oriental tapestry papers and have cosy corners draped with Bagdad curtains and hung with Moorish lamps, while cushioned couches and heavily upholstered chairs and tabourets bearing tall vases or tobacco jars are regarded as appropriate furnishings. For the Oriental den almost every manufacturer of wall paper offers a variety of tapestry patterns, which can be appropriately used above a Turkey red burlap dado. The woodwork of the room should be stained a dark brown, or an even more effective treatment would be to paint it with coach black ground in japan or thinned with turpentine, giving a final coat of one of the dull drying varnishes.

The American Indians being also great smokers, the Indian den also seems appropriate when the chief object of the apartment is to be a smoking room. For draperies the Navajo blankets are very suitable, while Indian blankets and pottery, bows and arrows, snow shoes and trophies of the chase should be hung against the walls. For an Indian room, the walls might be hung either with red, green or leather colored burlap.

For the latter color a plain burlap might be used, painted a leather color and then varnished. More expensive, but even more effective, the walls might be hung with undressed leather, either allowing the skins to hang with ragged edges, or the leather may be arranged in panel effect, the joints being covered with folds of leather studded with large leather headed upholstery tacks. Wall papers in Navajo blanket effects are made, and these might be used as an upper third, above a plain burlap dado, of a color matching one of the colors in the paper. Another treatment for an Indian den would be to use the Indian frieze, that is made by a Cleveland manufacturer, and which shows groups of mounted Indians on a sage brush plain. the general tone of which is a deep buff, while in the

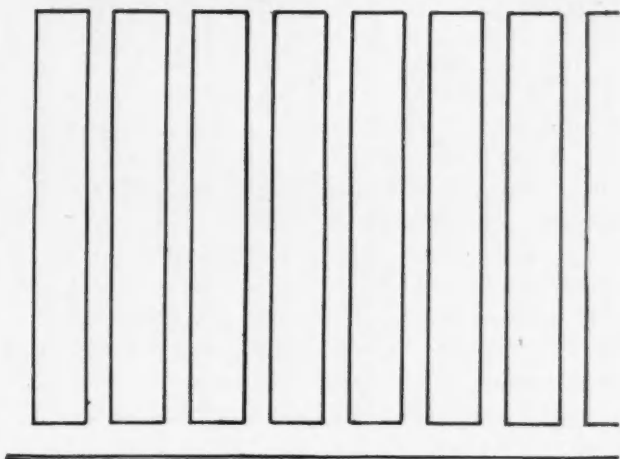
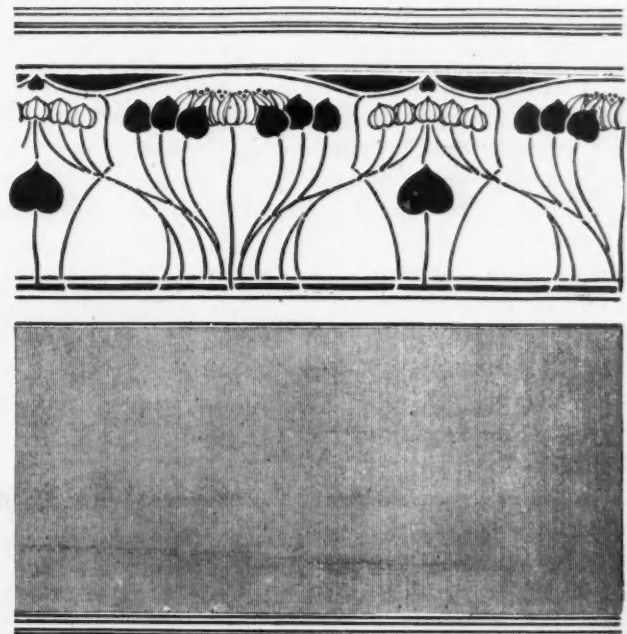


FIG. 3

distance are greenish blue mountains, and the sky is a gray tone. This frieze is printed in oil colors, and is made in six sections, each one five feet long. They are interchangeable, so that the grouping of the figures may be varied at will. Two sets of this frieze will go round any ordinary room, and by means of

what is known as an "elastic section," the pattern can be brought together without any break, giving the effect of a specially painted decoration. Used in connection with a plain burlap of harmonious tone for the wall hanging, against which may be displayed various Indian trophies, colored photographs of Indian chiefs and the like, and a dado of rough boards, or better yet, of slabs from the saw mills, turned with the curved side outward, and preferably with the bark on, capped by a narrow shelf of rough oak, one would have a most effective room. A brick or rough stone fireplace with a swinging iron crane from which an iron pot or kettle is suspended, adds to the backwoods character of the room.

The old English tavern gives many suggestions for den decoration. For this effect we might suggest a paneled wainscot, finished in white enamel, the upper part of the wall being hung with a green or red burlap, which would serve as an excellent background for framed prints of coaching and hunting scenes or characters from Dickens. The ceiling, in this case, should either be finished with mouldings in imitation of beams, or a relief material, such as lincrusta or anaglypta, in a pattern resembling the old-English ornamental plastered ceilings, could be used, and tinted a white or old ivory. The furnishings in such a room might be either of mahogany upholstered with green or red leather, or old-fashioned rush bottomed chairs with green enamel, and a leather covered couch could be used.

A somewhat similar idea is conveyed by our illustration (Fig. 1), which would be specially appropriate for a seaside house, or for the man who is fond of yachting. In this case the woodwork is of fumed oak, the dado panels being leather, pantasote or leathersole, studded with a border of large oxidized copper upholstery nails. A shelf supported by brackets forms the dado cap, and serves to support a row of steins, plates, brass tankards and candlesticks that stand out well against the dark green burlap side wall. This space is also used for pictures. For the frieze, we have suggested a stencil design of quaint old galleons on a billowy sea, that should be carried out in tones of green and blue, the vessels standing out in strong bright red with orange sails, or dark green with golden sails, and the flags in bright heraldic colors. A similar treatment of the wall might be used in connection with a poster frieze, formed of groups of actual posters, or with a pictorial wall paper frieze of any character.

For the literary man or the college student, Fig. 2 gives an appropriate suggestion. The tall panels of the wainscot are in leather or burlap, with a stenciled border in gold or some other metallic bronze. The stenciled frieze, introducing owls and bugs may be carried out in a two-tone color effect, or natural colors may be used. Beam mouldings cross the ceiling, the panels being filled with ivory toned buckram.

The Mission and Craftsman styles of furnishing

are peculiarly appropriate for the modern den, and Fig. 3 suggests a wall treatment suitable for furnishings of this character. The dado is carried out in green or fumed oak, the middle wall in a plain burlap, giving an excellent background for pictures, while an appropriate stenciled frieze gives character to the room.

These are but a few suggestions, for the purpose and character of the den varies so much that its decorations necessarily must vary more or less with the taste of the owner. Indeed, more in the den than in any other room in the house should it be the decorator's aim to reflect the owner's personality.



Enormous Excavations

One of the largest excavating undertakings in the history of the country is about to be entered upon by the Oliver Iron Mining Company, at Coleraine, on the Western Mesaba Range. The company, to uncover an immense body of iron ore, will strip a piece of land, eighty acres in extent, to an average depth of eighty feet. This will involve the removal of fully 13,000,000 cubic yards of earth. It is estimated that the body of ore thus to be bared is fully twice the bulk of the overlying earth to be removed. This means 25,000,000 cubic yards of iron ore, which shows that there is yet some ore in sight, despite the croaking by those who say that the supply will soon be exhausted. The same company have started a similar undertaking, on nearly as large a scale, at Holman, a short distance northeast of Coleraine.



Where Colors Come From

The cochineal bug furnishes many of the most brilliant colors, including the bright carmine, crimson, purple lake, and scarlet. The cuttlefish gives the sepia, and Indian yellow comes from the camel.

Ivory chips produce ivory black and bone black, and the exquisite Persian blue was discovered accidentally by fusing horses' hoofs and other refuse animal matter with impure potassium carbonate. Crimson lake comes from the roots and barks of certain trees; blue-black from the charcoal of the vine chalk; and Turkey red comes from the root of the madder plant found in Hindustan. India ink is made from burned camphor by the Chinese.—*Exchange*.



Too many people are willing to step from the straight and narrow path for the purpose of picking up a dollar.



Fortune knocks often at the door of the man who keeps his address in the advertising columns.



The worst feature about a divorce is that it usually results in two more marriages.

MANUAL TRAINING

Ira S. Griffith

Something the Boys Can Make

COMPLETE DETAILS AND DESCRIPTION OF HOW TO CONSTRUCT A MISSION CHAIR—KIND AND SIZE OF LUMBER TO USE—PROPER FINISH OF THE SAME

A MISSION chair of ample proportions is described this month. It is not a difficult piece of furniture to construct. Any boy who has had some experience in making the mortise and tenon will find it well within his ability. The chair, the photograph of which is shown, was made by a boy of fourteen and was a piece of furniture that any one might be proud to own.

The cushion was purchased at the upholsterer's, and is of art leather of a color to match the rich brown Flemish finish of the wood.

The four legs are of the same length and may all be got from a plank mill planed to one and three-quarters inches. A piece five and one-half feet long, six and one-half inches wide will answer.

The rails are all of seven-eighths inch mill-planed stock. One board six inches wide by ten feet long, also one board five inches wide by seven feet long should be got. If the lumber is to be purchased at a yard it will

be better to call for two ten-foot pieces of six inch, as the order will be more easily and just as cheaply filled.

For slats, Fig. 1, three-eighths inch stock should be used. A piece that will dress to two inches in width with a length of fourteen feet will be necessary.

For the pieces to which the slats may be fastened, get a piece of five-eighths inch stock four inches wide by five feet long.

Square up the four legs in the usual manner. If the plank is not warped badly, set the smooth plane blade very shallow and smooth the two broad surfaces before ripping out any of the legs. The rest of the operation will then consist in straightening one edge and squaring it to the working-face, gauging and rip-

ping. This repeated until the required number is obtained, after which the rough edges may be planed to the gauge lines. If the plank is badly warped it will be necessary to level each working-face separately.

Plane a very slight bevel on what is to be the lower ends of the legs and one of an eighth of an inch on the top ends. The bevel on the lower ends will prevent the slivering of the wood. The one at the top is to take off the sharp corners. Square up two rails to five and three

quarters inches by thirty inches, smoothing the broad surface to a thickness of seven-eighths of an inch; two rails to the same width with a length of twenty-three and three-quarters inches, smoothing the surfaces as on the previous rails.

Square up one rail to four and one-half inches by thirty inches, smoothing the surfaces for a thickness of seven-eighths of an inch; also two rails to the same width and thickness with a length of twenty-three and three-quarters inches.

Square two pieces of five-eighths inch stock to a width of three and three-quarters inches. Smooth the broad surfaces and square one end. As these pieces will need to be fitted in place after the frame has been put together, the remaining ends need not be squared at this time. The length should be slightly over twenty-six inches, a quarter of an inch will give sufficient saw hold.

The slats should be smoothed and squared to a width of two inches. One end of each should be squared, the remaining ends being accurately cut when they are fitted in place. The length of these slats, seven in number, should be slightly over twenty-three and one-quarter inches.



Now lay out the mortises which are to be cut in the legs, Fig. 2. Place the legs side by side with the inner edges up and even the ends by means of the square. Begin at the lower end of one of them and mark with the knife a point at eight inches. From this point measure four and one-quarter inches; from the last point, fourteen inches; next, three inches. There

one-eighth inches and, with the block against the same surfaces, repeat.

Cut these mortises with a one-half inch chisel. The description of mortise cutting where the chisel is of the same width as the mortise will be found in a previous number of the journal.

Cut the mortises in the edges first.

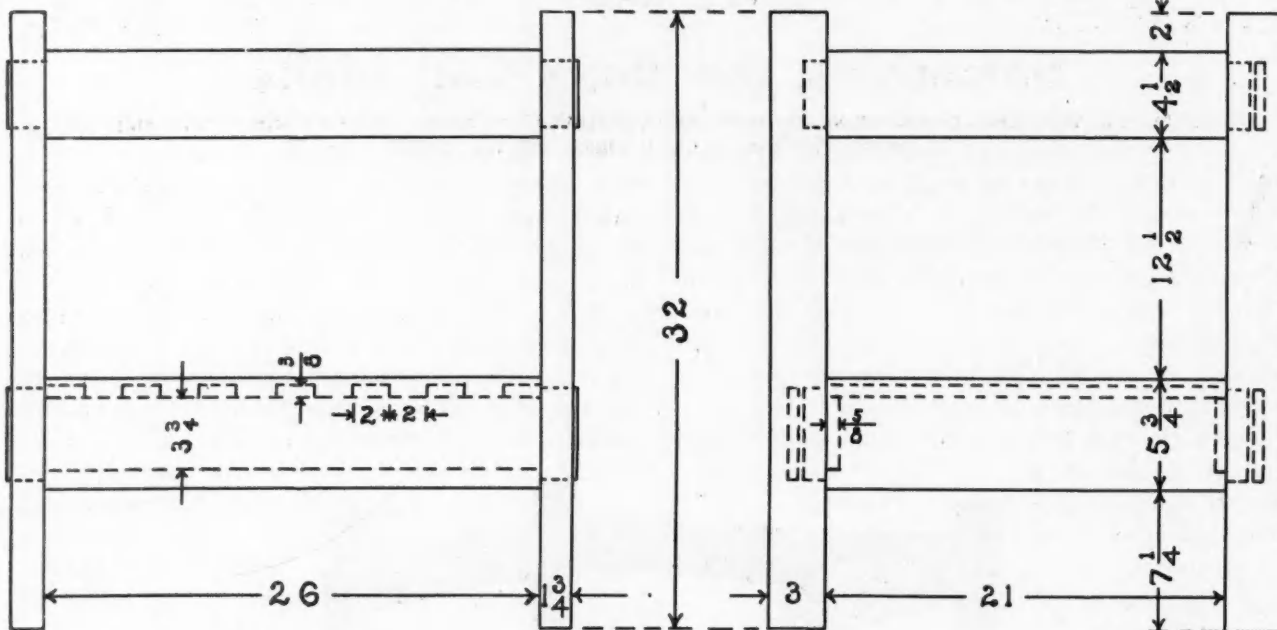


FIG. 1.

should remain two and three-quarter inches from the last point to the end of the leg. At each of these points square lines across the four legs. If a pencil is used it should be sharpened so as to make a fine sharp line.

Next, stand the legs upright in the positions they are to occupy relative one to another and mark with the pencil in some way the approximate locations of the holes. Keep the marks just made on the inside of the legs. Remember that one rail, hence its mortises, must be omitted at the top. The mortise A, Fig. 2, is on two legs only.

Having marked the mortise locations, square lines across the broad faces at these places to correspond with those drawn across the edges. Square across both faces of each piece. To locate the sides of the mortises which are on the broad surfaces, set the gauge to one inch and gauge them with the gauge block against what is to be the outside edge of each. As these mortises are to extend entirely through the leg they are to be laid off on both sides. Fig. 2 shows between what lines the gauging is to be done. Make all the marks on all the legs that can be made with this setting of the gauge, then reset it to one and one-half inches and gauge with the block against the same edges as before.

For the sides of the mortises which are to be made on the edges of the legs, set the gauge first to five-eighths of an inch and mark, keeping the gauge block against the outer broad surfaces. Reset to one and

Fig. 3 gives the layout of the tenons. At A, Fig. 3, is shown the tenons for the front and back lower rails. Stand the rails on edge and even the ends. Measure

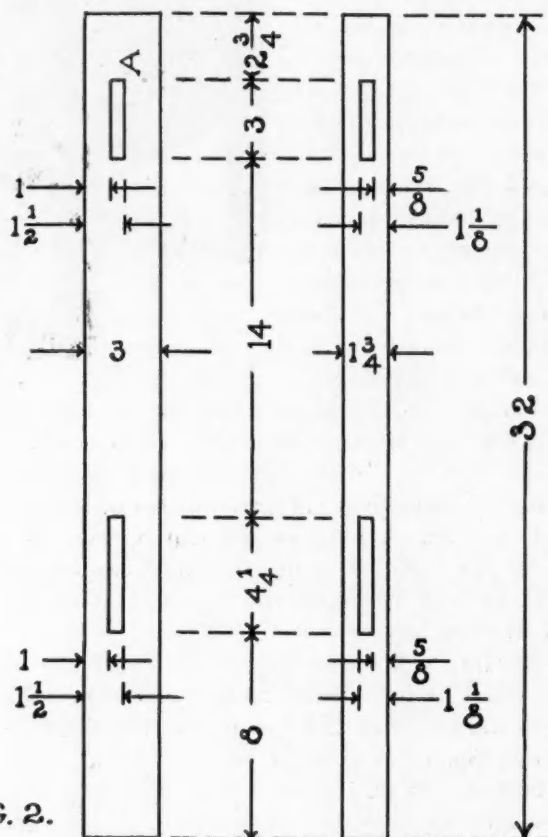


FIG. 2.

from one end two inches and square a sharp knife line across the two upturned edges. From this line measure twenty-six inches and repeat. There should remain two inches from this line to the remaining end of the piece. Square knife lines around each end of each piece to correspond with these lines.

Next set the gauge to three-quarters of an inch and, with the gauge block against the joint edge, gauge on the ends and on the sides as far as the cross knife-marks. Now set the gauge to five inches. Keep the

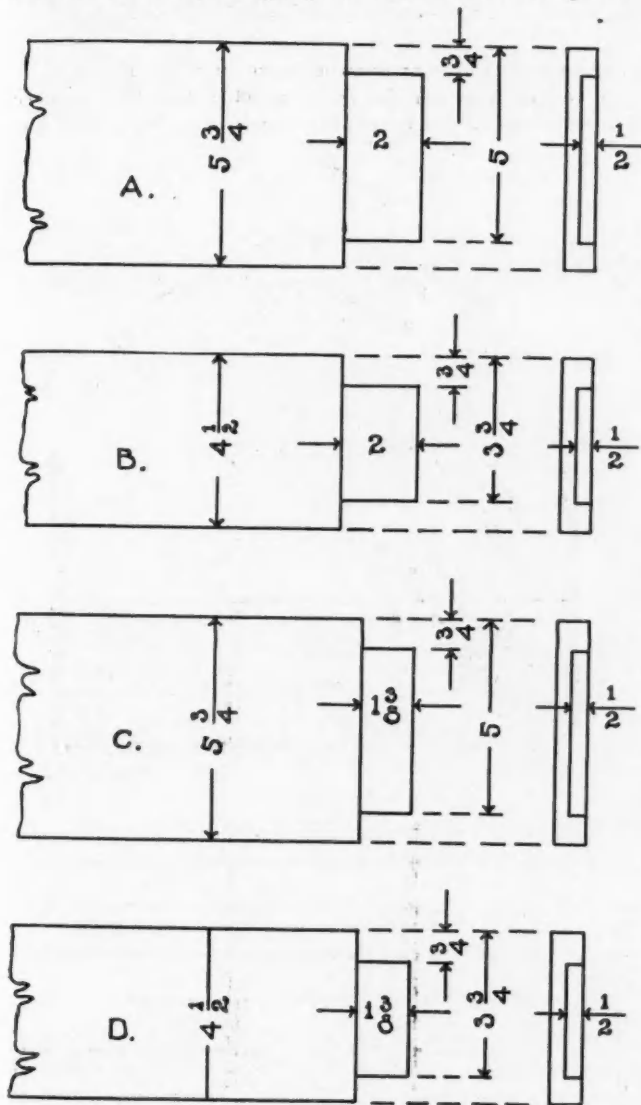


FIG. 3.

gauge block against the joint edge and gauge as was just done. With the gauge set to one-half an inch and the block held against what is to become the outside surface, gauge across the ends and down the edges far enough to meet the knife lines.

The tenons for the top back rail are laid off similarly, B, Fig. 3, except that in the second step of gauging the gauge is set to three and three-quarters inches instead of five inches.

The tenons for the lower side-rails are shown at C, Fig. 3. The layout is similar to that at A, Fig. 3. The difference being in the length of tenon. At C, Fig. 3, the tenon is one and three-eighths inches instead of two

inches as at A, Fig. 3. Again the distance between the shoulders of the tenons for these rails is but twenty-one inches instead of twenty-six inches, as at A, Fig. 3.

Fig. 3, D, shows the tenon for the upper side rails. The length of tenon is the same as at C, Fig. 3. The distance between the shoulders is the same, twenty-one inches. The gauge in the second step is set to three and three-quarters inches, however, instead of five inches.

The manner of cutting the mortises has been described in previous numbers of this journal and will not be repeated. It is suggested that a one-half inch chisel be used, that the chisel may be of the same width as that of the mortise. The tenons are best cut with the tenon saw and nothing but the most careful cutting to a neat knife-mark will look well or fit well when the parts are assembled.

Put the sides of the chair in the clamps first, using only the best glue. Allow these to stand over night, then put in the other three rails. Measure the diagonals, that is, from one leg to another across the center of the framework, and see that they are equal. Put on a clamp diagonally if necessary to hold the frame in proper position.

After the clamps have been removed, fit the five-eighths inch pieces so that they shall just go between the legs and fasten them to the front and back rails, Fig. 1, by means of screws. The top edges should be about one inch below the top edges of the rails and parallel to them.

The slats of three-eighths inch stock may next be fitted between the front and back rails. They are to be spaced two inches apart, the first and last being pushed tightly against the legs.

Small nails should be used to fasten them to the pieces just screwed to the front and back rails.

Nothing works up into Mission furniture better than plain sawed red or white oak. Many stains are on the market for producing Mission effects upon oak. The extremely dark, almost black, effects have held sway for a comparatively long time and are quite common at present. There is a tendency, however, to break away from the sombre colors and rich browns are much in evidence.

Directions for filling and finishing the wood will be found upon the cans containing the finishes and should be carefully followed.

✦
A Valuable Magazine

I think your paper a very valuable one to a young man learning the trade if he is of the stamp that wants to understand the principles of framing and the square. I have often wished I could have been able to get such a paper when I had more time to work the different articles out than I can find at present. I think I could have taken my square and some materials to cut up and imbedded the principles in my brain so deeply that no one could have driven them out.

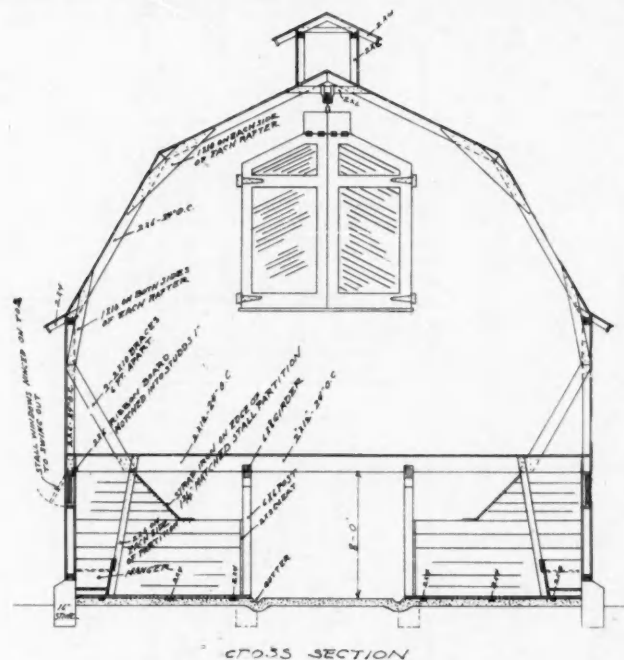
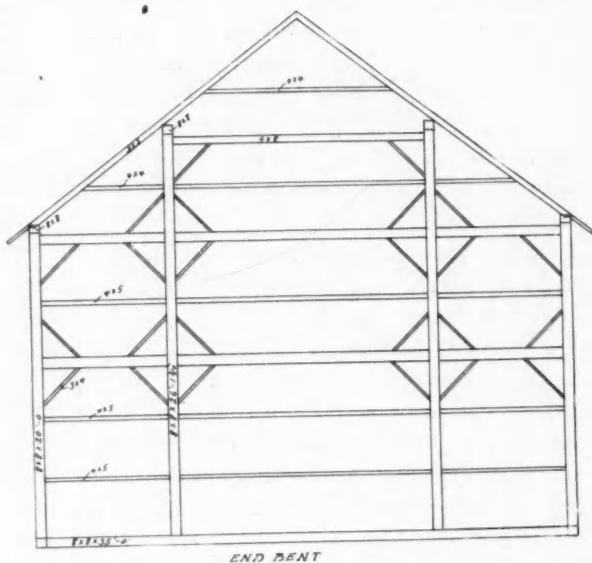
A. M. TROWBRIDGE.

CORRESPONDENCE

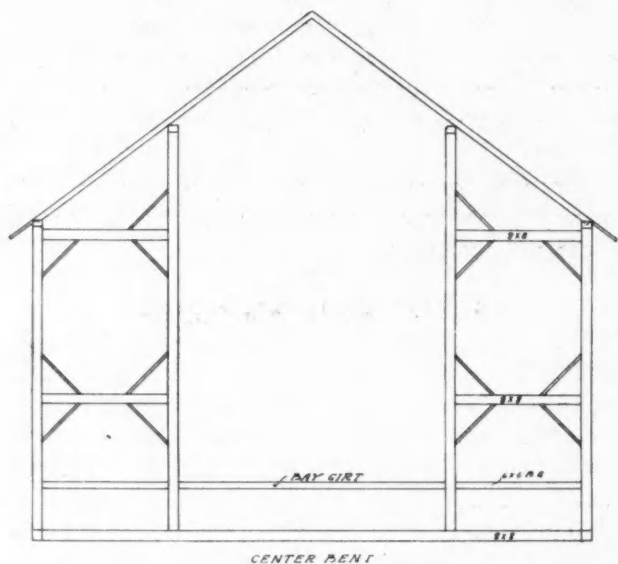
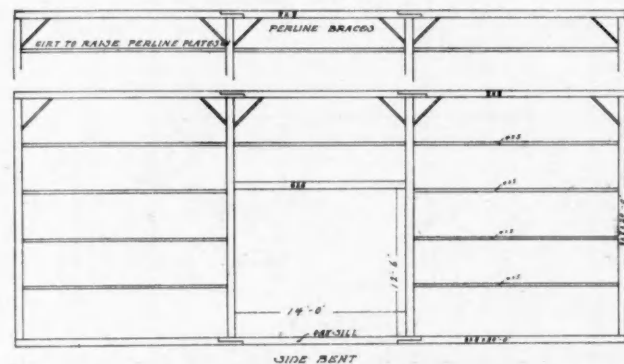
Hay and Grain Barn

To the Editor: Depauville, N. Y.
 I am sending herewith a draft of a hay and grain barn as we build them here. Some of your many readers may be able to derive some benefit from them, and I hope in the

difference in the construction between the two. The gambrel roof has many advantages over the other and there is more hay room and also a better opportunity to put in a large hay



future others will do likewise. You will notice the center of the barn is clear, and there are no posts or timbers in the way. I would like to have you show me how to put a gambrel roof on a frame like this. FRANK W. TRACY.



door, which will facilitate the unloading of hay. By the method of construction shown here it will be seen that none of the strength is lost as all the timbers are well braced. EDITOR.

Some Interesting Questions

To the Editor: Tulia, Tex.
 I like your paper very much. "It can't be beat." I like to hear the boys tell what they can do, and I like the discussions on many points. I want to hear something about how to do better work, and if some man is very fast let's know how he manages. When he fits a door does he mark it all around and mark the place for the hinges on the door and jambs or

Answer: In following Mr. Tracy's request we are publishing herewith plans of a gambrel roof which shows the

casing at one "setting," or does he set his door up two, three or four times to get it fitted? Does it fit when he is done? How long do his locks stay right? Can you raise some of the windows with a prize and then use the same stick to prop the looser ones in with? I've seen nearly all kinds of workmen, and there is a great difference. We want to know the way and try to make some improvement.

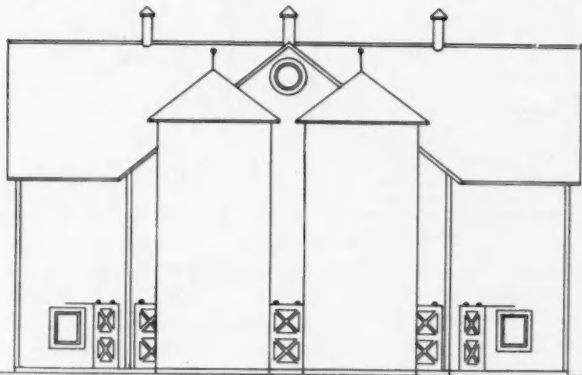
Now I would like to hear from the boys on the scaffolds. How much siding can you put on and cut it to the casing? How much can you put on when casing is to be put on top of siding? How many lineal feet of cornice consisting of frieze, plancer, fascia and bed and shingle mold, can you cut and nail on after the bench man has it ready? In mitering eave and gable frieze together on corner of one-half pitch roof what is the cut across the edge of gable frieze?

Success to the AMERICAN CARPENTER AND BUILDER and all its people.
R. M. LEONARD.

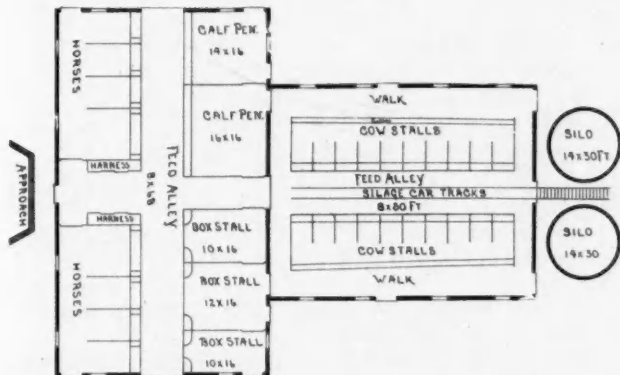
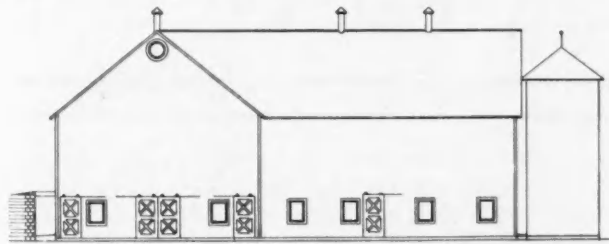
Plan of a Barn

To the Editor:

The main barn is 40 feet by 68 feet, and the wing 40 feet by 50 feet, the main barn being fitted up with six single horse



stalls and two double stalls, two harness closets, five large box stalls and feed alley. The wing will accommodate twenty cows.



The building stands on a concrete foundation and has concrete floors throughout basement. The basement is constructed

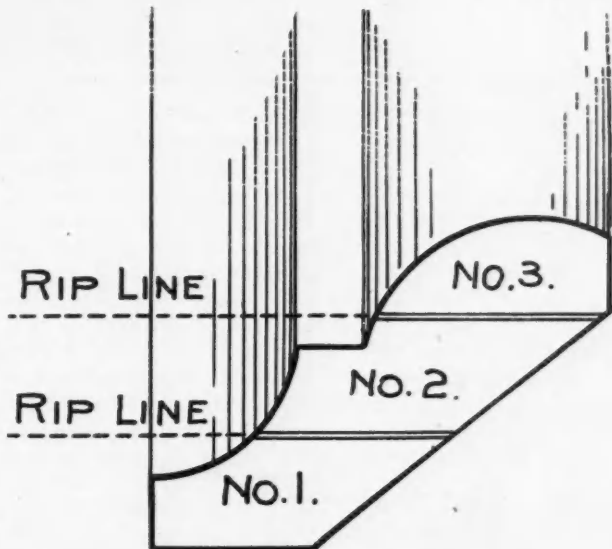
of square timbers, mortise and tenon style, and the walls are double-boarded. The superstructure is constructed of plank on the Shaerer system—the entire floor of both the main barn and the wing being free from timbers.
ERNEST SHAURER.

Bending Moulding Around Circles

To the Editor:

Newton, Miss.

I have noticed in the magazine several methods of preparing moulding to bend around circles. Enclosed you will find rough sketch of my method and I would like



some of the readers to give their ideas about it. You take a piece of moulding and rip it into three pieces at the angle shown in sketch, then dress this strip where it has been ripped so it will make a tight joint. Then bend one strip at a time until you have built the mould up around the circle, making a neat job and not showing like a mould that has been kerfed.
Walter McKay.

A Problem to Solve

To the Editor:

Pleasantville, N. J.

I have a problem for your readers which I would like to submit, and while there is a little catch in it you know that "a little nonsense now and then is relished by the best of men." I have never met a mechanic who was able to solve it, so I thought I would submit it to your readers and see what they could do with it. The problem is to cut a piece of wood or other material of four equal sides of four inches on each side each way. At first sight some will take a piece of 4 by 4 and cut off four inches and fail to see that it has six sides. Who will be the first to send in the correct answer?
A. DAVIS.

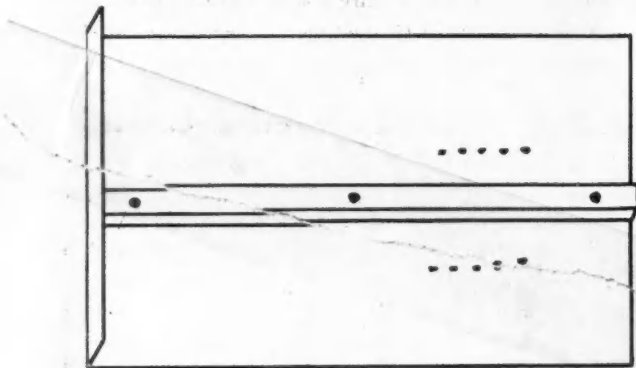
Sash Pulley Gauge

To the Editor:

Seneca, Ill.

In reading over the November issue of the AMERICAN CARPENTER AND BUILDER I noticed an illustration of Mr. Ben Johnson's, showing how to make a sash pulley gauge and marker. It is a very good plan. I will give an illustration of one I use: Take a piece of zinc or good tin six by eight inches; turn it up square at one end one-fourth of an inch. Now take a piece of parting stop six or seven inches long and rip off one-fourth of an inch. Nail this strip in the center of the zinc, as shown in the drawing, and when placed in

the groove in the jamb the small dots show where small holes should be punched through the zinc. These can be marked



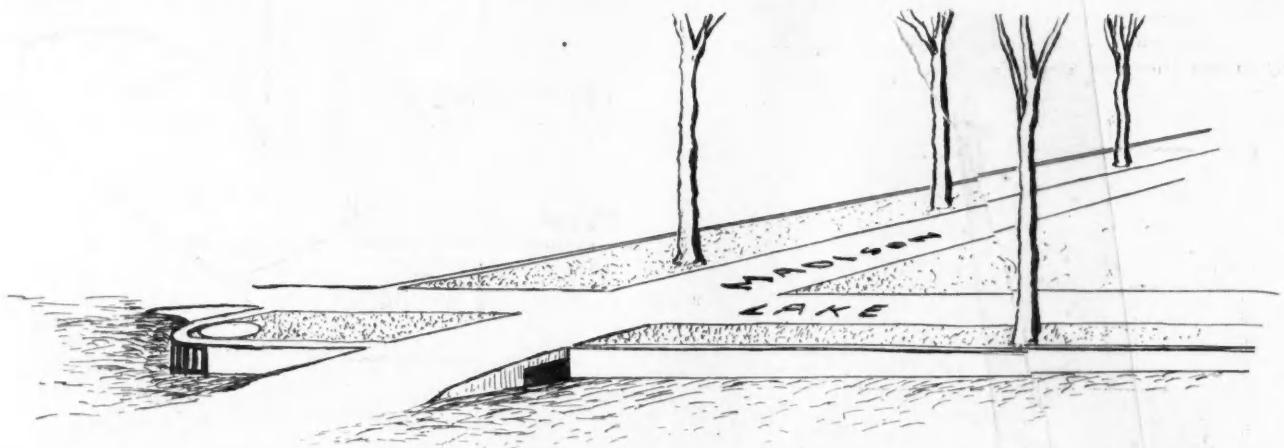
with a sharpened pencil or punched with a scratch awl. This little device is very light and handy to carry in the tool box.
L. E. BRUNDAGE.

Suggestion About Sidewalks

To the Editor:

Oak Park, Ill.

One of the serious drawbacks to the use of cement for sidewalks is its expansion, which causes the curb to give way at the street crossings. The cut shown herewith suggests an improvement which provides a resistance for the pressure. The pressure should be still further relieved by making the divisions between each slab at least three-eighths of an inch wide. This method does away with the usual jog which is so ruinous to one's temper when driving across them. Another suggestion is with regard to marking street names in the cement walks. Letters about four inches in height can be bought and set in during the process of construction. Old sidewalks may be chipped out and colored cement put in. This idea is not original, but very commendable on account of its practicability, as it is exceedingly cheaper, very plain and is not affected by the elements, and does not encourage the junk man as did the old fashioned sign posts.
W. H. PEARCE.



PRACTICAL TRADE APPLIANCES.

Builders Ought to Know About This

Here is something that every builder will recognize as a favorable tendency of the times—because instead of increasing the cost of necessary materials for improvements of



WAREHOUSE OF GORDON VAN TINE & Co., DAVENPORT, IOWA, WHERE MORE MILLWORK IS MADE THAN IN ANY OTHER FACTORY IN THE WORLD.

the home, it cuts the price in two, and the home owner, builder or contractor gets the benefit of the saving.

Gordon Van Tine & Co., of Davenport, Iowa, operate the largest woodwork mill in America, and they have used their strong position to revolutionize the woodwork and roofing

business of the whole country by withdrawing all their salesmen and agents, and giving this saving of expense to the man who buys their products direct from the mill. They guarantee to deliver safely and promptly to any man in the United States and Canada, who is building or repairing, just exactly what he wants in high quality millwork, or roofing, and save him half what it would cost him if he bought the same thing from his home dealer—freight included.

This company has been in business since 1865 and its responsibility runs into the hundred thousands, as any banker can tell you or anyone else wishing to order millwork.

And whether the order be for \$5 or \$10,000 worth, the price of each article is the same, and the saving is from 50 per cent. to even more on doors, windows, etc., including every piece of woodwork that goes into any kind of a building.

All you have to do is to write Gordon Van Tine & Co. a postal card for their free catalogue, which plainly tells how to order any of their products.

One of its main features is a set of pictures and complete architect's plans for houses of moderate cost, which in itself saves many a builder the expense of having plans drawn.

Other features of the catalogue are the tables of sizes and

prices on front doors, grained doors, painted doors, storm doors, white pine doors, art windows, plain rail windows, storm windows, barn windows, base mouldings, casing, sash, thresholds, lattice, moulding, hardwood flooring, window screen stock, door frames, window frames, gable ornaments, colonial columns, turned porch columns and porch newels, stair work, stair newels, porch frames and rails, stair balusters, building paper, stepladders, window glass, glazier's supplies, art glass, etc.

And the company also sends free a book of plans for barns, hen houses, hog houses and other out-door buildings, together with a free book on high quality roofing which they sell direct at half dealers' prices.

Gordon Van Tine & Company's catalogue is such a complete one that it has become a standard reference book in thousands of country homes, to be consulted whenever any building is to be done.

Another point which protects the consumer is that the quality of Gordon Van Tine millwork is always the highest, being made strictly in the official grades adopted by the Sash, Door and Blind Manufacturers' Association of the Northwest. Not all millwork is.

Besides this, any order may be returned at the company's expense if not exactly as represented, and all money will be refunded at once.

Without doubt the reason this firm saves the consumer 50 per cent of the cost of millwork below his local dealer's prices, freight included, is that they sell direct from the largest mill in the world. It covers 163,000 square feet of space, four acres. Besides, the company owns its own timber lands, sawmills and lumber yards and can keep large stocks of the finished millwork on hand to supply the demand even quicker than the local dealer can order and deliver it to the farmer or builder. And it is a great advantage to the consumer to deal directly with the mill rather than through ordinary mail order houses. He gets a lower price, as no middleman's profit is figured upon, and he gets what he wants.

We feel certain that every one of our readers who has any building or repair work to do now, or in the future, will do well to write for this company's Millwork Catalogue.

If you address the company, Station S, Davenport, Iowa, it will be known that you are one of our readers, and all the company's literature will be sent to you promptly—including the free Book of Plans, Roofing Book and the Grand Millwork Catalogue. Only a postal is necessary.

In its Tenth Edition

The tenth Edition of "Graphite as a Lubricant" has just been printed and is now being distributed by the Joseph Dixon Crucible Company. The subject of lubrication in general, and graphite lubrication in particular, is exhaustively treated. All the good features of the previous edition are retained, but the very latest information—both scientific and practical—that has to do with the subject is added, making it valuable to the student of theory and the man of practise.

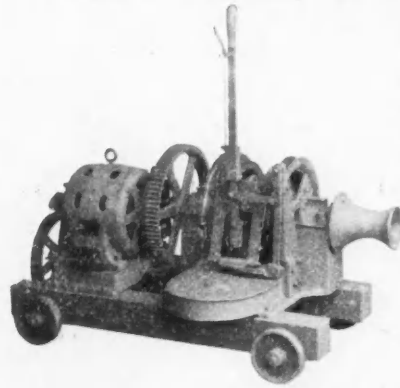
The publication is arranged and indexed so as to readily enable the reader to find the information he is most interested in. Those who desire to post themselves on better lubrication should secure a copy of "Graphite as a Lubricant" by writing the Joseph Dixon Crucible Co., Jersey City, N. J.

The Painter Hoist

A new and large field for the use of central station current has been opened up by the invention of the single phase builder's hoist shown in the accompanying illustration.

The hoist is manufactured by the Truxal-Painter Manu-

facturing Company, Chattanooga, Tenn., and is designed especially for hoisting brick, mortar or concrete in wheel-



barrows. The use of single phase motors gives the hoist a wide area of application, allowing it to be connected to alternating current lighting lines without causing voltage disturbances, the load being a day load and never crossing the peak.

In cities having alternating current and direct current districts the single phase motor can be removed and the direct current motor installed in its place on the same base frame.

The hoist operates by cable, two platforms moving side by side, one ascending while the other descends. By throwing a lever the driving sheaves on the hoist are started, stopped and reversed. The driving shaft runs continuously, the sheaves being thrown in and out by clutches.

The arrangement of the sheaves on the hoist (patented) provides a novel and reliable method for securing reverse of the cable travel without reverse of the driving mechanism.

Equipped with a 3 H. P. motor the hoist weighs 1,200 pounds, has a lifting capacity of 500 pounds at a speed of 250 feet per minute and will raise 50,000 brick with mortar per day.

Mr. R. L. Wescott, the contractor for the brick work on the new Nashville Railway Building, stated that with this



electric hoist he raised 700,000 brick with mortar at a cost of \$13.00 for the electric current, or a little less than two cents a thousand.

Had the hoist been worked to its full capacity, 50,000 bricks a day could have been raised at a cost of three cents a thousand for wages of operator, who does not require to be

a skilled man, making a total cost of five cents a thousand for current and labor.

The manufacturing company is securing most hearty co-operation from central station companies throughout the country, who gladly put their power solicitors at work on all prospects.

Mr. G. H. Patton, for many years connected with the General Electric Company, has resigned to become secretary and treasurer of the company manufacturing the hoist.

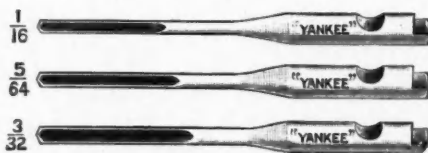
"Yankee" Spiral Ratchet Screw Driver

The North Bros. Manufacturing Company, of Philadelphia, have just placed on the market the latest addition to their extensive line of spiral ratchet screw drivers, an illustration of which appears herewith. This screw driver is made either right or left handed, and is rigid.



In construction it is same as the No. 30 and 31, but smaller and for driving small screws only.

It is intended for electrical workers, cabinet makers, carpenters and mechanics having a large number of small screws



DRILL POINTS.

to drive, and where a lighter tool will be much more sensitive and convenient than the standard pattern, or No. 30.

It is small enough to be conveniently carried in the pocket, measuring seven inches long when closed (without bit) and weighing complete less than seven ounces.

It drives screws in or out, ratchets in or out, and is arranged to hold rigid when closed or extended.

The bits are straight, so they can be used to drive screws through holes in in-



COUNTERSINK.

ulators, etc., where the flattened blades will not pass through holes.

The great convenience of this new driver in its smaller size and lesser weight will commend and make it a desirable tool even to those who already have the No. 30. The length of tool with bit in chuck is nine and one-eighth inches when extended.



CHUCK WITH DRILL POINTS.

At the time when the AMERICAN CARPENTER AND BUILDER ran its great prize contest last spring the Yankee Automatic Tools were in great demand by the prize winners, and of all who obtained them not one has made the slightest complaint of any imperfection or had other fault to find. This is a great testimonial for the tools. Any of our readers who wishes to lighten his work should write to North Bros. for all the information they can give regarding this screw driver.

Hercules 1907 Catalogue is Ready

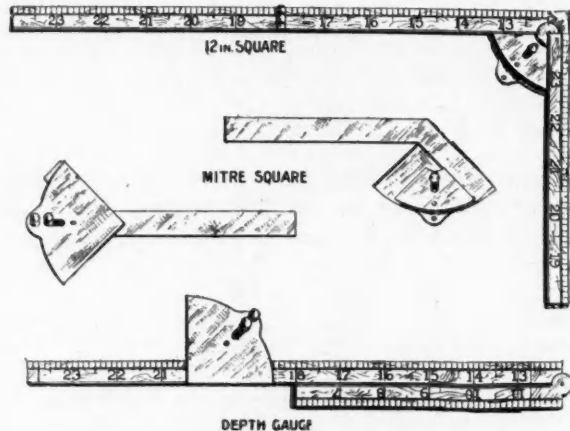
The Century Cement Machine Co., of Rochester, N. Y., makers of the Hercules Concrete Block Machine, have just

issued a very handsome and profusely illustrated catalogue setting forth the merits of the 1907 model Hercules, and explaining the improvements.

The catalogue will be sent free to readers of this publication. Be sure and ask for catalogue.

Use Your Rule for Square or Compass

The Eden Specialty Company are placing on the market as illustrated in the accompanying cut two very handy attachments for the rule which can be carried in the vest pocket.



One attached to the rule makes it as illustrated into a twelve-inch square, mitre square, or depth gauge. The trammel points of the other attachment fit to any two foot



rule (as in illustration), and can be used as compass in making circles, etc. The Eden Specialty Company, 954 Third Avenue, Brooklyn, N. Y., will be pleased to furnish full information.

Grammes Circular Saw Vise

After carefully looking into the merits of the Grammes Circular Saw Filing Vise, we find that this is a device that we can recommend to every circular saw user or circular saw filer. We find that it is just the thing that has been wanted for many years. There never was anything on the market that could be adjusted to the positions required by the filer. All have been stationary up to the time of the appearance of the Grammes Vise.

With the old style vise, the saw filer was always at a disadvantage when hard propositions came before him, such as filing a mitre tooth saw and other saws with special teeth. He was at a disadvantage not only in these respects but he could never get the proper light to the points of the tooth that he was filing. In these respects he was doing more or less guesswork all the time.

We are very glad to note that the Grammes Vise is one that can be adjusted to all positions, so that it will be a pleasure instead of a task for the filer to file all styles of teeth. Where the light is bad or where it does not strike the points that he is filing, he can swing the vise into such a position as to have the light come directly upon the points he is working on. This not only allows him to do the work quicker, but it allows him to do it better.

While a majority of other saw vises are made out of wood the Grammes is made out of iron, and its construction is so compact that it is very rigid. Another important feature about this vise is that it holds the saw at both teeth and col-



The Roofing Tin Experience of a Firm of Kansas Merchants

"Target and Arrow Old Style" tin still giving good service after many years' wear, while a cheap imitation "old style" gave out in a few years' time.

This building of M. E. Yost & Sons, of Hiawatha, Kansas, was built in two parts. One part was roofed with genuine "Target and Arrow Old Style" tin and the other with an imitation "old style." The "Target and Arrow Old Style" tin has given splendid service for many years without costing a dollar for repairs, while the so-called "old style" has been a constant trouble and expense.

Messrs. Yost & Sons are now building a cement block building of three stories and basement, and the builder has bought "Target and Arrow Old Style" tin for the roof.

The experience of Messrs. Yost & Sons with tins which are called "old style" for the purpose of trading on the reputation of the genuine "Target and Arrow Old Style" tin is being duplicated all over the country. Our booklet, "A Guide to Good Roofs," has kept many out of expensive mistakes of this kind. Would you like to read it?



Note that we now use the old name for the brand—"Target and Arrow Old Style"—rather than the words "Taylor Old Style," which have been imitated in every possible way by other tinplate houses.

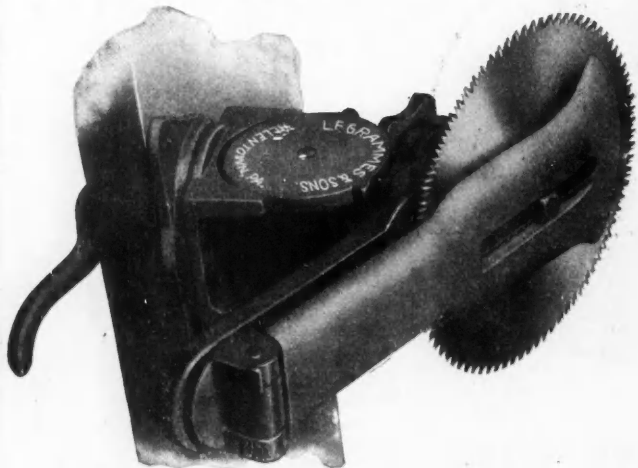
N. & G. TAYLOR COMPANY

ESTABLISHED 1810

Philadelphia

lar. Other saw vises hold the saw or cutter at teeth only. This is one of the principal reasons why many saws are buckled or dished after they have been filed.

We find that this vise is offered on thirty days' trial to all responsible parties with the understanding that it may be re-



turned at the end of this time if not found to be worth double the price. They even go so far as to offer to pay the freight both ways. With such a proposition no circular saw filer and operator should hesitate to at least give the Grammes Vise a thirty days' trial.

This vise can be bought from dealers or direct.

The "Lightning Estimator"

We have received a copy of the new fourth edition of "The Lightning Estimator," illustrated and considerably enlarged. For teaching unique, rapid and reliable methods for esti-

imating house work this book is not excelled. By showing the exact cost of each separate part of labor and material the builder may readily adjust the prices to his locality. The unique manner in which figures and quantities are combined to form a unit lessens the risk of errors and omissions, and makes rapid estimating easy and safe. The Bradt Publishing Company, whose ad. has appeared in every issue of the AMERICAN CARPENTER AND BUILDER since the start, are selling this book for a one dollar bill, a price which should permit every carpenter and builder to procure it.

Some Interesting Tests

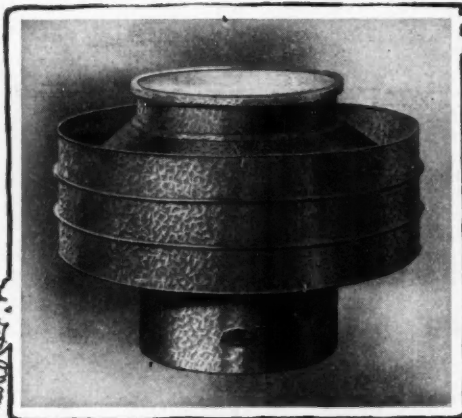
Some very interesting tests have recently been made by Boston purchasers of the Hayden Automatic Block Machine of blocks made on this machine. A block made on the Hayden machine which was submitted to the U. S. government arsenal at Watertown showed a maximum compressive strength of 800,000 pounds without any fracture, this being as high as the government machine was capable of testing.

In another case to determine the non-porous qualities of the block another block made on the Hayden machine was immersed in water for twenty-four hours, and when taken out showed that only one-third per cent in weight had been taken up during the immersion.

The building department of the city of Boston has given the block made on the Hayden machine unqualified praise.

An Instructive Catalogue

One of the neatest and most attractive catalogues which has reached our office is that of the Burt Mfg. Co., of Akron, Ohio, in which they describe their oil filters, exhaust heads and ventilators. It is illustrated with numerous fine half-tones showing cross sections as well as the entire operation and the interior construction. A partial list of the concerns using their products is given and among these



A Real Ventilator

worthy the name should be something more than a mere closable hole-in-the-roof. Architects who realize how justly this epithet applies to the average ventilator will find it well worth their while—and well worth their clients' while—to investigate the merits of

THE BURT VENTILATOR

The Burt Ventilator owes its pre-eminence principally to the fact that it is provided with a patented sliding sleeve damper which insures constant light as well as perfect ventilation. No obstruction to light whatever, even when the ventilator is closed and made absolutely storm proof. Where sky-light feature is not desired, we can furnish metal top instead of glass.

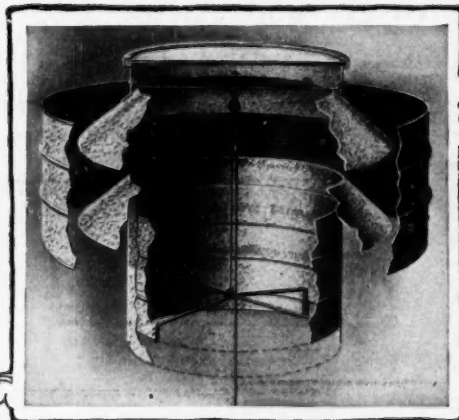
The Burt is the best-made ventilator as well as the best ventilator made, yet, because of its greater pulling power the total cost for large installations is less than for any other ventilator obtainable.

Our new and handsomely illustrated 64 page general catalog tells the whole story completely and concisely. Write for it

THE BURT MFG. CO.

500 Main St., Akron, O.

The Largest Manufacturers of Oil Filters
and Exhaust Heads in the World



Fill Those Cracks with Johnson's Crack Filler

Send Coupon
Below for
FREE
Sample Can



Photographic illustration showing ease of applying Johnson's Crack Filler.

"A Non-Shrinking Adhesive Compound for Filling Cracks."

It has taken us years to perfect Johnson's Crack Filler, which is now recognized as superior to all substitutes for putty. Expert painters and wood-finishers are using it in preference to any other. It is of special value in filling cracks between boards, nail and carpet tack holes in old floors. It is also used for rough and splintered surfaces, it will not shrink, is antiseptic and moth preventive.

Johnson's Crack Filler is Sold by all Dealers in Paint

1 and 2 lb. cans, per lb., 25c.

5 lb. cans, per lb., 20c.

Ask your dealer and insist on getting the genuine Johnson's Crack Filler.

Mail us coupon to the right and get **FREE** sample can of Johnson's Crack Filler and copy of our new 48-page color book "The Proper Treatment for Floors, Woodwork, and Furniture," regular 25c. edition **FREE**. This book is full of valuable information for painters. Send today.

Coupon
ACB12

S. C. Johnson & Son
Racine, Wis.

Gentlemen: My
paint dealer's
name is

His address is

for which please send me free pre-paid sample can of Johnson's Crack Filler and copy of your new illustrated 48-page color book "The Proper Treatment for Floors, Woodwork and Furniture," reg. 25c edition free.

My name is.....

Address.....



S. C. Johnson & Son
Racine, Wis.

"The Wood-Finishing Authorities."

are the largest and most reliable concerns in the country. This handsome catalogue may be had by those interested by writing to the Burt Mfg. Co., Akron, Ohio, and mentioning the AMERICAN CARPENTER AND BUILDER.

Has Been on the Market for Years

We are pleased to make a correction of an unintentional misstatement which appeared in this department in November. The following letter is self-explanatory:

NORWICH, CONN., Nov. 20, '06

"AMERICAN CARPENTER AND BUILDER, Chicago, Ill.

"GENTLEMEN:

"We would call your attention to the notice given us on Page 959 of the AMERICAN CARPENTER AND BUILDER, November issue, headed 'A New Shingle Stain.'

"The statement made by the writer of that article to the effect that we are makers of new shingle stains is absolutely incorrect and has done us an injustice in placing us before the public and prospective buyers, through our advertisement in your magazine, of being recently established in business; whereas the fact is we have been manufacturing waterproof and odorless shingle stains, waterproof flat brick stains and waterproof brick and stone filler for a number of years.

"The inference, therefore, of the article, is very annoying to us, and we will ask you to correct the mistake, giving it prominent notice in the next issue, as we certainly do not want it understood by consumers of our product that our goods are in any sense an experiment, but we do wish them to understand that our art in shingle stains and other products has been put to the severest tests and their merit thoroughly established for durability, protective properties, etc.

"Yours very truly,

"PARKER, PRESTON & Co., INC.,

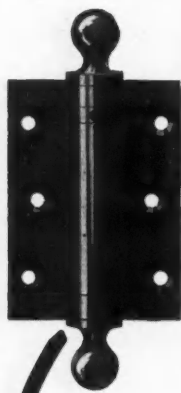
"R. S. PARKER, President."

Progress of Hollow Concrete Block Industry

Like all other new industries the hollow concrete building block has had its vicissitudes perhaps to a greater degree than almost any other.

The fact that it has gone nearly over the entire world in the short space of three years is proof that it has come to stay, and its increasing popularity is evidence of its undoubted merit. Every trade paper of note in this as well as foreign countries has devoted much space to discussions relative to the material, its adaptability to building construction, its sanitary qualities, cheapness and durability, which, together with its superiority as a substitute for the rapidly decreasing lumber, has attracted the attention of all classes of readers. That this has had a most beneficial effect no one can deny. The rapidity of its introduction compels haste in securing a practical education, which in turn was not slow to discern the qualities necessary to success in both blocks and the machines for their manufacture. Of all the two or three hundred patents which have been granted for machines and blocks there are less than one dozen which have proved so successful as to require a factory to make the machines, while scores have come to light for a few weeks and then dropped from sight.

However, various improvements have been added which in practice have been found desirable in their manufacture. The greatest of these is flexibility in the machine so as to make different sizes of blocks as well as different shapes and thicknesses. The machines of to-day are so admirably adapted to these changes that the most intricate designs of the architect are easily carried out with scarcely any effort of the machine operator. Many architects have taken up this branch of construction almost exclusively and in connection with



COLUMBIAN

DO you know we can furnish spring hinges for any kind of a door, no matter what?

So, Mr. Contractor or Carpenter, when building that next house, office, bank or castle, just remember what we have previously said and see if we can fulfill our promise.

This is only one of twenty-five different styles; it's all steel from tip to tip, single or double acting. Our double acting hinges have **seamless** center flanges. Every hinge has a carpenter's gauge, making it easier to apply.

All our hinges, from our double acting wrought-steel ball-bearing to our simplest screen door hinge, are guaranteed.

WRITE 12 ON A POSTAL

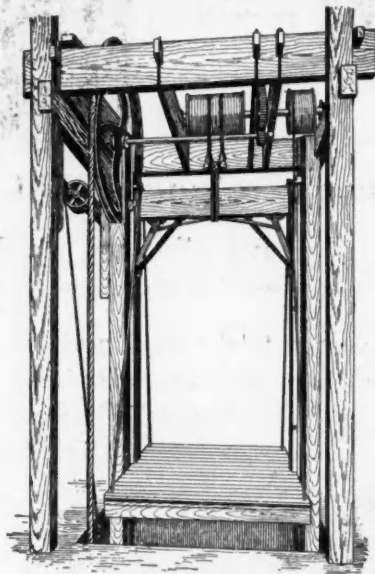
Uncle Sam has taken out thousands of our catalogues and placed them carefully on as many desks. Just write "No. 12" on a postal and he'll do it for you. Try it.

47 YEARS IN THE BUSINESS

THE COLUMBIAN HARDWARE COMPANY

168 Church St., New York CLEVELAND, OHIO 26 E. Lake St., Chicago

We Pay the Freight You Install Elevator Yourself

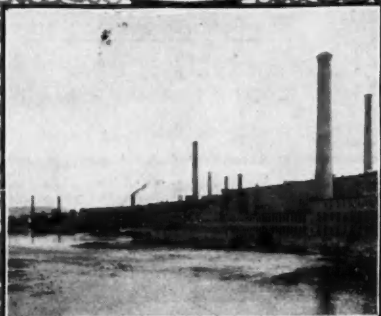


STORE HOIST

We will ship this Elevator direct to you, freight paid and you can install it yourself without expense except the help of the average mechanic. This is an exceptional offer. Everyone knows that EATON & PRINCE means dependable Elevators. No other Elevator is quite as good because none is made with such infinite care. Send for Catalogue No. 99.

EATON & PRINCE COMPANY
70-76 Michigan St., Chicago, Ill.

Barrett Specification Roofs



FEW things are as annoying and expensive as leaky roofs—and few things are as unnecessary. The damage which they cause (and it amounts to thousands of dollars annually) is due almost entirely to the fact that buildings are roofed with materials which, unless painted every two or three years, quickly rust out and leak.

A BARRETT SPECIFICATION ROOF not only requires no coating nor painting, but any reputable contractor will guarantee such a roof for at least ten years absolutely. Behind this guarantee is a record of fifty years of satisfaction on buildings of every kind all over the country.

The photographs opposite give some idea of the variety of structures for which Barrett Specification Roofs are particularly adapted.

No. 1—N. Y. C. & H. R. R. Freight Station at St. John's Park, New York. Roofed 36 years ago, and the roof to-day is in good condition.

No. 2—The Auditorium Hotel, Chicago. One of the largest hotels in the country.

No. 3—The Studebaker Plant at South Bend, Ind., covered with over 800,000 square feet of Barrett Specification Roofs.

No. 4—Massachusetts Cotton Mills, at Lowell, Mass., roofed in 1874, and in good condition to-day. Area 700,000 square feet.

No. 5—The Famous Department Store of R. H. Macy & Co., in New York. One of the most modern structures of its kind.

And of importance to every man who pays the bills is the fact that the cost of a Barrett Specification Roof is less than one of Tin or metal of any kind and its life is very much longer.

The Barrett Hand Book covering thoroughly the subjects of roofing and water proofing will be mailed free on application.



BARRETT MANUFACTURING CO.

New York, Chicago, Allegheny, Cleveland, St. Louis, Boston, Philadelphia, New Orleans, Kansas City, Minneapolis, Cincinnati.

the machine manufacturer are surely developing a class of buildings that will be a pride to our country, inasmuch as they will require neither paint or repairs, are dry and sanitary, durable and cheap, and if the floors and roofs are properly constructed with the same material, fire insurance, that

which an architect is likely to call for that this machine can not make, and the co-operation is so perfect and so easily understood by the architect that the machine is almost a necessary adjunct to his office and plans. Its flexibility is so great that one, two, three or more blocks can be made at one time, of any shape, size or thickness, with any number of air spaces in the blocks and at any location. One movement of a lever opens and closes the machine, saving enough time to add one hundred per cent to the usual output.



Owing to the interest which many of the devotees are taking in the development of this new industry five or six of the largest and most progressive companies in this line have just been practically merged into one called the "United Cement Machinery Manufacturing Company," with Harmon S. Palmer, President of the Palmer Company at Washington, D. C., as President; James F. Angell, President of the Winget Company of Columbus, Ohio, as First Vice-President; James W. Sanderson, President of the Cement Machinery Manufacturing Company of Burlington, Iowa, Second Vice-President and General Manager; James M. McDowell, of Columbus, Ohio, Secretary, and Howard C. Black, General Counsel. With the experience of these promoters and the number of factories and offices, together with the numerous patents which they control, this company should be a powerful factor in the hollow block and cement industry of this country.

industrial cancer, will be entirely unnecessary, unless the dwellings stand in the midst of many other inflammable buildings. This may seem a bold assertion, but it is not too strong, and the time will come when it will be considered a crime to erect a dwelling that can burn.

Sheet Metal Catalogue

The accompanying illustration is one of the latest machines of the above types just patented by the original inventor, called the "Multiple Automatic." Its points of excellence are its adaptability to innumerable changes. There is no design

The Edwards Manufacturing Company of Cincinnati, Ohio, have just completed their large and profusely illustrated catalogue. It contains 168 pages and is the most complete book devoted entirely to sheet metal building material in the world. All the old and out-of-date designs have been eliminated and only that which is modern and attractive is shown. In looking over the catalogue we note they make no specialty of any one line, but that they are thoroughly equipped to handle

PREVENTS DRAFTS, DUST AND WINDOW RATTLING.
IVES' PATENT
 Window Stop Adjuster.

PATENTED.

The only Stop Adjuster made from one piece of metal with solid ribs and heavy bed that will not cup, turn or bend in tightening the screw. Manufactured only by **The H. B. IVES CO., New Haven, Conn., U. S. A.** (Fifty-page Catalogue Mailed Free.)

The Carpenter or Woodworker
 who occasionally fits up an office should have one or more of these wickets in stock. The price is low enough to suit you. Also, send for price list of Brass Railings enabling you to estimate cost of same without referring to us for prices.

The Baldwin Brass Works
BRASS, STEEL AND WIRE WORK
 232-234 S. Clinton St., CHICAGO

No. 5 Wicket. 18x27 inches. Made of Steel, finished Antique Copper. Complete Catalogue sent upon request

LEARN PLUMBING
 A trade that pays well

HAVE YOU EVER CONSIDERED THE DIFFERENCE BETWEEN THE PLUMBER AND THE AVERAGE DAY LABORER?

The plumber works from 8 to 12 and from 1 to 5, has a helper, steady work and his average wage is \$5.00 a day or \$1,500 a year.

The day laborer usually works 10 hours a day, sometimes longer, does all his work himself and mighty hard work at that, is never sure of his job, does one kind of work today and another tomorrow for the average wage of \$1.50 a day or \$450 a year.

A difference in wages alone for 40 years of \$42,000, and consider the difference in the work and the steadiness of it.

Any man, young or old, can learn plumbing. Many of our students have graduated in less than four months and are today working at regular plumber's wages. A few months ago they were working at the day laborer's wage.

We can do the same for you.

Let us send you copies of letters which we have received from our graduates. Read what they say about our method of teaching and what we have done for them. Illustrated Catalog FREE.

ST. LOUIS TRADE SCHOOL, 3988 OLIVE STREET ST. LOUIS, MO.

BUILD WITH PRACTICAL KNOWLEDGE



If you are a Carpenter, Builder, Draftsman, Architect or Mechanic, this is an unusual opportunity FOR YOU. Without leaving your own home or losing a minute from your regular work you can make yourself complete master of your own trade. Better still, it does not cost you a cent to try.

Cyclopedia of Architecture, Carpentry and Building

Ready for Delivery January 31st, 1907.

Published by the American School of Correspondence, Chicago, Ill.

SEVEN LARGE VOLUMES—3,000 PAGES—1,900 ILLUSTRATIONS—Handsomely bound in three-quarters red Morocco leather, marbled edges, full page plates, plans, sections, tables, formulæ, fully indexed. Labels stamped in gold. Type is new, clear, easy to read.

Not prepared by ONE man, but by a staff of TWENTY practical writers of acknowledged authority, such as FRED. T. HODGSON, author of "Modern Carpentry," JAMES C. PLANT, office of Supervising Architect of the United States, WALTER LORING WEBB, C. E., expert on Re-inforced Concrete, and others, each a specialist in his particular line, supplemented by test questions to enable the reader to test his knowledge of the subject, making the most complete, strictly up-to-date Library on CARPENTRY and BUILDING ever published. The CARPENTER, BUILDER and CONTRACTOR should have in his possession, for ready reference, the best, latest, most complete books on building possible to obtain. Neither a great building nor a successful career can be built on a poor foundation.

Price for Thirty Days, \$19.00
Regular Price, \$42.00

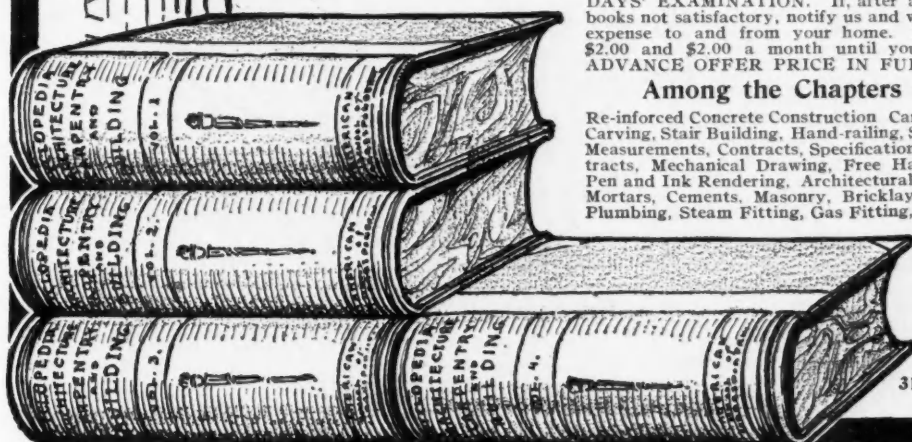
To those who order now while the first edition is on the press, we will give the benefit of the saving we can make by printing a larger edition and will cut the price in half.

You Need Not Pay One Penny in Advance

The books will be sent by express (prepaid) on January 31st for FIVE DAYS' EXAMINATION. If, after a careful examination, you find the books not satisfactory, notify us and we will order them back, paying all expense to and from your home. If you want to keep them, send us \$2.00 and \$2.00 a month until you have paid \$19.00, the SPECIAL ADVANCE OFFER PRICE IN FULL.

Among the Chapters are the Following:

Re-inforced Concrete Construction Carpentry, Hardwood Finishing, Wood Carving, Stair Building, Hand-railing, Superintendence, Estimating, Correct Measurements, Contracts, Specifications, Strength of Materials, Law of Contracts, Mechanical Drawing, Free Hand Drawing, Perspective Drawing, Pen and Ink Rendering, Architectural Drawing, Foundations, Concretes, Mortars, Cements, Masonry, Bricklaying, Excavating, Electric Wiring, Plumbing, Steam Fitting, Gas Fitting, Heating, Ventilating, Cornice Work, Skylight Work, Roofing, Mill Work, Steel Square Problems, Steel Construction, Burglar Alarms, Door Bells.



THE AMERICAN SCHOOL OF CORRESPONDENCE

3127 Armour Ave. Chicago, Ill.

everything in sheet metal used in the construction of a building. New designs of galvanized iron cornices and metal ceilings and side walls are especially attractive and prove the wonderful possibilities to be attained in sheet metal work.

Those who are interested in sheet metal building material of any nature can secure a copy of this expensive catalogue. It may be had by writing to the Edwards Mfg. Co., "Sheet Metal Folks," Cincinnati, Ohio, and mentioning the AMERICAN CARPENTER AND BUILDER.

Complete Pocket Catalogue

The Baldwin Brass Works, 232-234 S. Clinton street, Chicago, Ill., has just issued a pocket catalogue. This little booklet gives full information as to price and material in all kinds of brass, bronze, steel and wire work. In estimating this handy catalogue will furnish accurate data without the necessity of referring further for prices. The Baldwin Brass Works was established in 1862. Their long experience enables them to take a place well in the lead of all competitors.

Two Leading Papers for \$1.00

Elsewhere in this issue the Concrete Age and the Southern Architect, both of Atlanta, Ga., are offered for one year for \$1.00. These are the two leading papers of the South. The price of each is \$1.00 per year, but for a limited time the two will be sent one year for the price of one. Look this ad up on page 1007 and subscribe while the offer is open. No better \$1.00 value anywhere.

Classified Advertisements.

Advertisements under this heading will be inserted at the following rates:
 One month.....\$0.45 per line
 Three months..... 1.25 per line
 Six months..... 2.25 per line
 One year..... 4.25 per line

Count 10 words to the line. Situations wanted one-half above rates. Replies may be addressed in our care and will be promptly forwarded.

Situations Wanted.

SITUATION WANTED—By young man thoroughly familiar with cement block making; would like to take charge of a block plant as foreman or superintendent of construction; carpenter and builder by trade; draw plans, make estimates; capable of doing anything in connection with stone making or building in general. Best of references. Address "Builder," American Carpenter and Builder. N-1.

SITUATION WANTED—As foreman or superintendent for big contracting firm; have contracted for six years; employed eight to ten men; age 34; best of references. Address "D," American Carpenter and Builder. N-1.

Miscellaneous.

A FEW DOLLARS will start a prosperous mail order business; we furnish catalogues and everything necessary; by our easy method failure impossible. Send for particulars. Milburn-Hicks, 726 Pontiac Bldg Chicago.

TWO PAPERS FOR THE PRICE OF ONE

THE CONCRETE AGE is the leading paper of its class in this country—64 large pages profusely illustrated. Shows pictures and floor plans; cost, etc., of all kinds of buildings of concrete construction. Ably edited. Invaluable to every architect and builder. The price is \$1.00 per year.

THE SOUTHERN ARCHITECT is an ideal paper in its field. Shows views, plans, cost, etc., of the better class of buildings being erected in the South. Price \$1.00 per year. Every issue is worth price of year's subscription.

BOTH PAPERS FOR \$1.00

For a limited time only we will send both papers one year for \$1.00. Send us \$1.00, check, stamps, money order or currency, and both papers, THE CONCRETE AGE and THE SOUTHERN ARCHITECT, will come to you twelve months. Subscribe today. Address

**THE SOUTHERN ARCHITECT
 BOX 846, ATLANTA, GA.**

WHO WANTS SLATE?

Roofing Slate for Houses, Barns, &c. Always clean, beautiful and fireproof.
Blackboards for Schools, Colleges, &c. Needs no commendation; universally used all over this and other countries.
Structural Slate. Electrical Stock, Sinks, Troughs, Washtubs, &c. Superior to all stone for such purposes.
Slater's Supplies. Handmade Slating Tools, Felt, Cement, Nails, Snowguards, Punching Machines, &c.

Write for prices and I will tell you all about Slate.
DAVID McKENNA, Slatington, Pa., U. S. A.

The New Way of Scraping Floors With a

"Little Giant" Floor Scraper

The "LITTLE GIANT" Working

Saves time, money, labor. Operated by one man. Will pay for itself in a very short time.

To scrape floors operator pulls machine



Note These Comparisons

One man will scrape by hand about 100 sq. feet in 4 hours at 40c per hour—costs \$1.60 per square.

The "Little Giant" and one man will scrape about 400 square feet in 4 hours at 40c per hour—costs \$1.60 for 4 squares, costs 40c per square; Saving \$1.20 per square.

How long will it take you to pay for the machine, and commence saving money in its use?

Write Your Dealer for Prices

HURLEY MACHINE COMPANY

153 S. Jefferson Street
 CHICAGO, ILL.

1010 Flat Iron Building
 NEW YORK

Grilles of Every Description



RAISED CARVINGS

We also manufacture CHINA CASES, SIDE-BOARDS, and EVERYTHING in the CABINET LINE.

You can rely upon us for PROMPT SHIPMENTS.


Chicago Embossed Moulding Co.

598 Austin Avenue, Chicago

SEND FOR OUR CATALOG, "HOME HEATING"

HOT-WATER HEATED \$198

by **ANDREWS SYSTEM** EACH



14 ANDREWS HEATERS IN ONE BLOCK AVERAGE PRICE \$198.00

IT IS WELL WORTH READING

1908 CATALOG Of Hot Water and Steam Heating

Our new catalog explains fully the principles and advantages of hot water heating, based on 18 years' experience in the cold Northwest, and describes how any carpenter or mechanic can erect the Andrews System in any building from complete plans and directions which we send with each heating plant, saving plumbers' charges.

This book should be in the hands of every contractor and builder. Send your address and names and addresses of two other people who expect to buy heating plants, and we will send our catalog postpaid.

WE DO IT RIGHT IN 44 STATES, CANADA AND ALASKA. Our catalog contains a partial list of our customers from all parts of the country. Look them up and examine the Andrews System in your vicinity.

PRICES. We will sell you the plant with all material complete pipe cut to fit so you can erect it yourself. The cost of each heating plant here shown is based on Minnesota climate and includes an Andrews Steel Boiler, richly ornamented radiators, for every room except the kitchen, pipe cut to fit, fittings, valves, gold bronze, brushes and all other material ready for use, with diagrams and directions so plain and simple that any man handy with tools can erect the plant and save money. You can in this way include the heating plant in your general contract for the building.

FACTORY TO USER. We design, manufacture, guarantee and sell each plant direct from Factory to User, giving you the lowest price for the value. Estimates free. **ALL PLANTS GUARANTEED AND SOLD ON 360 DAYS' TRIAL FREE.** Freight rates equalized. **Old Houses Easily Heated.**

ANDREWS HEATING CO. 97 LaSalle Building, Chicago
397 Hennepin Ave., Minneapolis

MANUFACTURERS CONTRACTORS CONSULTING ENGINEERS

FRESH AIR *and* HEAT

INSURED BY THE USE OF THE
HEITLAND RETURN-DRAFT GRATE

It burns wood, coal or gas. In the majority of cases it can be installed without any tearing out of your rooms. It will heat two floors if desired and is a constant and perfect ventilator.

It gives to your rooms all the advantages of the old-fashioned open fireplace with none of its disadvantages. Costs less to maintain and is more satisfactory than any other grate on the market.

Guarantee—If after one winter's use our grates fail to give you satisfaction return same at our expense and we will refund your money.

Send for our special catalogue. It also includes a full line of Wood Mantels, Fireplace Furnishings, etc. Free on request.

Heitland Grate & Mantel Co.
827 Maine Street, Quincy, Ill.

Note in the diagram the thorough circulation of heat. Not only throws out into the room its own heat but heats air in chamber directly over bed of fire. Uses smallest amount of fuel, gives off greatest amount of heat.



A Dollar An Hour Instead of A Dollar A Day



Do you realize what this means to you and those depending upon you?

Don't be satisfied with a small salary all your life—do as thousands of others have done; let the **International Correspondence Schools** show you how your pay can be increased. It matters not where you are, in the factory or in the shop, in the mine or in the mill, in the office or store, the **I. C. S.** can and will increase your earning capacity.

A Dollar an Hour is not out of your reach, if you will let us help you. It will cost you nothing to ask us—*How?* Clip and mark the coupon, mail it at once, and it will bring to your aid all the resources of that great institution—the **I. C. S.**, a six-million dollar establishment founded and maintained for the benefit of poorly paid men and women. If you want your pay increased say so—*At once.*

International Correspondence Schools Box 910
Scranton, Pa.

Please send me your free "Carpenters' and Architects' Booklet," and explain how I can secure a higher position and a larger salary in the building trades.

Name _____
St. & No. _____
City _____ State _____



No. 468.—Modern Mission Style, 5 feet 11 inches high and 5 feet wide; heavy plan, shelves, recessed leather panels; the brackets supporting main shelf are carved with Spanish insignia. Forlan-Vitrea tile hearth and facing. Hand-wrought Andirons of Romanesque design.

CHAS. F. LORENZEN & CO., Inc.,

LORENZEN MANTELS

A Mantel in the home is useful as well as artistic and decorative. It saves you furnace heat on chill spring and autumn days, and diffuses cheer and comfort like no other piece of furniture in the house.

Lorenzen Mantels

\$10 to \$250

In Colonial, Craftsman, Modern Mission and numerous other styles, and all woods and finishes. Our modern factory, large stock of air-seasoned lumber and expert, skilled-workmen all mean beautiful mantels, far above the ordinary. We are at all times prepared to furnish designs of Mantels and Fireplaces in the historic periods of architecture, such as Louis XIV, Louis XV, Louis XVI, Renaissance, Gothic, Rococo, Empire, Early English, Colonial, Chippendale, Sheraton, Adam, etc.

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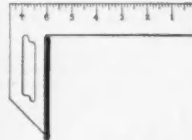
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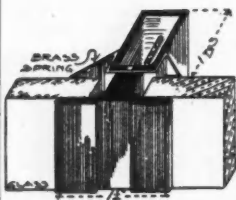
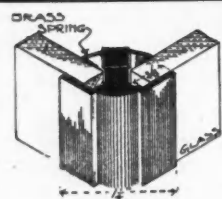
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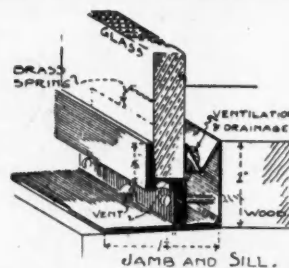
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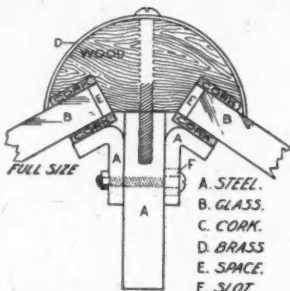
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SHULTZ'S

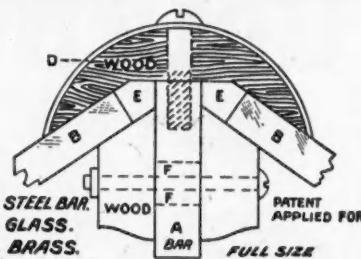
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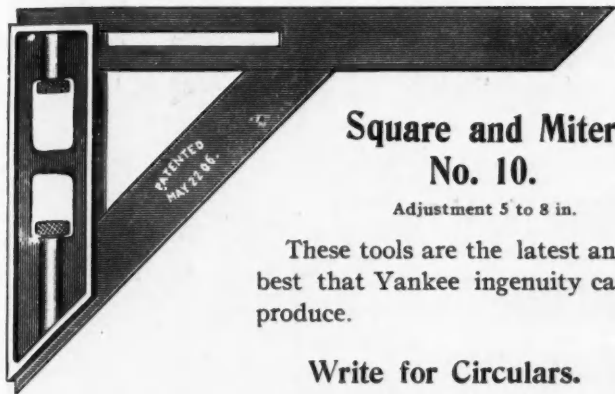
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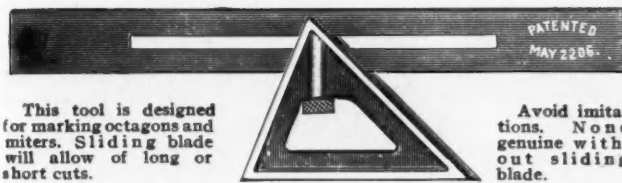
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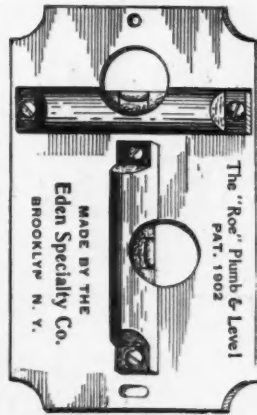
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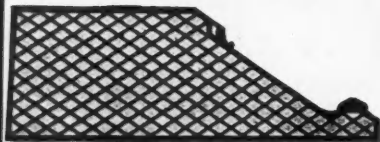


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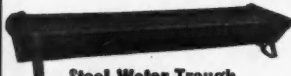
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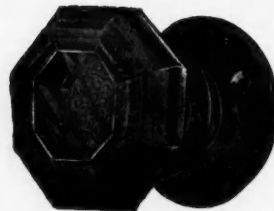
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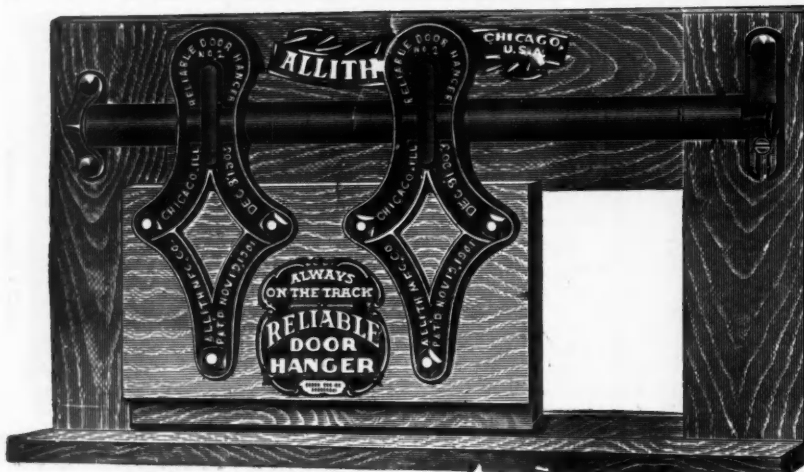


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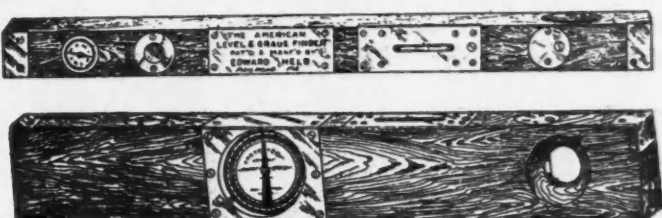
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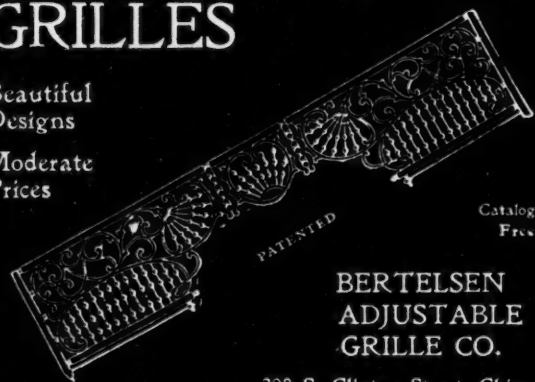
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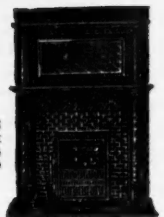
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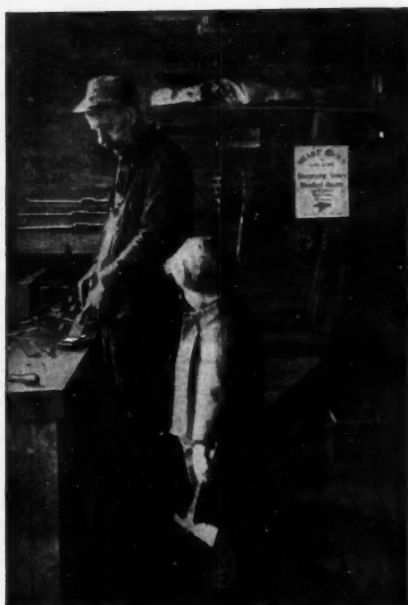
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Supplies 15 to 20 brickmasons.

Raises 6,000 bricks per hour.

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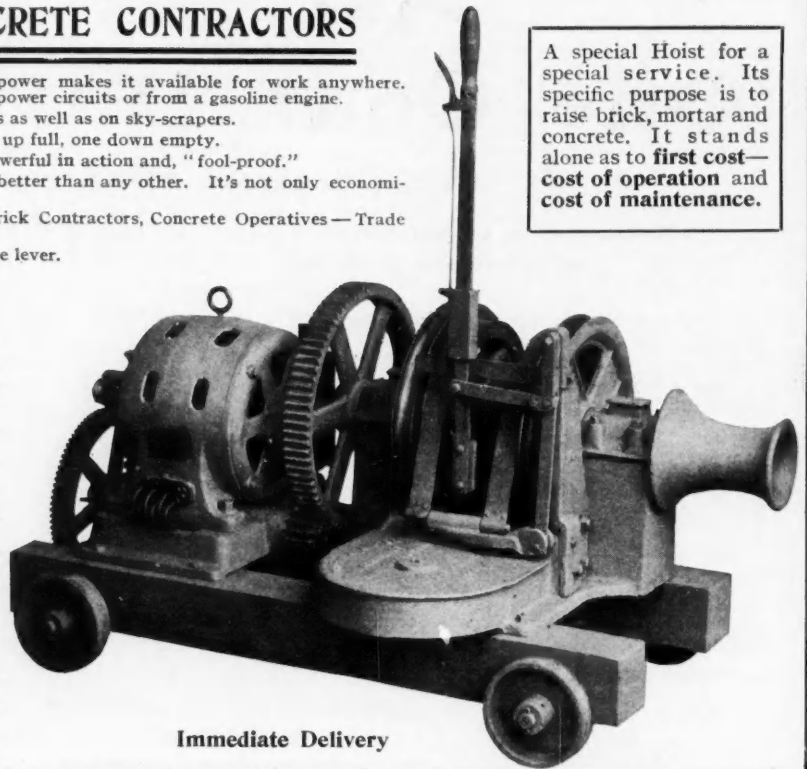
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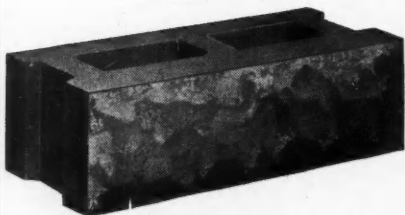
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We Move the Machine NOT THE BLOCKS

or while it is setting, but this is the only machine by which this is possible. The blocks cost 6 cents to make—sell for 18 cents. One man can make 200 blocks per day. Whole outfit costs \$125.00. Figure the profits.

Competition simply demonstrates the superiority of the Pettyjohn machine. Unlimited guarantee. SENT ON TRIAL

THE PETTYJOHN COMPANY

634 No. 6th Street, TERRE HAUTE, IND.



WALTON STONE MACHINE CO.

2502 East 18th Street, - - - KANSAS CITY, MO.

THE WALTON Stone Machine

Two-piece wall system makes **DRY WALLS**

Makes lengths from 4 to 32 in. and 3, 4, 1-2, 6 and 9 in. heights. 10, 12, 14 and 16 ft. circles. 30 and 45 degree angles.

All widths by lapping blocks. All shapes, lengths and widths made on the same pallet. Reducing cores save material.

LET US TELL YOU how we save labor, save material, save pallets, save expensive facings, save 8c. per cubic foot over other machines by our method. Send for illustrated catalogue

None Better

Cement & Concrete Workers', Contractors Asphalt and Pavement'



Steel Blade Jointer

TOOLS

Rollers, Jointers, Groovers Concrete Knives, Tampers, Name Plates Stamps, Shovels, Picks, Etc., Etc. Complete line and low prices

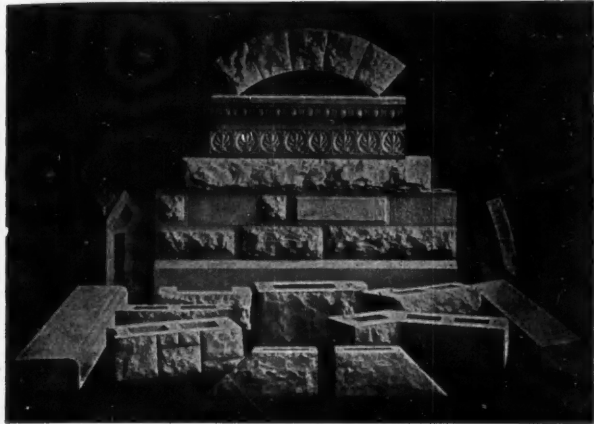
Write for Catalogue

JOHN STORTZ & SON, Mfrs.
224 Vine Street, Philadelphia, Pa.



Dot Roller

FREE TO YOU



Our 1907 Catalog—Hand-
somely Printed—Beautifully
and Profusely Illustrated—
is just off the press.

Every improvement that the trained
minds of Master Mechanics can conceive
is found in the

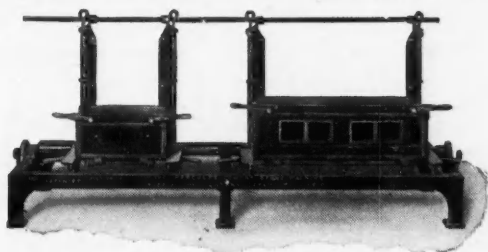
1907 Model Hercules

Years of successful manufacturing ex-
perience is back of the 1907 Model—
the Strongest, Simplest, Most Durable
and Economical Concrete Block Ma-
chine in the world

Our new catalog is a work of art.
It's Free—be sure and ask for
Catalog XX

CENTURY CEMENT MACHINE CO.

273 W. Main St., Rochester, N. Y.

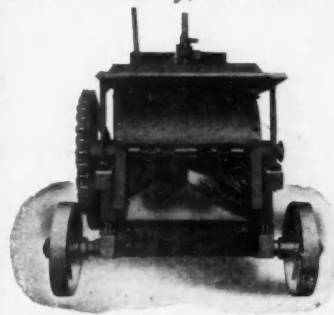


A Good Mixer A Good Mixture

If either is bad, both are: Concrete must be
uniform, for a structure is no stronger than its
weakest part. There are no weak parts in the

American's Mix

The mixture is like the mixer—every part true
to its purpose. The secret is out. That's the
reason for the American's popularity. Discrim-
inating contractors, those who get and give value
for their money, never fail to recognize the merits
of the American
Mixer. Its superi-
ority is too evident.
Revolving plows
inside the drum do
the work.



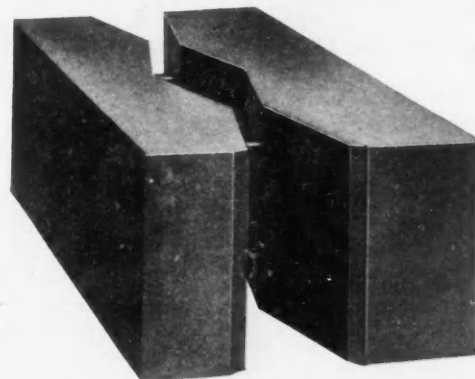
INVESTIGATE!

Catalogue O.

International F. & Fireproofing Co.,
COLUMBUS, OHIO.

ANCHOR CONCRETE STONE MACHINES

Make This Continuous Air-Space Block



TWO SLABS OF CONCRETE TIED TOGETHER
with four one-quarter inch galvanized iron rods firmly
imbedded in the block in its construction. Blocks lay
in the wall 8 in. high, 24 in. long, 8 to 16 in. wide.

Easy to Make Easy to Lay Look Fine
Very Strong Frost Proof Moisture Proof

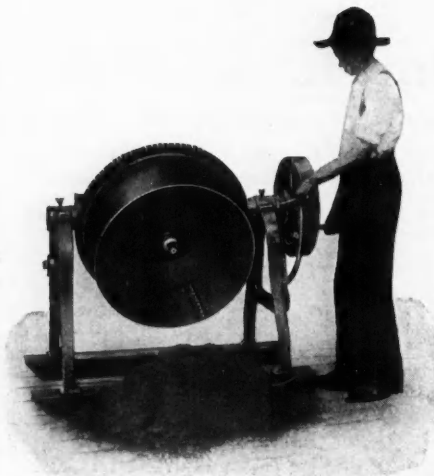
Capacity of Machine:

300 PERFECT BLOCKS PER DAY

Write for Special Low Prices and Catalog of Machines

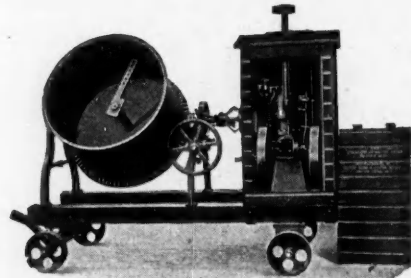
ANCHOR CONCRETE STONE COMPANY
ROCK RAPIDS : : : : : IOWA

Standard Concrete Machinery



Hand Power STANDARD Concrete Mixer, Ball Bearing, especially adapted to brick and block work where large capacity is unnecessary

Weight 600 lbs.



Portable Power Outfits \$270 to \$470, according to Size and Equipment

THE STANDARD CEMENT BRICK MACHINE is the fastest hand brick machine on the market; will make plain, veneered, and ornamental face and shape; all perfect, smooth brick, true to size and design.

THE STANDARD CONCRETE MIXER handles wet or dry mix; requires little power to operate; mixes batch perfectly in one minute; self-cleaning; easily charged and dumped.

THE STANDARD GAS AND GASOLINE ENGINE is made in all sizes. Especially adapted to running concrete machinery.

THE STANDARD PORTABLE MIXER AND ENGINE are mounted on suitable truck; well designed; convenient to operate.

WRITE FOR CATALOGUE AND PRICES

SOUTH BEND MACHINE MANUFACTURING CO.

Price \$95.00 1803 South Franklin Street : : : : SOUTH BEND, IND.

Waterloo Concrete Brick & Block Machine Co.

ONE movement of the lever operates the ENTIRE machine, consuming the least time for operation of any machine. Two men will make 250 blocks per day.

Our block is patented. Has double, a vertical and horizontal air space.

The brick attachment makes 18 brick as easily as a block.

No gears or chain to clog or break.

Write for catalogue "B." Agents wanted.

O. H. SWEENEY, Secretary

101 East 4th Street, Waterloo, Iowa.

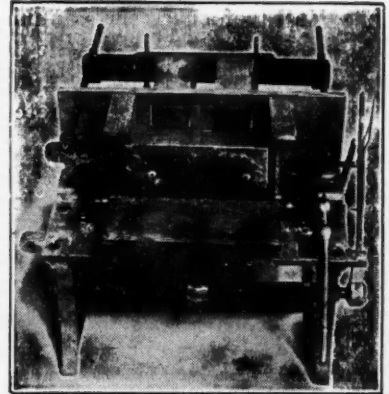
Southern Agts., SILVERA & GADSDEN, Savannah, Ga.

Agents for the the Pacific Coast, C. J. TALLON & CO., 618 Bailey Bldg., Seattle, Wash.

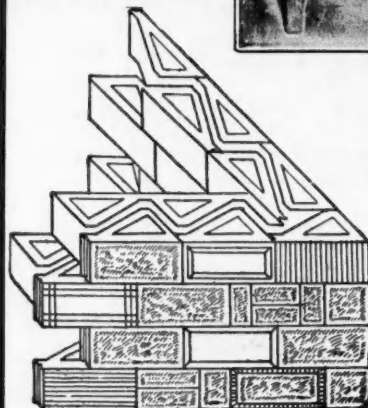
The Reed Machines Are in the Lead SPEED! SPEED! SPEED! LOOK AT THIS

E. W. Ellison, of Peoria, Ill., reports manufacturing, on our Reed Junior Face Down Machine, 210 Concrete Blocks per day, size 8" x 10" x 18" with extra Face, working three men who mixed their own material.

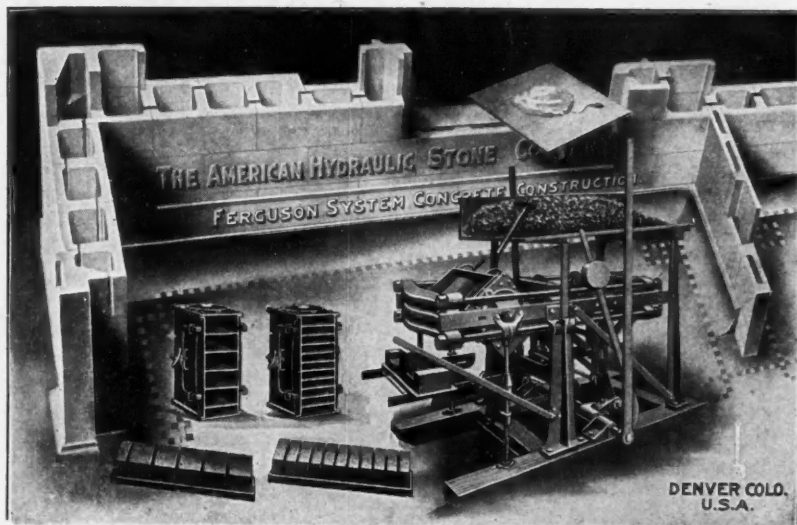
Why not get in the race and use a Machine that lays your competitors in the shade and permits you to secure the business? Perfect Blocks produced. Machines adjustable. Our right angle triangle Block producing triple hol-



low walls, excels all others and is guaranteed against frost and fire. You want a machine with speed, and the best wall that can be secured.



Wichita Coal & Material Co.
Wichita, Kansas,
U. S. A.



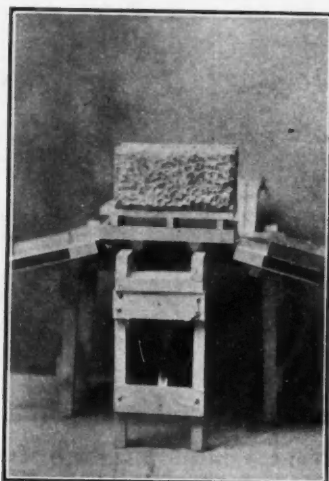
TWO-Piece Hollow Concrete Wall and Partition, containing Header Bond and Continuous Horizontal Air Space. Impervious to Heat, Cold, Moisture and Sound. Fire and Vermin-Proof. Walls of all widths; blocks of all shapes and sizes. New Hand Press enables three men (mixture supplied) to

make 1200 blocks, 10000 brick or 5000 paving blocks in 10 hours. THE WALLS OF A COTTAGE ARE THE WORK OF A SINGLE DAY. 80 page catalog, fully illustrated, mailed upon request.

The American Hydraulic Stone Co. Century Building
Denver, Colo.

LOOK! \$35⁰⁰ Complete

Nurock Cement Stone Machine



Guaranteed for
RAPIDITY
AND
EASE OF
OPERATION
EQUAL
TO ANY
MACHINE
ON THE
MARKET
AT
ANY PRICE

Everything Furnished With This Machine
Complete for Making Hollow Building Blocks....

— Makes —
ROCK FACE
PLAIN FACE
CORNER BLOCKS

SEND FOR CATALOG
Nurock Cement Machine Co.
DELEVAN, N. Y.

SUPERIOR
THE BEST CONCRETE BLOCK MACHINE



The **SUPERIOR** makes the stone with the face down or in the bottom of the flask, which permits of the use of fine rich material for the face and coarser, cheaper material for the main body of the block.

It is manufactured by
T. O. EICHELBERGER COMPANY
MIAMISBURG, OHIO
who will gladly tell you all about it. Write them.
ADAMS & CO., General Agents. Room 604 115 Dearborn St
CHICAGO, ILL.

Harmon S. Palmer's Patents Established by Nine Recent U. S. Court Decisions



Showing Machine Open With Two Blocks Made at Once Ready for Removal

Ours has been an expensive and trying struggle to maintain our rights

We Own the Basic Patents of the Hollow Concrete Block and Block Machines Numbering 159 Claims

Ours the Only Machines Free From Infringements

The patent laws have shown us that not only the maker, but the **seller** and **user** are liable for infringement. We sell the **Standard** and **New Multiple Automatic**. The automatic machines are either twenty-four or thirty-two inches in length, any width and nine inches high. Will make **two piece blocks, staggered air space, two or more at one time** if so ordered. We do not claim our machines are the cheaper only in the long run.

Output! Output! Output!

A Combination That is Revolutionary

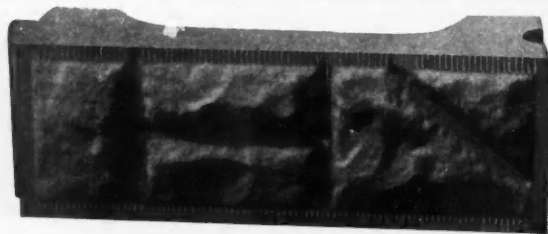
Multiple Makes any size or number of blocks within its capacity.

Automatic One operation opens the machine and removes all cores, dividing plates, etc. A reverse movement again closes the machine and locks it completely.

Greatest Speed - Least Labor - Write for Proof

Write for Catalogue "A"

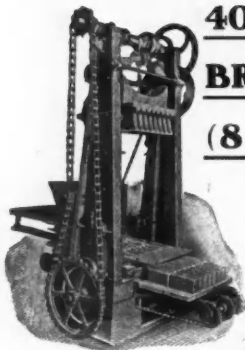
H. S. Palmer Building Block Company, Washington, D. C.



THE BEAVERS FAST BUILDING MACHINE

The outfit includes twenty-four different molds, each ranging in length from 10 to 24 inches and 8 inches wide. We have 30 other molds in stock. We have the facilities for casting any design you desire. Write us your wants. We will gladly give you any information about our machine or the concrete business in general. This machine has a capacity of 900 blocks per day.

OLSON & RICHARDSON
Stoughton, Wis., U. S. A.



40,000 SAND-CEMENT

BRICK or 5,000 BLOCK

(8 x 24) PER DAY

Only **TAMPING** principle power machine made.

We also make an up-to-date mixer.

Write for our Catalogue of power machines, also of our perfect bond-damp-proof block wall. (Hand moulds).

CONCRETE MACHINERY CO.

950 Majestic Building, DETROIT, MICH.

THE HOOSIER



Makes
all
Blocks
Face
Down

Adjustable to Different Widths and Lengths

INVESTIGATE

Using the same face plates and pallets for all sizes of blocks, makes any angle perfect from 15 to 90 degrees. Priced complete, including iron pallets that do not warp or wear out.

PRICE \$ This is attractive for the complete outfit

ADDRESS:

HOOSIER MFG. CO., Auburn, Ind., U.S.A.

For FIRE PROTECTION

— USE —

Refractory Concrete

So called because it is worked the same as cement or plaster, and will endure heat equal to fire clay products.

For flue linings, chimney blocks and tops, floor and partition blocks, conduits for electric wires, fire proof plaster for wood and metal lath, or as a scratch coat for stucco, this is the ideal material.

A finished product of this composition can always be had in less than twenty-four hours, this permits the formation of the product on the job, and to fit any requirement.

A ventilated flue or chimney from this composition is positively fire proof, and at the same time ventilates all rooms which it enters. Cheap to construct, and will meet the requirement of any size buildings.

Refractory Concrete will prove a profitable proposition for any concrete worker, contractor or builder.

For full information address

E. R. STOWELL : New Corydon, Ind.

NOTICE!

Hollow Concrete Block Machines leased or rented with the privilege of buying. No better Blocks, Lintels, Sills, etc., can be made by any method, wet or dry system. We also make built-up Steel Girders, Beams, Columns, etc., for Reinforced Concrete Construction Buildings. No better or cheaper floors can be made than by our Hollow Reinforced Concrete System.

Write us for full particulars.

The National Hollow Concrete Machine Co.

921 F Street, N. W.
Washington, D. C.

Buy A HAYDEN for Results

The Hayden Automatic and Adjustable Block Machine meets every situation arising in the block business. Its wide range of adjustments, ease of operation and adaptability make it pre-eminent in its field. A plant equipped with a Hayden is thoroughly and properly equipped. The Hayden is the Standard of Excellence.

Its great strength lessens the cost of maintenance by reducing repair bills to the minimum. The first cost of the Hayden is the only cost. Our catalog tells these and many more interesting things about the Hayden Standard of Excellence.

Send for book (M) to-day.



The HAYDEN AUTOMATIC BLOCK MACHINE CO., Columbus Ohio
Western Office: Room 415, Real Estate Building, 821 Chestnut St., St. Louis, Mo.
N. Y. and Foreign Office: Hayden Automatic & Equipment Co., 26 Courtland St., N. Y.

Bedford Stone

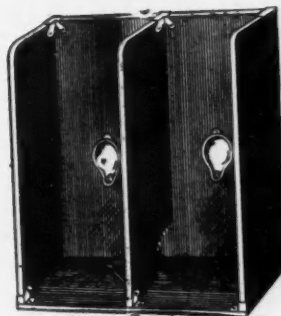
BUFF AND BLUE

Sawed, Planed, Turned
Cut Ready to Set

Estimates promptly made for stone delivered to any point. Plans sent for estimate, promptly returned.

Bedford Steam Stone Works
Bedford : : Indiana

ROOFING, GENUINE BANGOR SLATE
BLACKBOARDS & STRUCTURAL



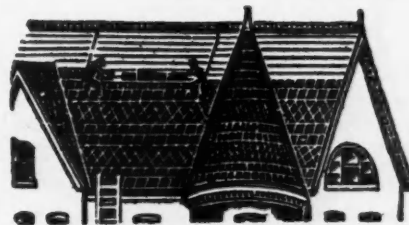
ALL ORDERS FILLED PROMPTLY.

Order direct from the miners and manufacturers

HEADQUARTERS FOR
SLATE BURIAL VAULTS,
CATACOMBS, ETC.

THE BANGOR STRUCTURAL SLATE CO.
LOCK BOX 48 BANGOR, PA.

SLATE SLATE
GENUINE BANGOR



Roofing
Blackboards
Structural

Write us before ordering elsewhere.

The Bangor Slate Co.
Miners and Mfgs. BANGOR, PA.

BUY A COMPLETE MACHINE
EXTRAS SPLIT THE PROFITS
THE NATIONAL CONCRETE
BUILDING-BLOCK MACHINE

comes to you complete for making all sizes, angles, etc., that are required in building—all made on one pallet and makes them with as little work and time as any machine sold.

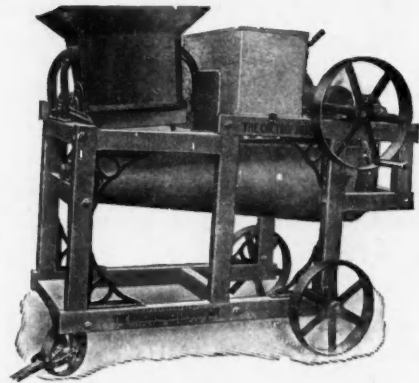
OUR CATALOG

gives some good, substantial reasons why you should buy a NATIONAL in preference to other machines and besides contains a fund of information on the business. Send for Catalog "E."

National Cement Machine Co.
BAY CITY, MICH.

New York State Agents: Woodruff Bros.,
 Old Forge, N. Y.

TURNING HIMSELF
 AVERAGES
FOUR CUBIC YARDS PER HOUR



Walkerton, Ind., Oct. 12, 1906.

The Knickerbocker Co.
 Jackson, Mich.

Gentlemen:—I paid your draft on the second day's run of the Mixer, and am more than pleased with it. I use hand power and am putting a concrete foundation under the elevator here. I am mixing on an average of four yards per hour and do most of the turning myself, and am satisfied I have the best Mixer on the market.

Yours truly,

WM. H. NIXON.

THE KNICKERBOCKER CO.,
JACKSON, MICHIGAN



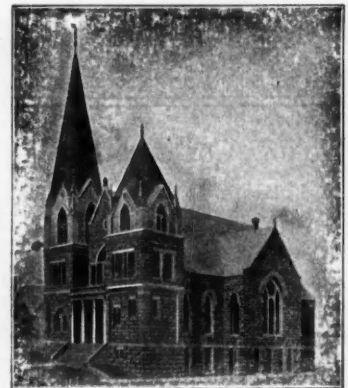
GET A MACHINE THAT WILL
DO THE BUSINESS

The cut of the church shows what can be done with the Stewart Machine, as this church was erected of blocks made on a Stewart. You can make blocks in any old box, but if you want to make good blocks,

GET A STEWART

Write for Catalogue to the
STEWART CEMENT BLOCK MACHINE CO.
 888 Lafayette Block, WATERLOO, IOWA

The OHIO CERAMIC ENGINEERING CO., Cleveland, Ohio
 Agents east of Wisconsin, Illinois and the Mississippi River



The DUNN HOLLOW BLOCK MACHINE



COMPLETE in every detail. Especially adapted to the use of the Block manufacturer. Making blocks in all widths, lengths and many designs, including Sills, Lintels, Pier Blocks etc. PRICE \$100

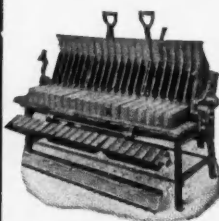
Masons & Builders
Block Machine

MAKES blocks from 2 to 12 inches in width, up to 20 inches long in different designs. No expensive iron pallets required. A practical, rapid and economical machine for the Mason & Builder. No machine at any price makes better blocks or makes them more rapidly or economically. PRICE \$40

WRITE FOR CATALOGS.
W. E. DUNN & CO., Sole manufacturers in the U. S. 339 GRAND AVE. CHICAGO

Favorite Bricks Are Standard

When contractors and architects the world over adopt the product of the



Favorite Brick Machines

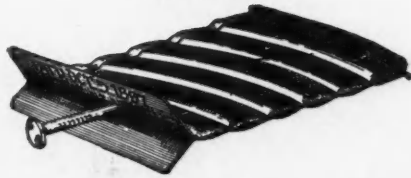
it means that the machines are leaders. Patents protect their efficient methods of tamping, and of raising and lowering the division blades. The bricks are clear cut and flawless.

CEMENT MACHINERY CO.,
 JACKSON, MICH.

A CATALOG WILL BE SENT TO ANY ADDRESS

Concrete Construction is Incomplete

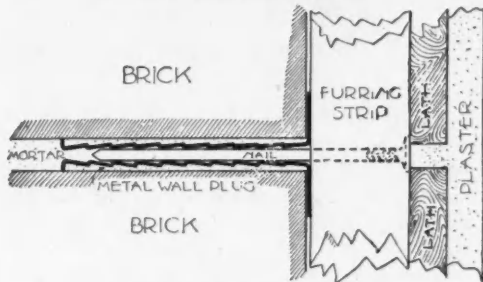
Without Our



RUTTY METAL WALL PLUGS

They are laid instantly, are indestructible, yet cost less than any other method. Previous difficulties of securing interior finish are entirely overcome by the use of the Ruddy Plug.

We make also Morse Steel Wall Ties and Prescott Steel Corner Beads



Furring Out on Brick or Concrete

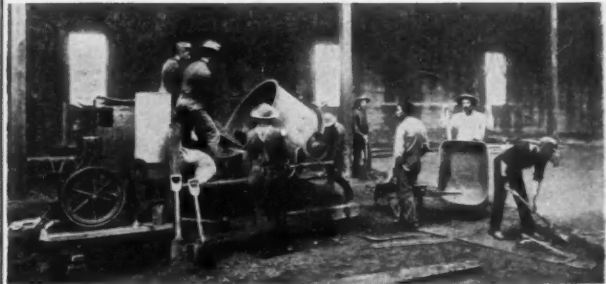
Send for Samples and Catalog

J. B. PRESCOTT & SON, Foundry Ave., Webster, Mass.

THE SNELL MIXERS

Easy to

LOAD
OPERATE
DISCHARGE
CLEAN



PUTTING CONCRETE FLOOR ON OUR OWN BUILDING

The Snell Mixers are Adapted

For all Classes of Concrete. For Wet or Dry Mixture.
For Heavy Concrete Construction.
For Sidewalk and Curb Work.
For Cement Blocks. For Cement Brick.

† It will mix the finest of sand and cement together, any moisture desired, from a mealy dry to a sloppy wet, without balling.

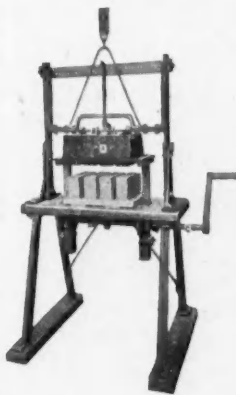
The R. Z. Snell Mfg. Company
SOUTH BEND INDIANA

The Emery Cement Brick Machine

THE "TAMPING" PROCESS

There is but one way to make a perfectly sound Cement Brick, and that way is by the tamping process. Tamping excludes the air, leaving the Brick Solid to the core. Tamping is our process. Results: Solid Brick, Sound Brick, Brick that are perfectly square and all of exactly the same size. No material handled the second time. Each mold holds just enough material to make a perfect brick, no more, no less. Every moment with our machine accomplishes something.

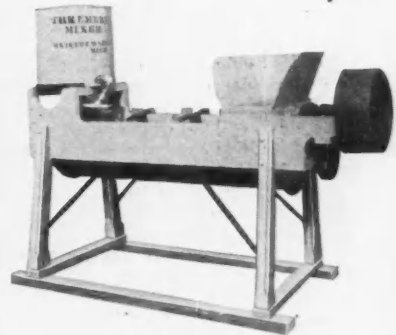
Three men 10 hours 6,280 perfect Brick. Ordinary daily output 5,000. We prove our claim. Positively no machine on earth is as well adapted for making cement Brick. Cement Brick are the most durable that can be made. You probably would like our catalogue.



Emery
Cement
Brick
Machine

Emery & McKerlie
301 E. Jane St., Bay City, Mich.

Emery
Mixer

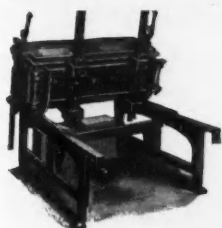


Antihydrine

DAMP PROOF AND STAIN PROOF COATING

Only and Original Material for Making Walls Damp Proof and Stain Proof.

Address ANTIHYDRINE CO., NEW HAVEN, CONN.



THE FRANCISCO BLOCK MACHINE IS A WONDER

Note What It Makes. Two 24 in. blocks at one operation or one 32 in. and one 16 in. or two 20 in. and one 8 in. or three 16 in., all made on one pallet and off beared at once. By placing in extension, makes caps, sills, lintels and waterable, any length up to 5 ft. 6 in. long. 8, 9, 10 and 12 in. blocks for width of wall. All made from the adjustments on the machine. No additional parts required, which means a big saving in the cost of your equipment, also makes circles, octagons, angles, chimney blocks, porch columns, veneered slabs, sidewalk block and sectional blocks, is a face down machine, using crushed stone, gravel or sand, wet process and wood pallets. MACHINE ON TEN DAYS' TRIAL. Send for catalogue G showing six different sizes of machine, prices ranging from \$25.00 up. Also fence post machine. Agents wanted. Don't delay.

FRANCISCO BLOCK MACHINE COMPANY

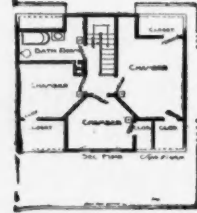
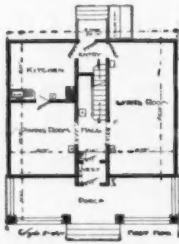
338 NORTH HIGH STREET

COLUMBUS, OHIO

WHEN WRITING ADVERTISERS PLEASE MENTION THE AMERICAN CARPENTER AND BUILDER



PLAN No. 1.



I WILL SEND
18 COMPLETE SETS
OF WORKING PLANS
TO ANY SUBSCRIBER

THESE plans consist of artistic, up-to-date designs for 18 Cottages, Homes and Stores, ranging in cost-to-build from \$1,800 to \$3,000. Each plan is totally different and includes not only all necessary exterior views, floor plans and working drawings (all on a $\frac{1}{4}$ inch scale) but also a large Photographic Illustration of each building. *Itemized bills of material showing actual cost of all work, including plumbing, heating, painting, hardware, mill work, and all other necessary building materials.*

The first plan (see illustration) is of an artistic cottage 30x26 ground measurement, and is designed with the popular Gable Dip Roof. It has been built a number of times for approximately \$2,200—just the kind and priced house that the average home builder wants.

The plans cost subscribers to Journal of Modern Construction absolutely nothing—and this is the only way they can be secured.

Journal of Modern Construction

my new technical monthly magazine for Contractors, Builders, Carpenters and dealers in building materials. The plans will not only enable any Carpenter or Builder to meet any legitimate local competition on "designs," but in 9 cases out of 10 he can also land the contract because he can estimate so accurately.

Besides one or two of these Plans, each issue also contains from 48 to 56 pages, 9x12, well printed and profusely illustrated, of which about 20 pages are devoted to *Special Articles*

by recognized authorities, on New Building Materials, New Methods of Construction and other Timely Subjects.

Each issue also contains Regular Departments covering general Building News, The Cement User, Heating, Plumbing, Price of Building Materials, the Painter and Finisher, Good Books on Construction, Correspondence, Questions and Answers and a department of Advertising Criticism.

During 1907, beginning with the January number, there will also ap-

pear a continued article on "Advertising Building Materials," specially contributed by Stanley L. Wilcox, the well known specialist in this field.

This feature will be of great interest and value to all Dealers and Manufacturers of building materials and supplies, as well as to all progressive Builders and Contractors.

Yearly subscriptions, \$2.00. Special terms to Local Agents, Clubs, etc. Single copies 20 cents each at all news stands.

SPECIAL OFFER

As a special inducement to the readers of the American Carpenter and Builder, send me \$2.00 for a year's subscription, beginning with the January issue, on the distinct understanding that your money will be instantly refunded if after two issues you are not satisfied or if you feel that my magazine is not exactly as represented. By this offer the publication must sell entirely upon its own merits, and as I am a responsible publisher, you take absolutely no risk whatsoever.

Or, if you prefer, write me and I will send you the complete Descriptive Prospectus for 1907 and Advance Illustrations of 10 of the 18 complete working plans which will be published during 1907.

I will also send you full details of our special proposition and terms to Local Subscription Agents, if you are interested. Write me immediately—now, before you turn this page. The sooner you subscribe the sooner I believe you start towards a bigger business and bigger profits.

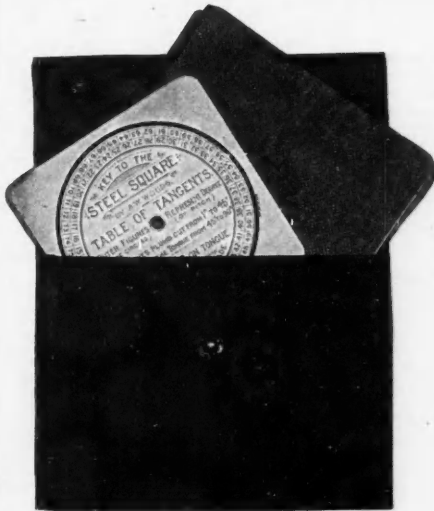
519 Lumber Exchange

Max L. Keith

Minneapolis, Minn.

NOTE:—As the publisher for many years of the well known Keith's Magazine on Home Building, Mr. Max L. Keith hardly needs any introduction to the readers of this publication, and his great success in publishing Keith's Magazine is the strongest possible guarantee that the JOURNAL OF MODERN CONSTRUCTION will be equally good and successful.

KEY TO THE STEEL SQUARE.



This is it.

The Key,
Book of
Instruction
and
Morocco
Case.

Full Size
4x5 inches.

It tells the whole story of how to use the common steel square for all kinds of framing.

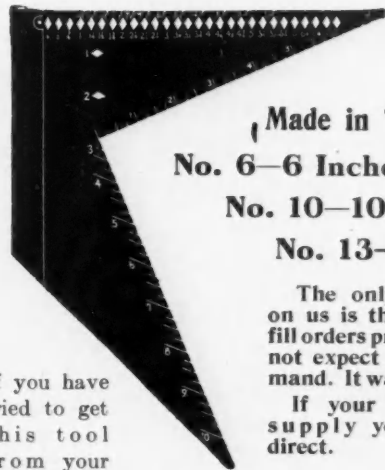
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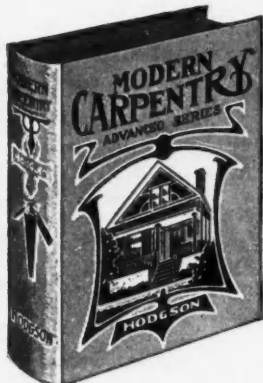
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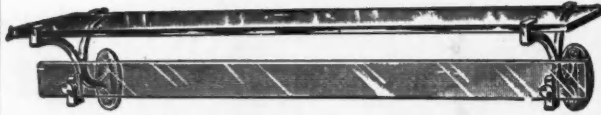
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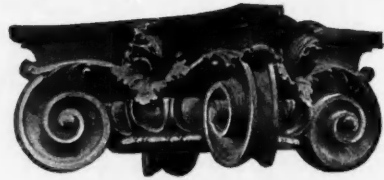
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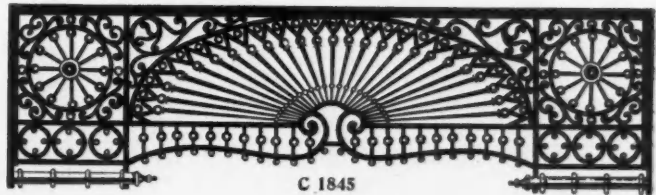
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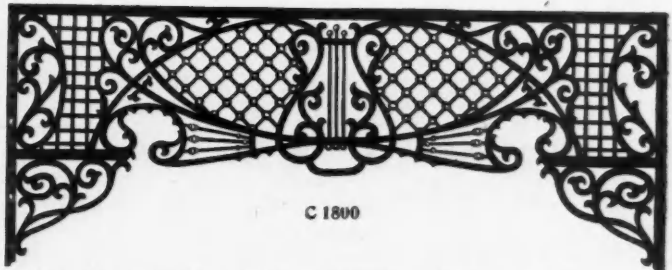
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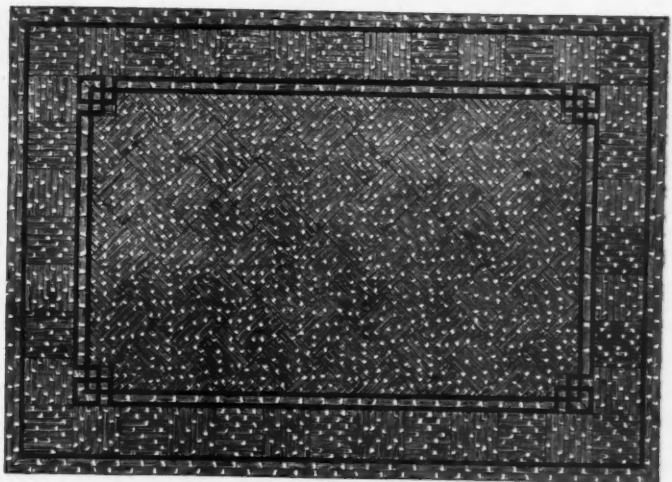


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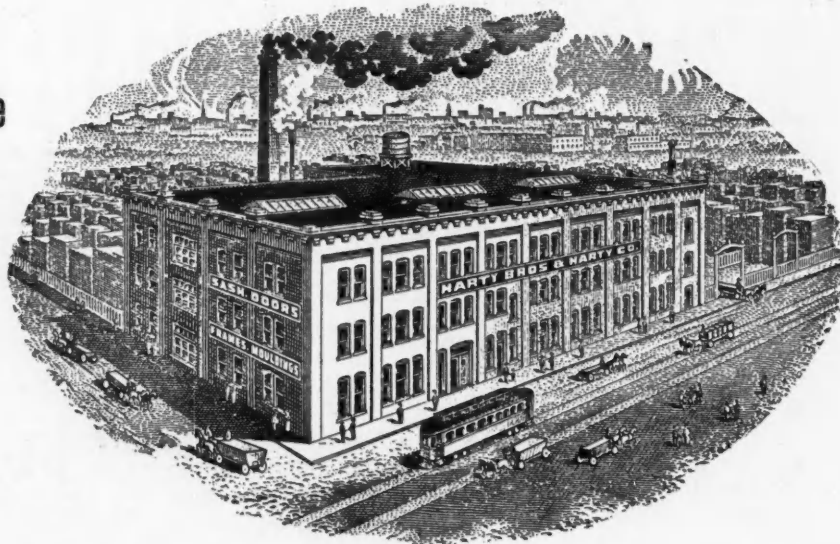
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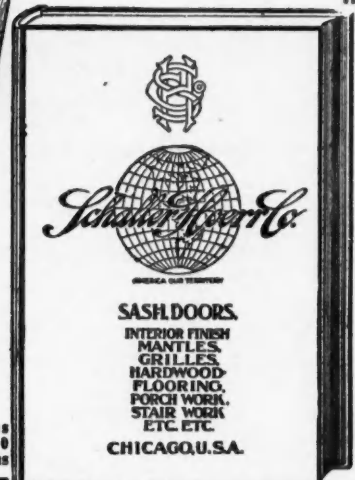
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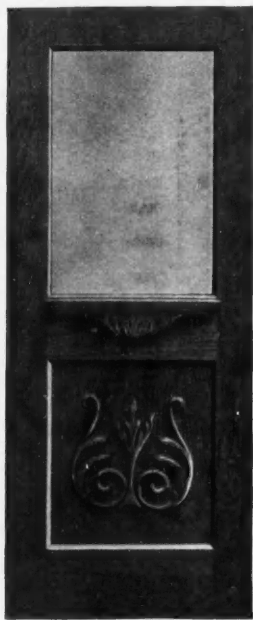
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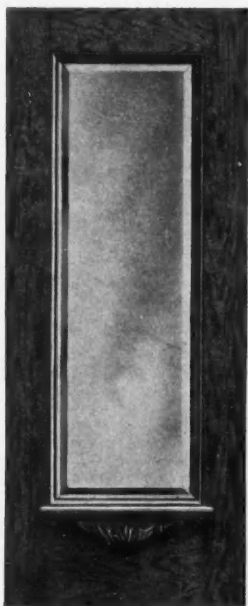
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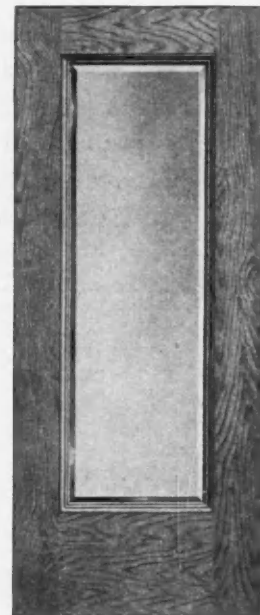
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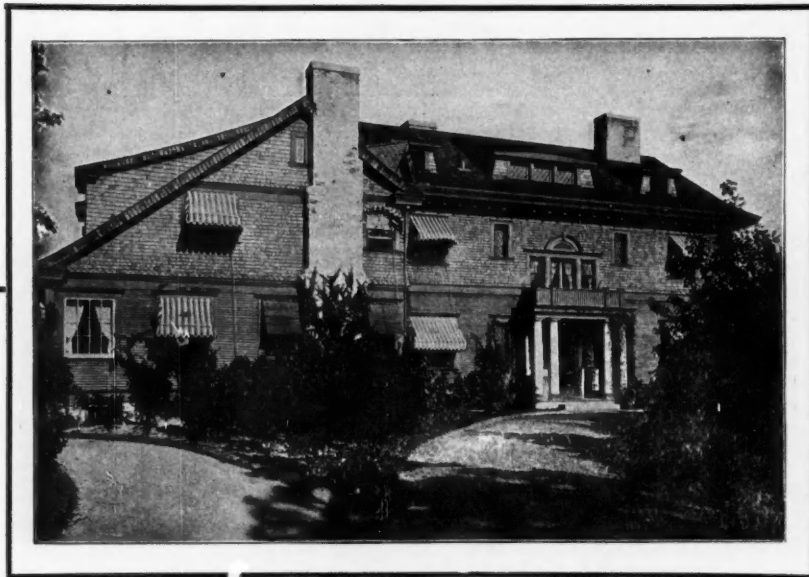
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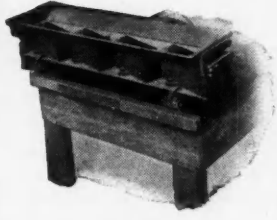
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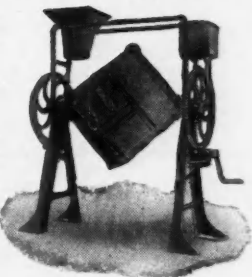
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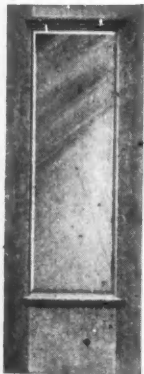
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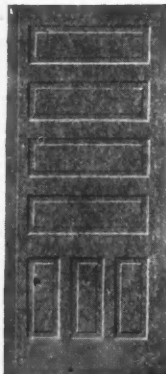
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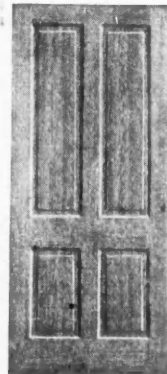
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Storm Door
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Storm Door
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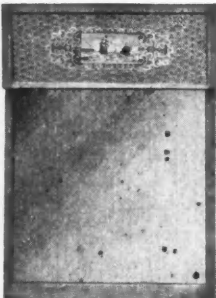
Grand FREE Millwork Catalog

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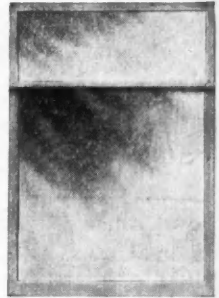
You see here a few illustrations and prices taken from our catalog. These are but Specimen Values. Ask yourself if it isn't worth while to see that catalog. It illustrates the entire products of the Biggest Mill in America—the only Manufacturers of Millwork who sell direct to any man who is repairing or building, to Carpenters and Contractors or Builders.

Our catalog is an authority on Millwork styles. It will show you what you ought to use—show you how it will look—show you prices 50 per cent below your local dealer's prices—delivered to you safe and promptly, in the best of condition to use. These are all statements that we know are true. We are shipping our Millwork to men who are repairing and building every day in every state in the Union.

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Stair Newels
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Spindle 1 1/2c



Baluster 4c



50c



Window 60c



33c

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