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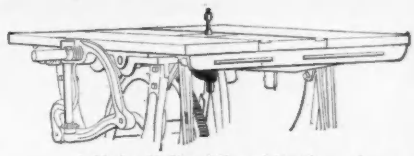

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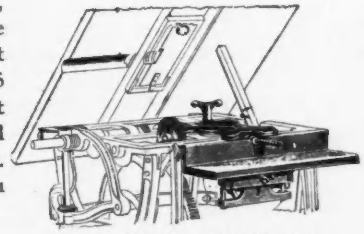

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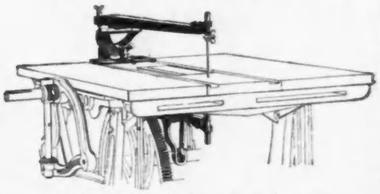

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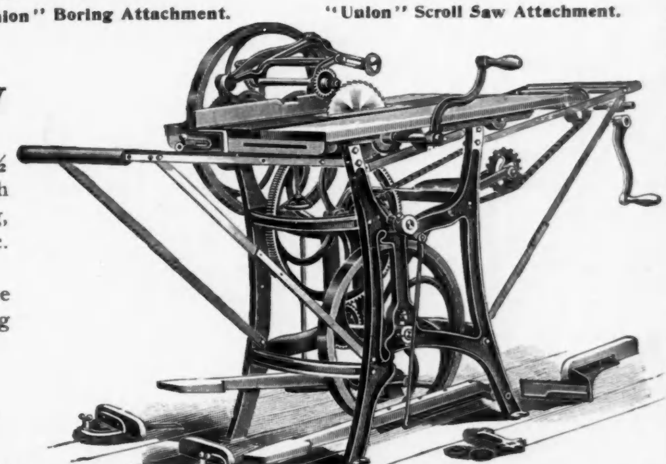

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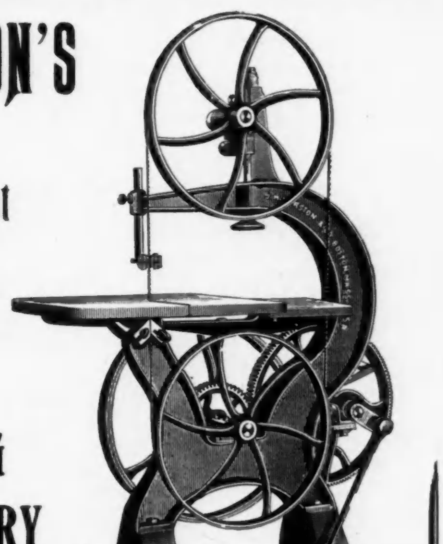

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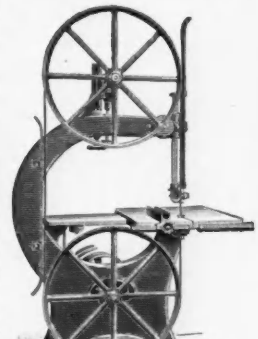

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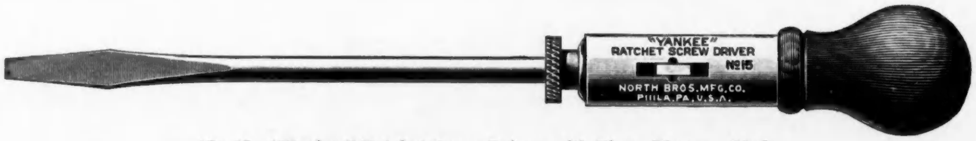

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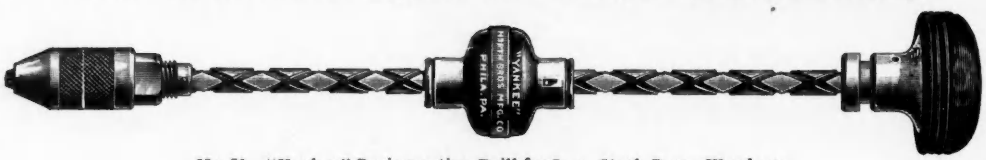

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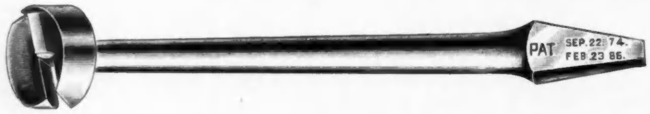

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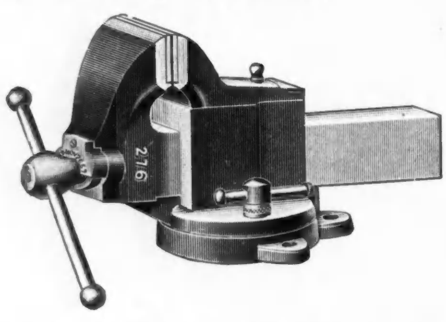

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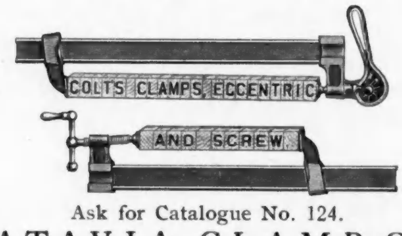

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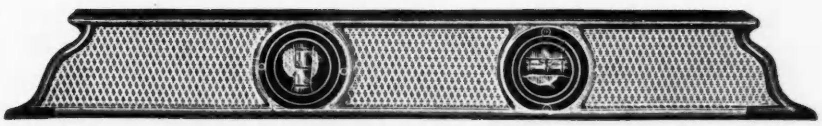

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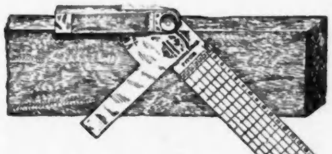

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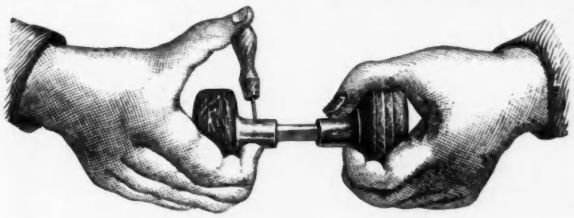

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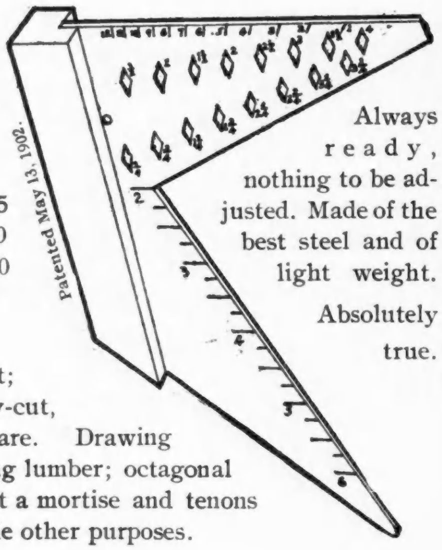

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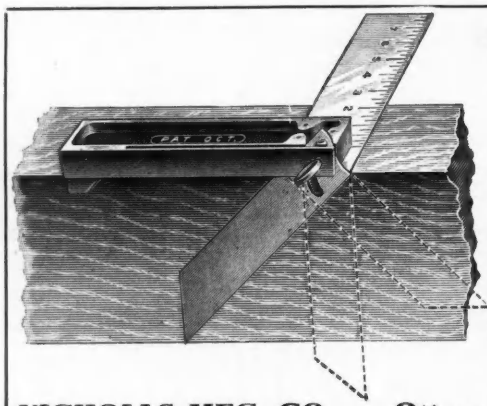

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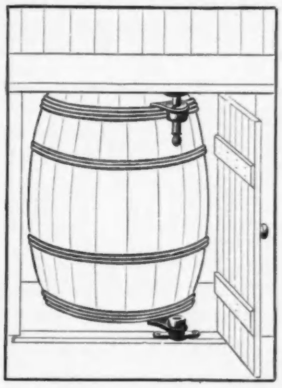

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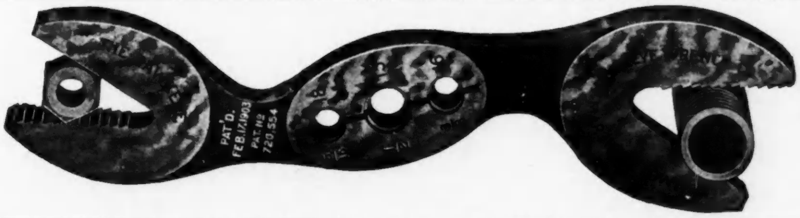

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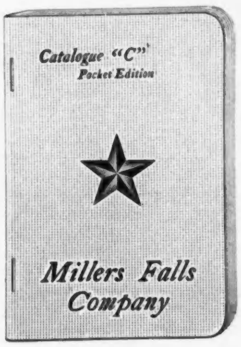

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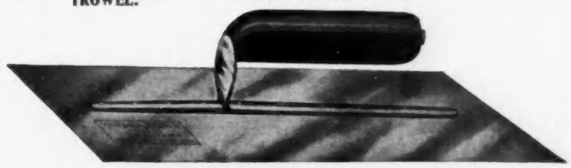

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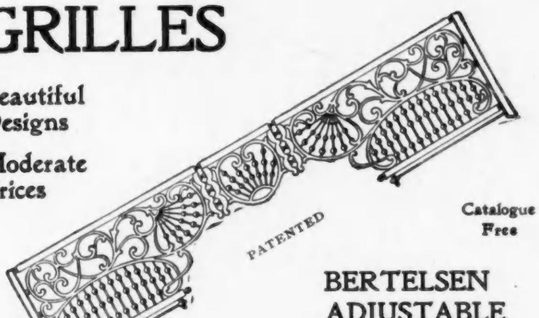

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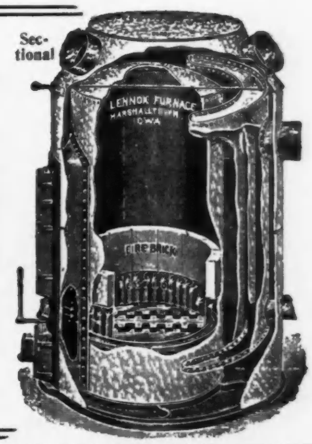

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AMERICAN CARPENTER AND BUILDER

The Largest, Best and Most Practical Trade Journal in the World for the Carpenter and Builder

Vol. I OCTOBER, 1905 No. 7

Making a Good Reputation

BY J. CROW TAYLOR

IT WAS a new house we were building, and there was enough originality about it to make it interesting, and it may be remarked in passing that this is a feature of house building this year, originality and individuality; a feature that is especially noticeable in the rural districts where increased prosperity and broader education has begotten a very marked desire for a much better class of homes, homes that are not only worth while, but have certain individual features about them. As a result of this tendency the rural builder has been giving the architect some work to do, where as in times gone by he did most of his own planning, getting what little assistance he needed free either from some carpenter, or local lumberman who hoped to sell him lumber for the work, and, there is enough of this yet for that matter, but it is remarkable what a change has come over the country in the past two years in the way of building better homes in the rural districts.

We had all been very much interested in the work of the new house from the very start, because it was one of the most elaborate that had been undertaken in the community, and, as stated, had enough individual features to make it interesting. Notwithstanding all this, J. B., who, with all the surplus energy of the average American youth, was generally the life of the bunch, had been very thoughtful and apparently absent-minded for a couple of days, until it finally attracted the attention of Uncle Rural and, during the noon hour, he took him to task and wanted to know if he was getting girls on the brain or malaria in his bones.

Uncle Rural

"That's where you guess wrong," said J. B., for I have simply been thinking and the more I think the less I know. I am getting big enough to begin to think about the time when I want to start out for myself, and I have become impressed with the importance of the idea of having something of a reputation to start out with, but I'll be blamed if I can figure out with all the advice I have had, just how a man should begin to acquire one of these reputations. One feature about the advice we get which impresses me very much, is that a lot of it is on the don't order. We are told that we should not do this and we should not do that, till I think it is now in order to be told some of the things we should do and not always be told what we should not do. It is too much like a game of blind man's buff, when you see the blind one is going into something that is likely to hurt him you say 'blue button,' but as long as he is fumbling around and not getting into danger you don't say anything."

"Young man," said Uncle Rural, "you are supposed to do some thinking for yourself; you get a certain amount of both example and teaching in working out what we might call your apprenticeship term with the crew here, and with this as a starter it is up to you to do a little thinking and planning as you go along to get your think box in trim for future needs."

"That's all right, and I have been doing some thinking the past few days, and the reward for this thinking so far has been two or three scoldings from you for not keeping my mind on my work as I usually do. I am not complaining about that, however, and I am willing to go on thinking and planning, but a little advice now and then, or a signboard to point the way would help matters considerably, and I would appreciate it very much if you will tell me a few things on the subject of how one should go about making a reputation."

"Every man," said Uncle Rural, "is every day making some part of some kind of a reputation. In other words, a reputation is a record of a man's life as he lives it. Sometimes the record is falsified, at other times it is surrounded with mystery to make it appear great when it really is not, but just the same, when you get down to the real truth of the matter the genuine article is purely a record of a man's accomplishments. If I understand what is working on you, however, your desire is to develop certain traits of individuality that will be worth something to you when you go out in the world to get building contracts for yourself. It is a commendable ambition, too, and the only trouble in the world with it is that sometimes it leads a man into doing foolish things. There are times, for example, when the desire to be original and attract attention leads a man into freakish ways and he makes something of a monkey out of himself. Then, getting down to everyday work, there are times when a desire to make a reputation for speed so possesses a man that he will slight his work, while on the other hand there are some whose ambitions lead them into ways of producing finer qualities of work until they become more of a burden than a help to those who employ them. There are other peculiar traits that help men to make fools of themselves, especially young men, and yet these very traits when properly handled, will do much toward assisting one in making a reputation. Practically every American mechanic is full of individuality to start with and all he needs to do is to properly develop this strongest individual trait. Take yourself for example, and your long suit is speed. You can turn out more work than any man on the job, and while I have made you do work over many times because you rush through with it too quick, I have at the same time realized that the day will come when your reputation for speed will be worth a lot to you. Moreover, in making you do things over again my idea has not been to put a damper on your enthusiasm for speed, but to force on you a realization of the fact that your work must be done right. You'll hold to the speed end all right, that is in your nature, and as soon as you get the quality part of it trained into your system properly you'll make a record. There are other men whose tendency go in different lines unconsciously acquiring reputations for doing smooth work, others for doing substantial work, and unfortunately some acquire reputations for doing sloppy work.

"Once upon a time there was an old wild west crack-shot bronco-buster sort of a fellow who gave me a pointer along this line that I have never forgotten. He stood on the sidewalk of the main square of the town with his big saddle mounted on a barrel and his gun in his hand, making a show of himself for advertising purposes, and when a crowd of us collected around him and wanted to know how he did it, how he managed to become such a crack shot with a gun he said that different men's nerves were constituted for different things. For example, while he could not do much at cutting up beef in a butcher shop, because his nerves were not built that way, yet because of the fact that his nerves were peculiarly constituted for using a gun he soon became expert in the art. Any man, he said, could from continuous practice, become a fair shot with a gun, but unless his nerves were constituted peculiarly for that work he could not become what is termed an expert fancy shooter. The point of it all was that frequently a man's nerves are peculiarly fitted for some one line of work, and when he strikes that one line of work he very soon becomes an expert. Some men fail to make their mark in the world by not discovering what they are best fitted for, and again, there are some men who have no very strong individual traits, and these in time become what we call a jacks-of-all-trades and masters of none. When we bring this lesson home and apply it to carpenter work and building we find that some men are cut out for speed, some for strength, some for polish, and many others, while they have certain individual traits, do not have them to such a marked degree as to attract attention, and consequently need not hope to acquire fame along either of these lines. All this is nothing to grieve over, however, for after all it is the great mass of average men and not the few geniuses that really contribute most to the world's greatness, and there is always room for a man with a fair amount of brains and enterprise to make his mark in the world."

Then, pulling out a roll of plans, Uncle Rural spread them out and continued: "One of the best roads to success is by devising new things, putting new ideas in circulation and getting outside of old ruts generally. This is a bit of advice which, as I told you before, must be handled carefully, because a man don't want to make a freak out of himself, but he should strive for as much originality as is consistent with good logic. Here is a case in point where a man had a good idea but he didn't carry it out well. I have not shown you boys these wall plans before, because there was a rumpus over them between the builder and architect, but if you will look at these plans closely you will see that the original design was to have the walls of this house built hollow instead of solid brick. The plans call for two rows of brick laying lengthwise of the wall with an air space of three inches between them and the two tied together with metal ties. This is the point that brought on the row, for the man who was having the building done had never seen anything of that kind before, and what he wanted was a house and not an experiment. It was all right to make certain original features about the plans and this pleased him, but when it came to monkeying with the wall he balked like a backwoods mule at the sight of a steam thresher and wouldn't stand for it. It is not my purpose to argue here whether this wall is all right or whether it is not, but it shows two things. It shows that the architect has ideas, and it also shows that good ideas may be badly used. In other words, this man's ideas may be excellent, and if they are he has a chance to make a reputation, but in this instance he went at it wrong. If he wanted to put up a wall like this he should first have gotten the consent of the man for whom it is to be done, by making explanations and putting up whatever arguments he deemed necessary, and should never have undertaken to force it on to a man who had no knowledge or warning of what was coming. It takes a test and more or less experimenting to prove an idea of any value, and when this experimenting is done at somebody else's expense it is all right if it proves a success, and practically insures a reputation for the builder, but when he fails there is trouble in the air and the builder is worse off than when he started, especially if he is a new man. An old man, that is, a man with a firmly established reputation can monkey with unsuccessful experiments without serious damage, but the young man starting out at building a reputation must handle these things with extra caution, because failure means much more to him in the way of damage than it does to an older head in the business."

"The plans call for two rows of brick"

"That," said J. B., "is one of the very points I have been trying to get at. It is when a man starts out to do things for himself that he needs a reputation more than at any other time in the world and yet it is harder for him to get, he has to be more careful of experiments and things of that kind than an older head in the business, while after he has got to be an old head in the business and don't have any particular need of a reputation he can safely project with all kinds of new ideas without fear of doing serious damage. I wish some of you old heads in the business would invent a process for turning these conditions around so that a man could get his reputation earlier in the game when he needs it most, and then do his monkeying with it after he reaches the stage where he can get along very well whether he has got it or not. Just let us look ahead a little and assume that we have come to the day when I start out into the world to tackle a job by myself. The first thing the first man will ask me that I apply to will be what work I have done, where I have done it, whether any jobs of my own, and when I tell him that I have never tackled anything on my own responsibility he will begin to fight shy of me right away, and he will be something like the man was about the hollow brick walls, it will be a full-fledged workman he will want and not an experiment."

"It is perfectly natural for you to look at it that way now, J. B., but when you get older you will look at it from a different viewpoint. You must remember that you young fellows while you are the coming greatness of the world, are not the whole thing yet, and the older heads in the business are entitled to something for their past efforts, something more, too, than we would get if we had things fixed up according

(*Continued on page 467*)

Mr. McSmith finds out who is responsible for the delays on his house.

AMERICAN CARPENTER AND BUILDER

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UNLESS you are looking for trouble don't make promises you can't keep, merely for the sake of securing a contract for which there is sharp competition, for promises are things that should be judiciously made and religiously kept.

THERE are two extremes in the ornamental feature of residence construction, the one which entirely ignores the ornamental feature, and the other which overdoes it. And, the man that overdoes this feature is in many respects worse than the man who practically ignores it, because he not only mars the beauty of the structure but wastes much energy and good material.

Fireproof Buildings

WHILE there is no building at the present which is entirely fireproof, it is pleasing to note that the tendency is to use as little inflammable material as possible. Such material must, to a greater or less extent, be used in the construction of all buildings, as no good substitute has as yet been found, but the firetraps of the past are no longer in evidence. The more general use of fireproof materials extends not only in the construction of our public buildings, but also to private houses, as the people are realizing that, although the first cost is larger, the greater security, durability and smaller rate of insurance more than counterbalance it. This is shown in the recent rapid growth of the concrete block industry. While a concrete block building is not absolutely fireproof, it certainly is as near to it as we shall get for some time. This greater regard for the value of life and property is certainly a stride forward in civilization.

A Concrete Block House

OWING to the increasing popularity of concrete block houses, we are this month publishing the complete plans and detail work of such a residence. When the advantages of these houses are considered it is not at all surprising that the demand for them is continually increasing. Their durability is without doubt far greater than that of any frame house, with the important additional advantage of their fire resisting qualities. While the first cost is a trifle greater, it is the only cost the builder will have, which is certainly more than can be said with regard to any other building material. As concrete will undoubtedly be the great building material of the future, it is our desire to acquaint our readers, as far as possible as to the best and latest methods of using it. We have among our staff of editors one of the most competent engineers on concrete construction in the country, and we will give our readers the benefit of his ideas and experiments. We are devoting extra space to this, not by shortening any of our other articles, but by increasing the size of our magazine.

Plans for a Peace Palace

ON SEPTEMBER 1st a prospectus was issued by the Carnegie foundation offering $15,000 in prizes and the honor of being one of the five architects who plan the peace palace for the use of the permanent court of arbitration at the Hague. This invitation was made to secure the ideas of many minds as to the most fitting edifice in which to house the tribunal which it is hoped will make war unnecessary. The five most successful architects will receive prizes, the largest of which is for $5,000.

In addition to their open offer to the world, the directors of the Carnegie foundation, which will become the owners of the five prize plans, also have issued a special invitation to certain architects from each of the principal countries of the world, requesting them to join the competition. The palace contemplated in the announcement is to be divided into two parts, one a court house for the permanent court of arbitration, and the other a library to contain about 200,000 volumes. The total cost is to be about $640,000. Regulations for the competition allow seven months for full completion of architectural drawings.

Design of a Truss

HEIGHT OF SAME IN PROPORTION TO THE SPAN—INCLINATION AND POSITION OF BRACES—SIZE OF RODS TO BE USED

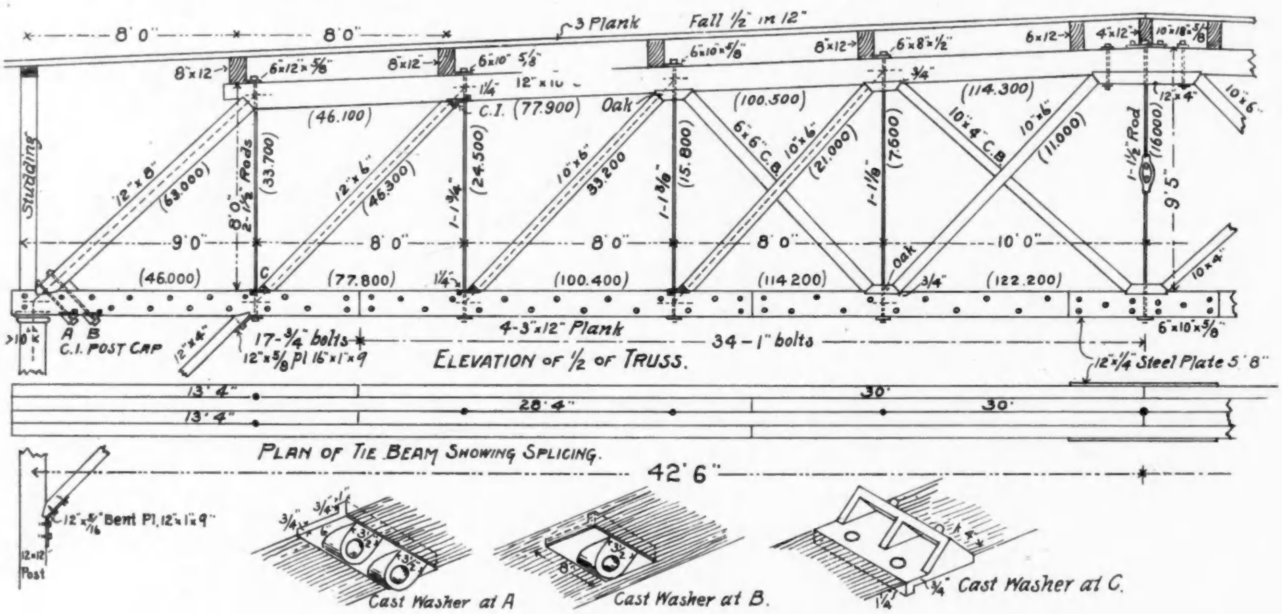
By Frank E. Kidder

THE full explanation of how the various results in the accompanying article are obtained, would require too much space to be here given, but we have made it as clear as possible:

To the Editor: Groveton, N. H.

I have to put up a building for a paper mill; the building is eighty-four feet wide and two hundred and forty feet long. The trusses will carry three-inch white pine plank, six-ply paper with tar gravel; an allowance is to be made for snow. There will also be a center load of fifteen thousand pounds which will come on these trusses. Please give a sketch in your paper of what you would recommend for the place, giving diameter of timbers and size of rods. Also give a rule for figuring this kind of truss, giving the height and angle of struts and the spacing and length of the same.

C. E. Sevage.



The accompanying illustration shows the proper design of a truss to meet the conditions stated by our correspondent. The stress in each member in pounds is given by the number in parenthesis.

These stresses are those that would be produced by the weight of the truss and roof, a snow load of 36 pounds per square foot, and a load of 15,000 pounds suspended from the centre of the truss all applied at the same time. The weight of the truss, purlins, planking and gravel roofing was estimated at 24 pounds per square foot.

An allowance for snow of 36 pounds per square foot may seem large, but in some portions of New Hampshire the snowfall is very heavy.

The stresses were computed by the graphic method which is fully explained in the Architects and Builders' Pocket Book, and would require too much space to explain in these pages.

In regard to the height of trusses of this kind, the height at the center measured between centre lines of the chords should not be less than one-tenth of the span, and it is not economical to make the height greater than one-sixth of the span. In this case the height at the center is about one-ninth of the span. The braces should have an inclination of about 45 degrees, and where purlins are used the braces and purlins should be arranged so that the purlin will come over the top of the brace, or as near to it as practicable.

The purlins should be notched on to the truss one-half an inch, so as to hold the truss laterally, and the ends of the purlins should be tied together either by pieces of boards or iron straps.

In fitting the braces they should be located so that their centre lines will intersect the centre lines of the chords at the same point as the centre line through the rods. This is shown in the engraving by dotted lines. For the braces in the centre panels it was not practicable to do this, as it is desirable to bring the top of the brace near the six by ten purlin, so as to avoid a cross strain in the top chord.

The braces marked C B (counter braces) are inserted to provide for any unequal loading of the truss, as might be caused by more snow on one side of the truss than on the other. Under a uniform load, there will be no stress whatever in these braces.

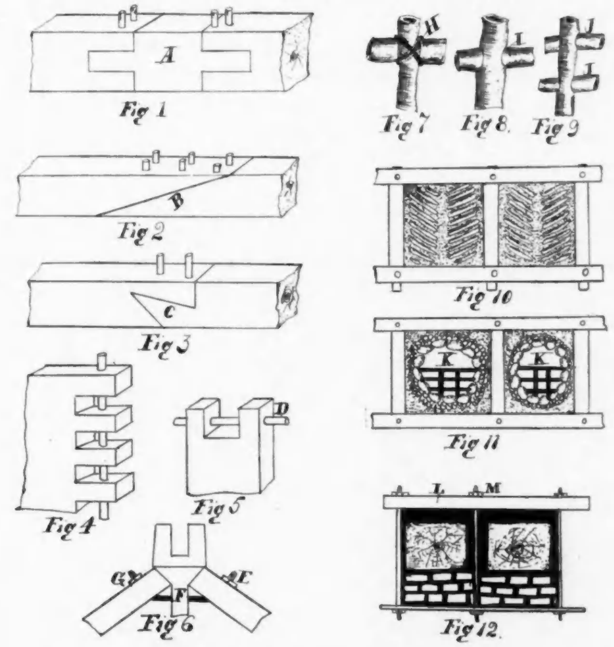
They should not be fitted in place until the truss is in position and had an opportunity to settle to its bearings.

The sizes given for the rods, are for plain rods, not upset. Upset rods are about as expensive for this class of work as plain rods, and upset rods require larger holes in the chords. The factor of safety in the rods under full load is about three and one-half. In the timber from four to eight. The method shown for building up the tie-beam seems to the author the most economical and as satisfactory as any that can be employed. In this case four three-inch planks are used, lapping each other fifteen feet. Two planks have sufficient strength to carry the entire stress, and the stress must be transferred to the other two planks by the bolts. It will require the full number of bolts shown to transfer the stress. The end of the tie beam is shown projecting four inches outside the post. If the outside wall is frame, a panel can be placed over end of truss. All truss timber should be of Georgia pine.

Building Methods in the Philippine Islands

ODD METHODS FOR LENGTHENING TIMBERS—WOODEN PINS USED OWING TO SCARCITY OF BOLTS AND NAILS—ARTISTIC DESIGNS MADE FROM STONE, MORTAR AND WOOD

SINCE my return to America from the Philippine Islands I have been asked many questions concerning the building methods employed by the native carpenters and builders of the country. I will endeavor to explain and illustrate with diagrams some of the odd systems employed by the Filipino con-



structors. The native carpenter is famously fond of making strange types of joints in timbers. What struck me as the oddest methods employed prevails in the joints for lengthening timbers by connecting pieces end to end, a model of which is shown in Fig. 1. The framing and bearing joints used in trusses, flooring, etc., are planned in the true peculiar native style. Joints for ties and braces are all odd, but as a rule, strong. Very powerful hardwood pins are freely employed in making the union. The native carpenters have access to vast quantities of excellent grades of hard woods, and these woods are worked up into the great beams employed in the native building. The sides are roughly hewn out by hand tools. In fact, all of the timber work is by the use of manual devices. There are a very few circular saws, planers, and kindred machines in the islands. One may see the natives tediously hewing out the great logs to the needed dimensions. In Fig. 1 we illustrate the mode of intersecting the piece A for forming the union of the two ends of heavy timbers. Usually quite a neat fit is made, by careful workmanship, and then two holes are bored on either end for the insertion of the hardwood pins. These pins are driven home tight and sawed off even with the timber.

Another way of effecting a joint of timber is presented in Fig. 2. The two ends of the beams are tapered down as shown, and united as at B. Then four to six wood pins are driven in. It is calculated that there shall be a support in the form of a post directly beneath the joint, thus sustaining the same. Sometimes the unions are made by bolting pieces on each side, now that it is possible for the native carpenters to secure American bolts. The tranverse and longitudinal strains are resisted by use of metal straps in some cases. I found the common scarf joint employed now and then. Key and wedge joints are not at all uncommon.

In Fig. 3 is a sketching of a popular joint used frequently. The joint can be drawn together tightly by the fact of the wedge-shape as shown at C. There are pins driven through to complete the union as shown. Then the natives have forms of longitudinal joints in timbers which are intended to be used for vertical pressure only. I have seen some odd styles of joints made for this line of work. Some of the joints require considerable chipping and guaging in order to get them into suitable order for the making of the joint. There is always considerable elasticity to the native system of jointing, and this is desired, from the fact that earthquakes often set the buildings to rocking, and the resulting flexibility is essential. The way in which the native woodworker toils, tinkers, shaves and cuts would surprise the American carpenter.

The Filipino will squat himself upon the ground, near his work, and by using his toes almost as often as his fingers, he is able to work out some pieces of the pattern exhibited in Fig. 4. Here we have a model of the noted dove-tail work of the islanders. This matter of dovetailing practically everything is due to the lack of nails, screws, bolts, and other fastenings so common and cheap in the American hardware store. Some of the Filipino carpenters do not see a nail or a screw year in and year out. During the past few years American hardwaremen have established hardware stores in the islands and it is now possible for some of the native carpenters to obtain builder's hardware.

Still one finds that the native carpenter continues along his earlier methods of work, and puts together important timbers and parts of buildings by the intersecting and dovetailing plan. In dovetailing work, the native often puts a wood shaft through the joint as shown in Fig. 4. Sometimes in jointing ends that bear one upon the other, the system of joint shown in Fig. 5, is used, with the pin D.

Fig. 6 is a drawing to show the native system of constructing a king post. Formerly the adjustment was made entirely with wood, and the joints effected with wood pins. Since it has been possible to obtain American bolts, the custom now prevails of using the bolt as shown.

The bolt I saw in use for this purpose was put through the sides and center F, and the ends for the nuts were bent up to conform to the shape. The plain bamboo is often utilized by the native carpenter.

Fig. 7 shows the common jointing with cords, and Fig. 8 the system of making a joint by putting the one pole through the other as at I. At J, Fig. 9, is the system of two horizontal pieces in one upright.

What attracted our attention the most was the combinations of woodwork and masonry used throughout the islands, particularly in the larger buildings. The natives have a scheme of forming some artistic designs with stone, mortar and wood. Often the cement employed is more like mud than a cementing agent. However, in Fig. 10 is a drawing of one of the ways of combining stonework and wood in walls for buildings. The base for the herring-bone arrangement of stones is made with cement, using the sides of the wood as moulds. The long, narrow stones are placed into the bed of cement and are permitted to set. After a number of blocks are made, they are nailed and cemented, one above the other, forming the wall. Sometimes openings are made in this description of wall-work by adopting the course presented in Fig. 11. Instead of making the squares solid with stone and cement, round stones are laid up in proper order with mortar, leaving the space open in the center as illustrated. This opening is protected with the metal bars that extend from side to side as marked K.

One of the singular systems of work of both the Filipino and Chinese carpenters of the islands is presented in Fig. 12, in which a bountiful supply of mortar is used for supporting the ends of two beams. First a sort of a metal cage is made of strap iron and with connection by bolts, as at M, and at the sides. The bolts pass through the section of hard wood L. There is a series of courses of brick put in the base of the cage, and then the beam ends are plastered in with the mortar. As soon as the latter is thoroughly dried out, and hardened, quite a substantial support is obtained for the ends. I noticed other features of this nature while in the country. I noted with pleasure, however, that many of the queer native systems of carpentering were giving way to the improved methods introduced by the Americans. There are American carpenters and American tools as well as some American woodworking machinery in the country now, and these factors tend to advance the systems of carpentry so long in use by the natives. With a day's wages at 40 cents per day for experienced native carpenters, and the American carpenter at $3 to $5 per day in Manila, the chances are that the Filipino and the Chinese woodworker will predominate for years to come.

Building in the City of Mexico

Reports from the City of Mexico indicate that building is in progress upon an extensive scale and includes not only the erection of new business blocks, but handsome residences of an expensive nature. A few years ago it was the general practice to build business houses out of stone and adobe, but under the changed conditions and the introduction of new construction and architectural methods, up to date business blocks are being put up which involve an expenditure of hundreds of thousands of dollars. It is stated that there are now under way in the city buildings which when completed will cost as much as $3,000,000. The transformation in the character of the buildings has afforded an opportunity for American contractors, who are doing a goodly share of the modern class of work that is now in progress, experience having shown that aside from the superior workmanship the Americans can execute their contracts with much greater dispatch than is the case with the native builders.

There are certain builders' supplies not manufactured in Mexico which are coming into good demand in that country under the new conditions that have developed within the past few years. It is not so many years ago that practically no nails were used in Mexico, the timbers being joined together by the old time scheme of wooden pegs. Enterprising American manufacturers, however, brought about the gradual introduction of nails, and as soon as it was seen that there was a demand for them nail factories were established. The changed conditions have also brought about a big demand for lumber, and as a result many lumber mills are now in operation, as well as sash, door and blind factories.

Shingles are Scarce

La Montt—"Children are so much worse than they used to be. What do you attribute it to?"

La Moyne—"Improved ideas in building."

La Montt—"What has that to do with it?"

La Moyne—"Much. Shingles are scarce, and you can't spank a boy with a tin roof."

The best and rarest moral bracer in the world is the knowledge that some one has faith in you.

STEEL SQUARE

ALFRED W. WOODS

The Steel Square and Its Possibilities

SHOWING HOW TO APPLY THE STEEL SQUARE IN CONSTRUCTING VARIOUS DESIGNS IN MECHANICAL WORK—TAKING UP THE SUBJECT OF FRAMING

IN OUR last, we closed with an illustration of the polygonal miters, showing how they may be readily found together with the proportional lengths of their sides to enable the workman to frame them to any desired diameter.

In this article, we will carry the work a little further, using the same figures for the respective polygon in constructing various designs in mechanical work.

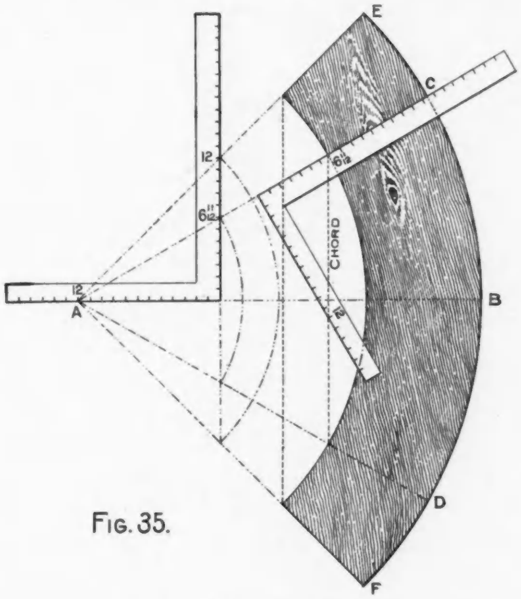


FIG. 35.

In Fig. 35, is shown how any part of a circular frame may be laid out with the aid of the steel square. If we wish to lay out one-sixth of the frame, it may be done as follows:

Lay off the desired radius as from A to B then apply the square with the 12-inch mark at A as shown and draw a line from 12 on the tongue, passing at 6 11-12 inches on the blade and drop to an equal amount on a plumb line below the heel, then that part of the frame as from C to D will represent one of the desired pieces, and by applying the square to the chord line, as shown, will give the required miter. Proceed in like manner for four pieces, using 12 on the blade and the space from E to F will be one of the desired pieces. The space from C to B represents one-twelfth and from E to B, one-eighth of the complete circle, but since the chords are changed, it requires the figures on the square that gives the miters for the respective polygons as shown in Fig. 28, of the August number.

In Fig. 36 is shown how to frame to any degree. For an example, say we wish to frame two pieces at an angle of 152 degrees. It is evident that the miter should stand at half way between the angle, or at 76 degrees from either side, and 76 degrees from 90 degrees leaves 14 degrees. Now by referring back to Fig. 4, of the May number, we find the tangent for 14 degrees to be 2.99 or practically, 3 inches. Therefore, 12 on the tongue and 3 inches on the blade will give the miter, the latter giving the cut. The square as placed would give the cuts for a brace set to either 14 or 76 degrees.

We will now call the attention of the reader to a few ornamental figures in miter work that may be accomplished by the aid of the compass and steel square. In this there is a wide field for culture with practically no end. We have prepared for this work a few designs along this line and the mechanically inclined will find in these excellent practice and if he has an eye for designing, these also will furnish a nucleus upon which to plan other designs that will not only

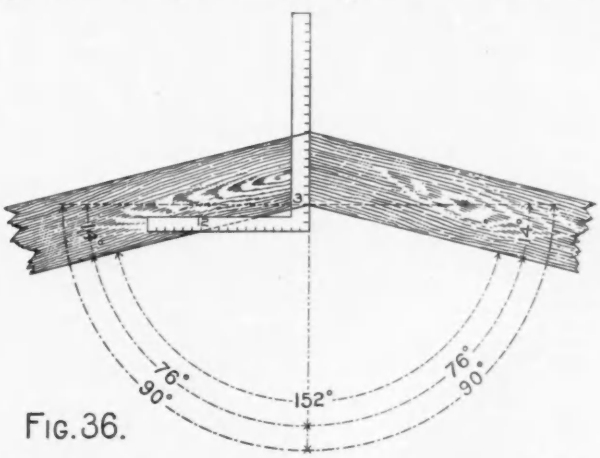


FIG. 36.

give practice and perfection in handling the steel square, but will help to broaden his knowledge in its use and place him on a higher plane in his chosen profession.

The equilateral triangle is more susceptible of changes in ornamental design than any of the other polygons for the reason that the length of its sides are the radius of the circumscribed diameter of

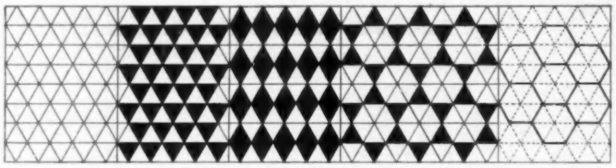


FIG. 37.

the hexagon. Its area being one-sixth that of the latter and the same figures used on the steel square for the miter of one also gives it for the other as we have previously shown.

The triangle can be arranged in many designs, or patterns and leave no intervening spaces as will be seen by referring to Fig. 37, which adapts itself to ornamental tile or inlaid work. Even the little honey bee understands the geometric principles in space saving and constructs her store house accordingly in hexagonal cells, which are in the form of six equilateral triangles and so arranged that they interlock each oth- as shown in part of the illustration. The equilateral triangle may indeed be classed as the monarch of all the polygons, for within its lines as a basis, any of the other polygons may be drawn to any desired size as we will show later on under another head.

In Fig. 38, is shown a hexagonal figure in general design and all of the miters can be had on 12 and 6 11-12 as indicated on the square. The blade giving the hexagonal and the tongue the triangular cuts. This proportion, of course, the reader will understand, taken at any other part on the blade and tongue would

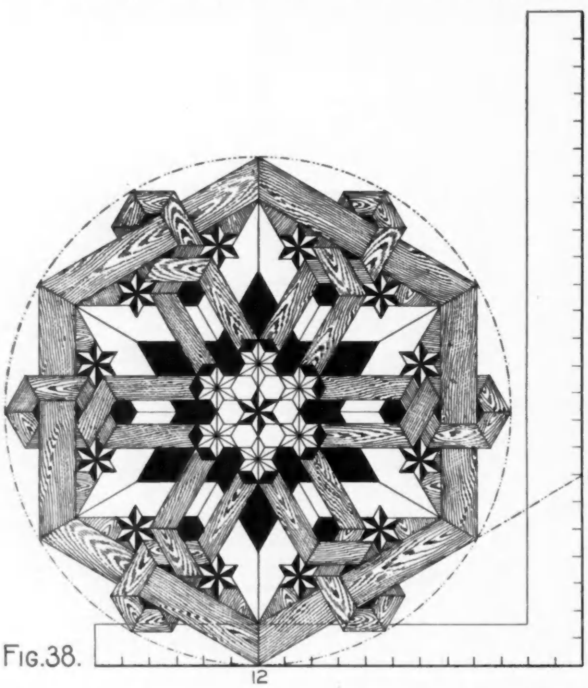


FIG. 38.

give the same result as every fractional part of the divisions on the blade represents a scale, but we will not take the time now to explain but will do so later on when we get into roof work. The same cuts exist again at 12 on the tongue and 20 19-24 on the blade but the cuts on the square are just the reverse.

In Fig. 39 is shown another design and is worked on the same degree lines as in the previous figure; what we said of that figure is just as applicable to this figure. Either of these designs furnish good examples for inlaid work and with care in selection of color of wood would make a very attractive piece of work.

In our next article, we will show other designs

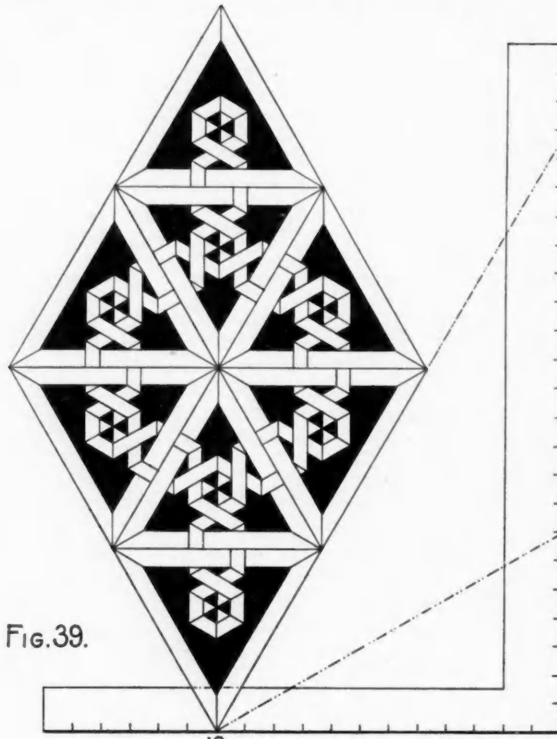


FIG. 39.

worked by the figures that form other polygonal miters.

Some of these designs may not appeal to the average carpenter as being of much value because he is not called upon to execute this class of work, as it is usually done in factories with machinery especially fitted for such work, run by hands more or less unskilled in general carpentry work. They manipulate the machinery and it does the rest. Thus day after day and week after week, the wheels may go, and go on forever, but never revealing what determines the real lines of beauty in the construction of geometrical designs. For this purpose, if nothng more, these designs will serve to illustrate how the different angles are formed and how they may be obtained with the aid of the protractor in connection with the common steel square.

Note: In our last article we quoted figures that we did not intend to say which escaped our attention till we saw it in print. The point in question is in Fig. 32, where mention is made of a polygon having 360 and 720 sides. Each of these numbers should have been just one-half of the above amounts. Those wishing to have their files correct should make this change.

BUILDING CONSTRUCTION

J.A.F. CARDIFF

Building a Home

A SERIES OF ILLUSTRATED ARTICLES COVERING CONSTRUCTION DETAILS IN THE ERECTION OF OUR AMERICAN HOMES—FROM THE LAYING OF THE FOUNDATION TO THE DELIVERY OF THE HOUSE TO THE PAINTER

FIG. 50 illustrates a cellar girder of six-inch by eight-inch yellow pine supported on a twelve-inch by twelve-inch brick pier with bluestone cap. The floor beams are let into girder to a depth of four inches. The top two inches of beam rests on top of girder, thus making the under side of girder flush with the underside of floor beam.

Fig. 51 illustrates another flush girder frequently employed though not as good as preceding example. It consists of a girder composed of three of the floor beams well spiked together, with two-inch by four-inch strips well spiked on to support floor beams which are notched over them.

Fig. 52 shows an ordinary girder with beams resting on top. Beams should be lapped over girder and spiked together as shown.

Fig. 53 illustrates the construction of an interior partition running at right angles to the direction of the floor beams. A rough flooring, usually of seven-eighths-inch by eight-inch matched spruce or hemlock, is laid diagonally over floor beams and well nailed to them. On top of this floor, the partition is erected by putting down a two-inch by four-inch partition sill or shoe and then raising the studs, which are usually of two-inch by four-inch stuff set sixteen inches on centers. A seven-eighths-inch by two-inch ground is nailed at the floor angle to serve as a gauge for lath and plaster and as a nailing for base. The finished floor is shown extending under the base and is generally of seven-eighths-inch stuff, matched, and not over three inches wide. A layer of deafening paper should be put between rough and finished floors. Boards should be blind nailed to every bearing and laid with end joints broken. Partitions are frequently made sound proof by filling in between studding with brick, as in the case of a frame partition between any living room and a kitchen, laundry or other room where there is any noise.

THE FIREPLACE

A fireplace when properly built should give a fair amount of heat with ordinary attention and should not smoke.

The principal points of construction are first a properly constructed throat which should be built well to the front and directly over the center of fireplace. The width of throat indicated at "A," Fig. 55, should not be less than three inches and not over six inches in the ordinary fireplace where no damper is provided. Too frequently it is made too wide, and, as a consequence, the air passes up the flue without being warmed and checks the draft. This causes smoky fireplaces, and in a great many cases of defective fireplaces a cure has been effected by simply contracting the throat. The flat ledge is built to deflect down drafts back into the warm rising air.

Each fireplace should have a separate flue; a good size being eight inches by twelve inches, and chimneys should be carried well above highest point of roof. The throat should extend entirely across the fireplace opening and should be gradually contracted to the flue directly over middle of fireplace, as shown by dotted lines in Fig. 56. If necessary to carry flue over to one side of chimney, it should be deflected by easy bends as indicated by dotted lines.

Flues, where lined with terra cotta pipe, only require four inches of brick around same, but where unlined, should have eight inches of brick with joints struck smooth on inside—not plastered. Flue lining is much to be preferred. Chimneys above roof should be laid up in cement mortar, one of cement to two of sand.

Back of fireplace should incline forward to throat and jambs should be splayed rather than set at right angles to face of fireplace, as this will reflect more heat into room.

Fig. 55 also shows the construction of ash dump and pit, which should never be omitted.

Fireplaces are commonly two feet six inches to three feet wide, one foot four inches to one foot eight inches deep and two feet six inches high. The arch across opening is supported on a one-half inch by two and one-half inch iron bar, slightly cambered and with ends turned up as shown in Fig. 56.

The trimmer arch consists of a one rowlock arch of

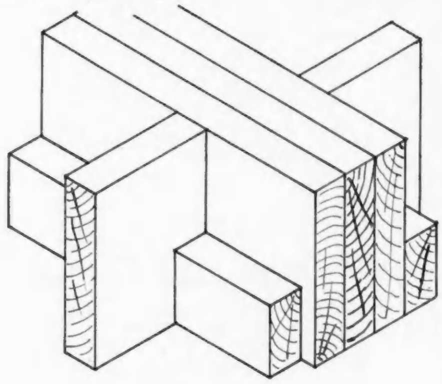


FIGURE 51.

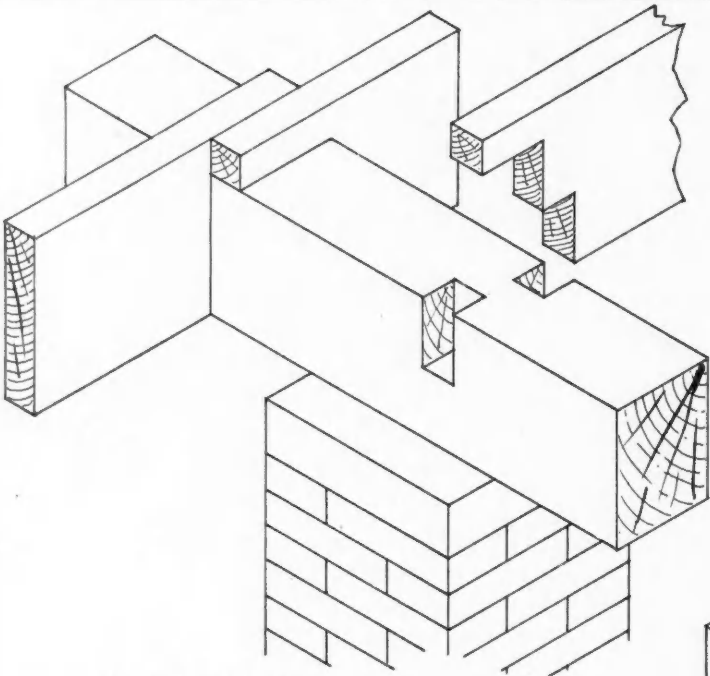


FIGURE 50.

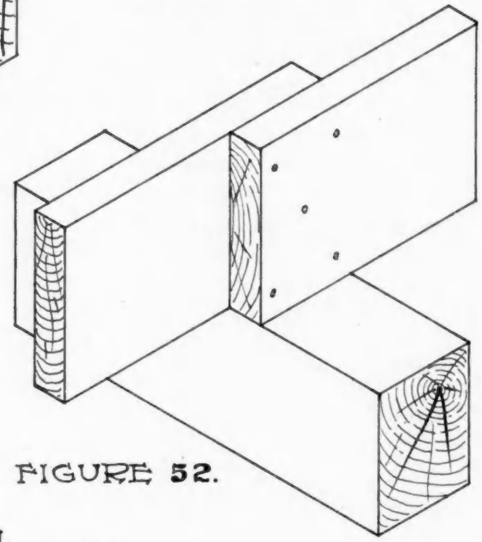


FIGURE 52.

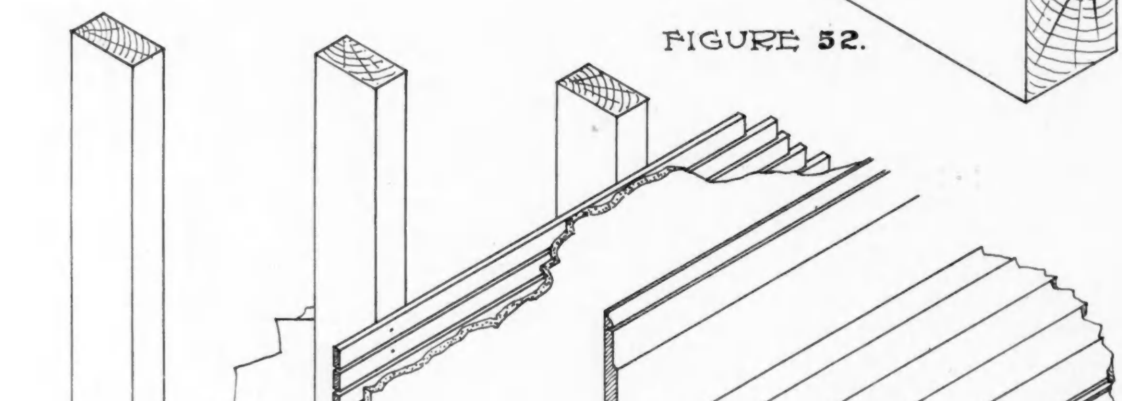


FIGURE 53.

PLATE XIII.

FRAMING.

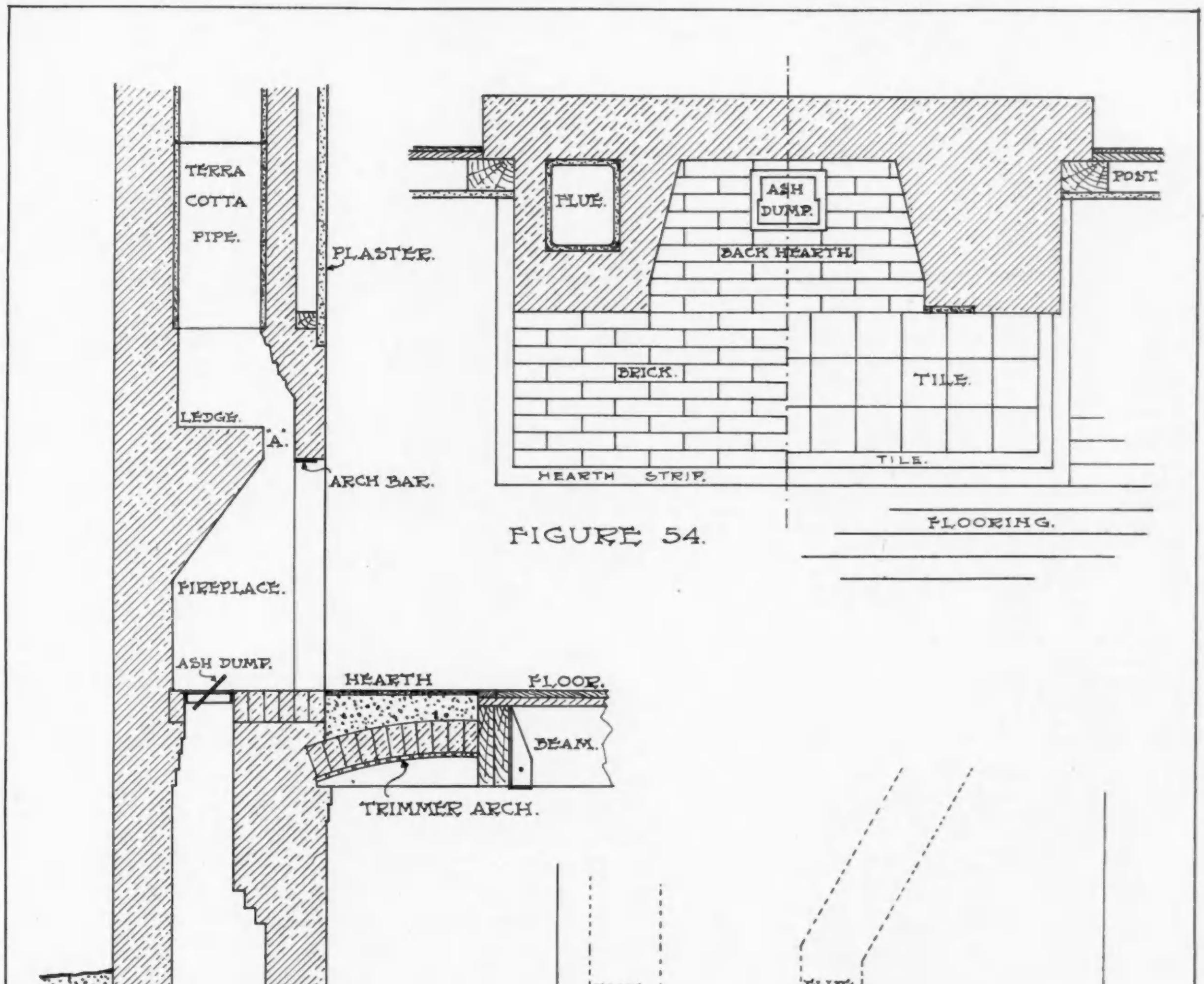


FIGURE 54.

FIGURE 55.

FIGURE 56.

PLATE XIV.

A FIREPLACE.

bricks laid upon centering constructed by carpenter, one end of which is secured to header, while the other end rests on a brick ledge corbelled out for it. A concrete filling is put over arch and brought to a level with rough flooring. On top of this tile hearth is set.

The back hearth and back and jambs of fireplace opening are usually of firebrick. The front hearth and facings are of brick, tile or marble.

A Well Equipped High School

HAVING ALL THE NECESSARY APPARATUS FOR ADVANCED STUDENTS—ONE OF THE BEST SCHOOLS IN THE STATE—HAVING ALSO A GYMNASIUM AND BATH ROOMS

THE school we are illustrating this month is known as the Cicero Stickney High School, located in the township of Cicero, Clyde, Ill. The building is situated in the middle of a six-acre lot of ground, thereby giving ample room for play grounds for the children and for holding their various athletic contests. The school is constructed of buff pressed brick with stone trimming, and the roof is of slate. It is furnished throughout in hard wood.

The basement contains boiler room, fuel room, toilet rooms, locker rooms and lunch rooms, where the children during the severe weather can eat their lunch without soiling the regular school room.

The gymnasium extends from the basement floor to the second floor, and has a running track which is level with the stair platform of the main floor. It is equipped with a complete set of apparatus, and is large enough to allow the students to play basket-ball, and is a great addition to the school, giving them a physical as well as a mental training.

Right off from the gymnasium are the bath rooms which are equipped with lockers and shower baths, which are not only a convenience but also a necessity after the exercises in the gymnasium.

Immediately over the gymnasium is the large assembly room which will seat one hundred and seventy-five pupils. This room is twenty-six feet high in the center, and has a beautiful ceiling with exposed timber trusses finished in oak. At one end of the assembly room is a large platform upon which entertainments can be given, with ante-rooms at either side which may be used as dressing rooms; or in case they are not adequate the drawing room which is right off from one of the ante-rooms can be used for this purpose, and the children can reach the platform through the ante-room without being observed by the audience.

The main floor is well equipped with chemical, physical and biological laboratories. These laboratories have a full equipment of instruments and desks which are essential in the pursuit of these various studies. The chemical laboratory is equipped with three double two-faced laboratory desks with running water and gas, which are essential in performing the various experiments. In case poisonous gases are generated in the course of their studies, hoods are provided with glass covers which carry off the gases to the outside of the building. The physical laboratory is equipped with numerous tables and instruments to be used in the study of physics. These instruments when not in use are put away in one of the store rooms, where they are protected from dust and dirt. The physical laboratory has several microscopes which are essential in the study of botany. In the store rooms are numerous cases for the storing of the various instruments. These cases are covered with Alberine stone. There is also a small dark room which is used in the pursuit of the study of photography, which is taken up in connection with chemistry.

This school is considered one of the best heated, lighted and ventilated buildings in the entire state of Illinois, and it is considered one of the finest high school buildings in the state outside of the city of Chicago. The cost of this building was fifty thousand dollars.

Berlin's Big Hospital

"Health at wholesale" might well be the cry of the new Rudolf Virchow Hospital in Berlin, which is now approaching completion, for 2,000 patients may be cared for at one time, in addition to those treated in the outdoor department.

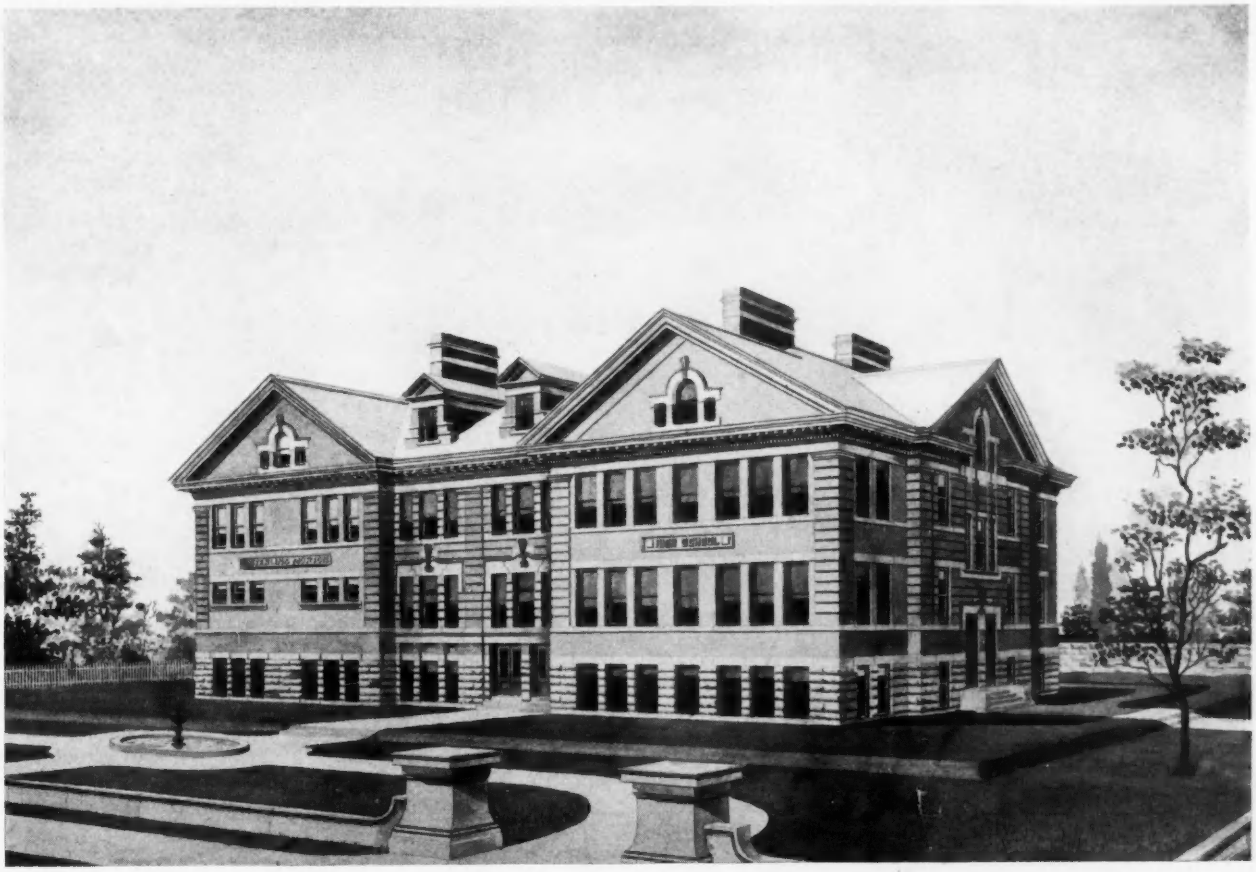
Seven hundred and fifty persons will be required upon the staff of this immense institution, and every appliance known to science will be installed, including a special building for one of the most complete X-ray equipments in the world. There will be an anatomical laboratory, a medico-mechanical department and one of the largest drug departments in Germany.

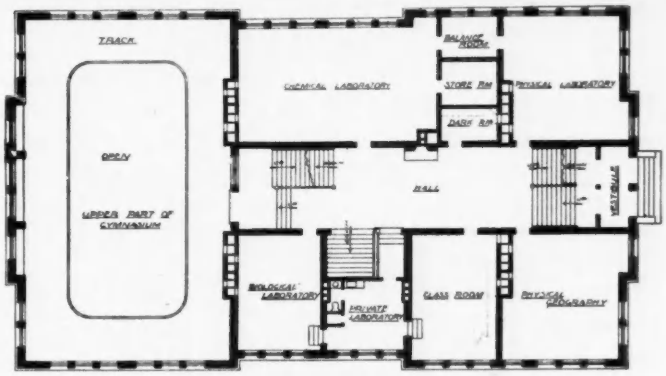
When it is known that the next largest hospital has but 1,600 beds and that most of the larger hospitals are prepared to care for only 700 or 800 patients, some idea of the immensity of this new institution may be gained.

It is the idea of the founders that here shall be centered the medical progress of Europe, and upon the list of surgeons will be found the names of many of the famous investigators in leading lines.

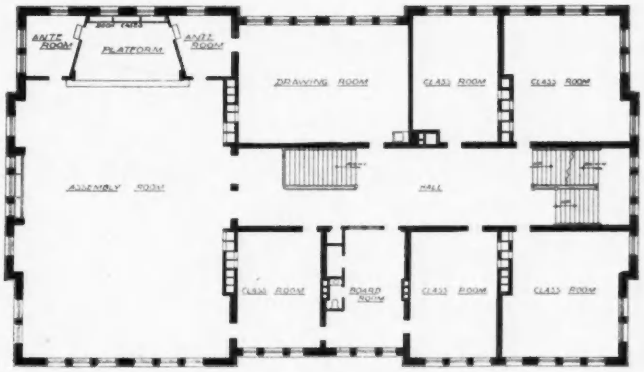
Growing Better Every Issue

I take this opportunity of congratulating you on your publication. I was pleased with the first number, and each subsequent issue, if possible, is better than the last.—George Powell, 1002 Ave. B, San Antonio, Texas.





MAIN FLOOR PLAN



SECOND FLOOR PLAN

PRACTICAL CARPENTRY

Geometrical Handrailing

A SERIES OF ILLUSTRATED ARTICLES ON STAIR BUILDING, USING GEOMETRY AS THE BASIS—A METHOD TO DEVELOPE TWO SECTIONS OBLIQUE TO TWO OF ITS SIDES

By Morris Williams

LAST month a method was presented to develop two sections—one made through a square prism oblique to one of its sides; and the other oblique to two of its sides.

The principle involved in the first was applied to the development of a face mold for a wreath over a well-hole, in a level landing stairway; the other will be applied in this article to find the form of a face mold for a wreath over and above a well-hole of a stairway having a riser in the center of the well; and, also, a stairway with a quadrant well-hole, one commonly known among stairbuilders as a quarter-turn stairway.

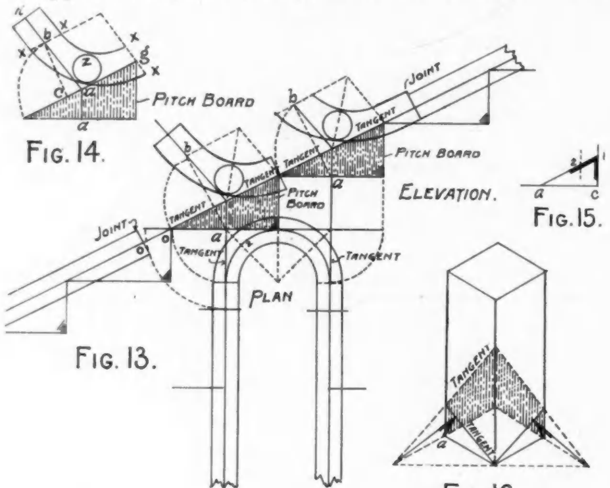


Fig. 14. Fig. 13. Fig. 15. Fig. 16.

In Fig. 13 is shown the plan and elevation of a stairway with a riser in the center of the well; where it will be noticed that the pitch of the tangent over and above the well-hole is the same as that of the two connecting flights; namely, that of the pitch-board, as shown by the shaded two steps in the figure.

The side plan tangents are shown continued to the pitch line of the elevation, and to bisect the pitch-boards at *a* and *a;* thus showing the base of the pitch-board to equal in length the length of two of the plan tangents—namely, one side tangent and one crown tangent, and thus determining the long side of the pitch-board to be the developed pitch of the two plan tangents.

The face mold for the two wreaths are shown in this figure developed by drawing a square line to the pitch-line of tangents from *a* to *b*, and a line from *b* to the intersection of the two inclined tangents.

This last line will be the same length as the bottom tangent, and the angle between it and the upper tangent is the angle required between the tangents on the face mold to square the joints at each end.

By referring to Fig. 11, which appeared in last month's issue, it will be noticed that the method to develop the face mold tangents as here demonstrated, coincide with the method there shown to develop a sectional cut made obliquely to two sides of a square prism. As before stated, the various systems of handrailing are founded on, and vary according to, the various methods of solving the problems pertaining to the development of sections of prisms and the cylinder. It is evident that, apart from a knowledge of how to develop such sections, a thorough knowledge of the science is an impossibility; and nothing less than thoroughness ought to satisfy the carpenters of such an advanced country as ours.

In Fig. 14 is shown how the face mold may be developed from the pitch-board.

Bisect its base in *a;* erect the perpendicular line *a d;* from *a* draw the line *a, c, b* square to the pitch; and connect *b, d*. Thus is determined the angle between the tangents of the face mold.

To draw the curves, make *d, z* equal to *a, z* shown in plan Fig. 13. Take *z* as a center and draw a circle of a diameter equal to the width of the rail, and determine the width of the mold at each end, *b* and *8;* by making *b x* on each side of *b* and *8 x* on each side of *g* equal to *1, 2* taken from the bevel in Fig. 15.

The inside and outside curve may now be drawn by bending a flexible lath to touch the points thus found.

The straight piece shown from *b* to *k*, called "shank," is drawn parallel to the tangent *d b* and made equal in length to the length shown from *o* to *o* on the pitch line in Fig. 13.

The bevel shown in Fig. 15 is found by drawing two lines at right angles to one another as shown at *a, c* and *c*, *1*; making *c*, *1* equal to *a c* on the pitch-board (Fig. 14), and *a*, *c* equal the radius of the plan center of rail; or, as in this case, equal to half the base of the pitch-board.

The bevel in this case is to be applied to each end of the wreath, owing to the tangents being of equal pitch.

The tangents are shown in perspective in Fig. 16, therefore will equal the full width of one tread; hence the pitch over and above the two tangents will equal the pitch of pitch-board of the two connecting flights; thus establishing the problem involved in the development of the face mold to be identical with that existing in the problem of unfolding a section made oblique and equally inclined to two sides of a square prism, such

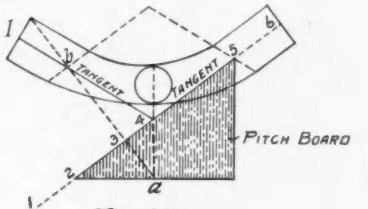


FIG. 18.

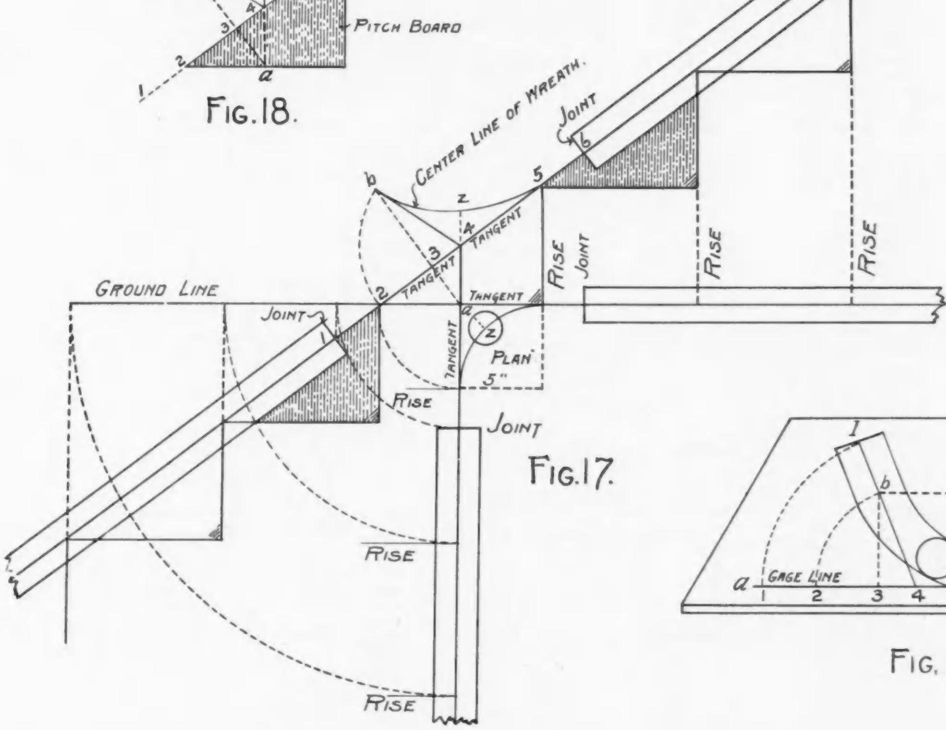


FIG. 17.

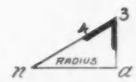


FIG. 20.

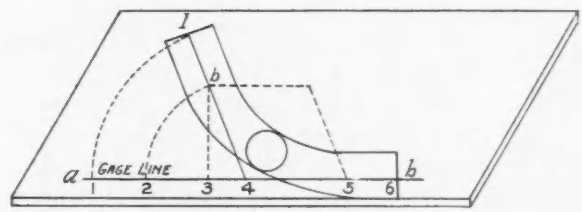


FIG. 19.

representing the inclined outlines of a sectional cut made through a square prism, and the bevels are shown to be the angle of the inclined plane of the section.

The nature of the bevels and a simple method of finding them under all conditions will be fully explained in future articles.

I will now apply the principle involved in a solution to develop a section through a square prism cut at an angle to two of its sides to another example of a stairway.

Fig. 17 represents the plan and elevation of a quarter-turn stairway. It will be noticed that the quadrant constituting the well-hole, or cylinder, is fixed at the intersection of two flights placed at right angles to one another; and that its radius equals half the well-hole shown in Fig. 13.

The last riser of the bottom flight is placed at the springing of the well; so also is the first riser of the upper flight.

The radius of the quadrant is five inches; which equals half the width of one tread, the two tangents as is shown in Fig. 16, and solved in Fig. 11, in last month's issue.

To find the angle between the tangents of the face mold, draw a square line to the pitch line of tangents from *a*, cutting the pitch line in *3*, continue to *b*.

Now fix one leg of the compasses in *4* and extend the other to *2*; revolve point *2* to *b* and connect *b 4*.

In this manner the bottom tangent *4 2* is revolved to its position in the face mold, thus forming the angle between the tangents of the face mold as shown at *b*, *4*, *5*.

Note how simple is the method here exemplified to find the angle between the tangents of the face molds, merely to draw a square line to the pitch line of the tangents from point *a* to *b* and making *b 4* equal the length of the bottom tangent *4 2*.

In the figure is also shown the center line of the wreath reaching from *b* to *5* through *z*. Points *b* and *5* are already established; hence all that is necessary to draw the curve is to locate point *z*; and this may be done by making *4 z* equal to *a z* of the plan.

Now, having located three points that are known to be contained in the curve, the curve itself may be described by connecting the three with any flexible material that will bend to touch each point.

In Fig. 18 is shown how the face mold may be developed from the pitch-board.

Bisect the pitch-board in *a*; from *a* draw a square line to the long edge through *3* to *b*; connect *b 4*; thus is found the angle between the tangents of the face mold as shown at *b 4 5*; the solution being the same as that explained in Fig. 17.

On the long edge are shown the figures *1, 2, 3, 4, 5, 6*, corresponding with the same figures in Fig. 17 where the distance from *1* to *6* is shown to represent the unfolded length of the wreath.

From *5* to *6* and from *b* to *1* in Fig. 18 is shown the length of the shanks, corresponding to *5 6* and *1 2*, respectively, in Fig. 17.

The width of the mold at *z* will equal the width of the straight rail and at *b* and *5* it is determined by placing on each side of *b* and *5* the length *3 4* taken from the bevel in Fig. 20.

It is evident from the solution shown in Fig. 18 that a pitch-board is all that is required to draw a face mold for wreaths of the kind under consideration in this article.

A practical stair-builder would not need to draw Fig. 17. He would, by using his pitch-board as in Fig. 18, find the points *1, 2, 3, 4, 5, 6*, then procure a piece of an inch board, wide enough to contain the mold, and proceed to develop his mold as shown in Fig. 19.

The line *a b* in this figure is gauged at a distance from the edge of the board equal to half the width of the mold taken from the bevel in Fig. 20.

On *a b* the figures *1, 2, 3, 4, 5, 6*, are transferred from the pitch-board and the mold completed as explained in Figs. 17 and 18.

The bevel shown in Fig. 20 is found by making *a 3* equal to *a 3* on the pitch-board shown in Fig. 18; and *a n* equal to half the base of the pitch-board; which as before stated is equal to the plan radius of the quadrant.

The Making of a Practical Carpenter

COMPLETE DEFINITION OF WHAT AN ARCH REALLY IS—NAMES OF VARIOUS PARTS OF AN ARCH—HOW TO DESIGN THEM

By Frank F. Addison

AS IT is also the business of the carpenter to prepare patterns for stonecutters, by which they are to cut stones to fit arches, centers for window and door heads, it is necessary he should have a clear conception of what an arch really is. For if a

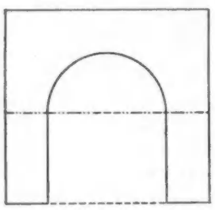


FIG. 26.

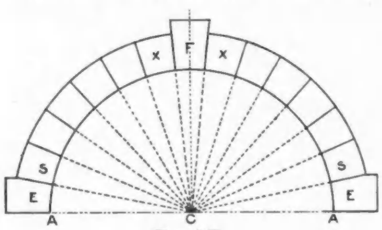


FIG. 27.

positive conclusion has not been arrived at, and if the arch principle is not fairly understood, he cannot be expected to design an arch, or to construct it with accuracy or intelligence, even if designed by another. Let us, then, state once for all, that every curved covering to an opening is not necessarily an arch. Thus the stone which rests on the piers shown in Fig. 26 is not an arch, but merely a stone hewn out in an archlike shape; but at its top, the very point where strength is required it is the weakest and would fracture the moment any great weight were placed upon it.

It is not my intention to enter into the scientific discussion on the arch, but some of its properties must be known to the mechanic before he will be able to construct centers understandingly; and the general principles here laid down will help the workman materially to form correct ideas concerning the work in hand.

The arch is an arrangement for spanning large openings so arranged that they may by mutual pressure support not only each other, but any weight that may be placed upon them.

The leading principles in the construction of an arch are—

1. That all the stones of which it is formed shall be of the form of wedges; that is narrower at the inner than the outer end.

2. That all the joints formed by the meeting of the slanting sides of the wedges should be radii of the circle, circles, or ellipse, forming the inner curve of the arch; and will, therefore, converge to the center or centers from which these are struck. As a rule, the

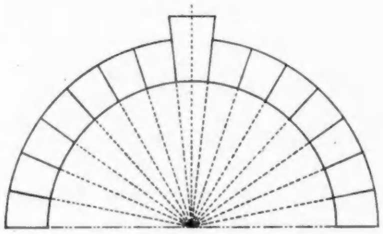


FIG. 28.

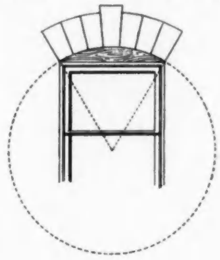


FIG. 29.

arch answers the same purpose as the beam, but it is widely different in its action and in the effect that it has upon the appearance of a building. A beam merely exerts a vertical force upon its supports, but the arch exerts both a vertical load and an outward thrust. Before taking up the construction of the arch, we will define the terms relating to it.

Fig. 27 shows the different parts of an arch. The distance AB is called the span of the arch; the under surface ADB is called the intrados, and the outer the extrados; the distance DC is the rise; F is the key-stone; the blocks, X, X, of which the arch itself is composed are called voussoirs, and the lowest ones, SS, the springers. In arches whose intrados are not

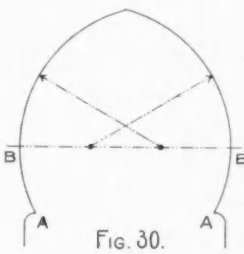


FIG. 30.

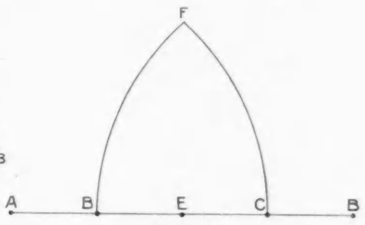


FIG. 31.

complete semi-circles, the springers rest upon two stones, E E, which have their upper surface cut to receive them; these stones are called skewbacks. The highest joint in the intrados is called the vertex or crown and the spaces between the vertex and the springing line AB are called the haunches.

Fig. 28 is the semi-circle arch, and was that principally used by the Romans, who employed it largely in their aqueducts and triumphal arches. The semi-circular and segmental arches are the best as regards stability and are the simplest to construct.

Fig. 29 is a segmental arch, and is extensively used over window heads. A true segmental arch is one-sixth of the circumference of a circle as shown in the figure.

The horseshoe arch is almost restricted to the Arabian or Moorish style of architecture. In this form of arch the curve is carried below the line of center or centers; for in some cases the arch is struck

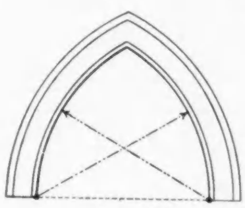


FIG. 32.

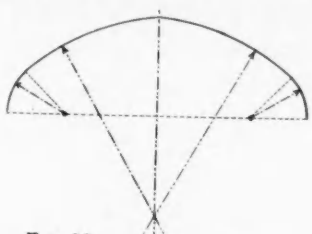


FIG. 33.

from one center, and in others from two, as in Fig. 30.

It must not be supposed that the real bearing of the arch is at the impost AA; for if this were really so, it must be seen that any weight or pressure on the crown of the arch would cause it to break at B, but the fact is simply that the real bearings of the arch are at BB, and the prolongation of the arch beyond these points is merely a matter of form and has no structural significance.

Next in point of time, but by far the most graceful in form, is the pointed arch, which is essentially the middle age style, and is capable of almost endless variety. Just where it originated is hard to tell, as recent discoveries have shown that it was used many centuries ago in Assyria.

The lancet arch indicates the style called "Early English," and is drawn as shown in Fig. 31. DC is the given span; bisect DC in E, make CB and DA equal to EC or ED; on B, as center, with DB as radius, describe the arc DF, and on A, as center, describe the arc CF, and the arch is complete.

The equilateral or Gothic arch is shown in Fig. 32, and is constructed as follows: The radius with which the arcs are struck being equal to the span of the arch, and the centers being the imposts; and thus the crown and the imposts being united and the equilateral triangle is formed.

A little later on we find the Tudor arches, or four-centered arches, Fig. 33, in which two of the centers are on the springing line and two below it. The arches at the later period of this style became flatter and flatter, and this forms one of the features of Debased Gothic, when the beautiful and graceful forms of that style gradually decayed, and for the time were lost. Happily, in the present century there has been a gradual revival of the Gothic style, and works are now being produced which bid fair to rival in beauty of form and in principle of construction the marvelous buildings of the middle ages.

From the examples here given the workman will be able to lay out any of the ordinary arches required in building.

Cement-Coated Nail

The cement-coated nail, which for a number of years has been a prominent factor in the nailing of boxes, especially with nailing machines, as of late years has been quite extensively introduced to the building trade, too, and the claim has been made, and demonstrated by a machine that is especially constructed for the purpose, that this nail not only holds better than the smooth wire nail, but also drives easier.

Making a Good Reputation

(Continued from page 451.)

to your notions, for if it were that way, if you could get a reputation to start out with of the kind you say you want, and had the way made clear all around you young fellows with all your energy would not leave anything for the older heads to do, and the old horses are certainly entitled to something for their years of work and study, and it would be more unfair to the older ones than it appears to you it now is for the young fellows. And, now as for your getting a start, getting a job when you have reached the point where you want to start out for yourself, you need not have any serious worry on that score, for you can write this down and paste it in your hat. By the time you are thoroughly competent to undertake the work the work will be there for you to do."

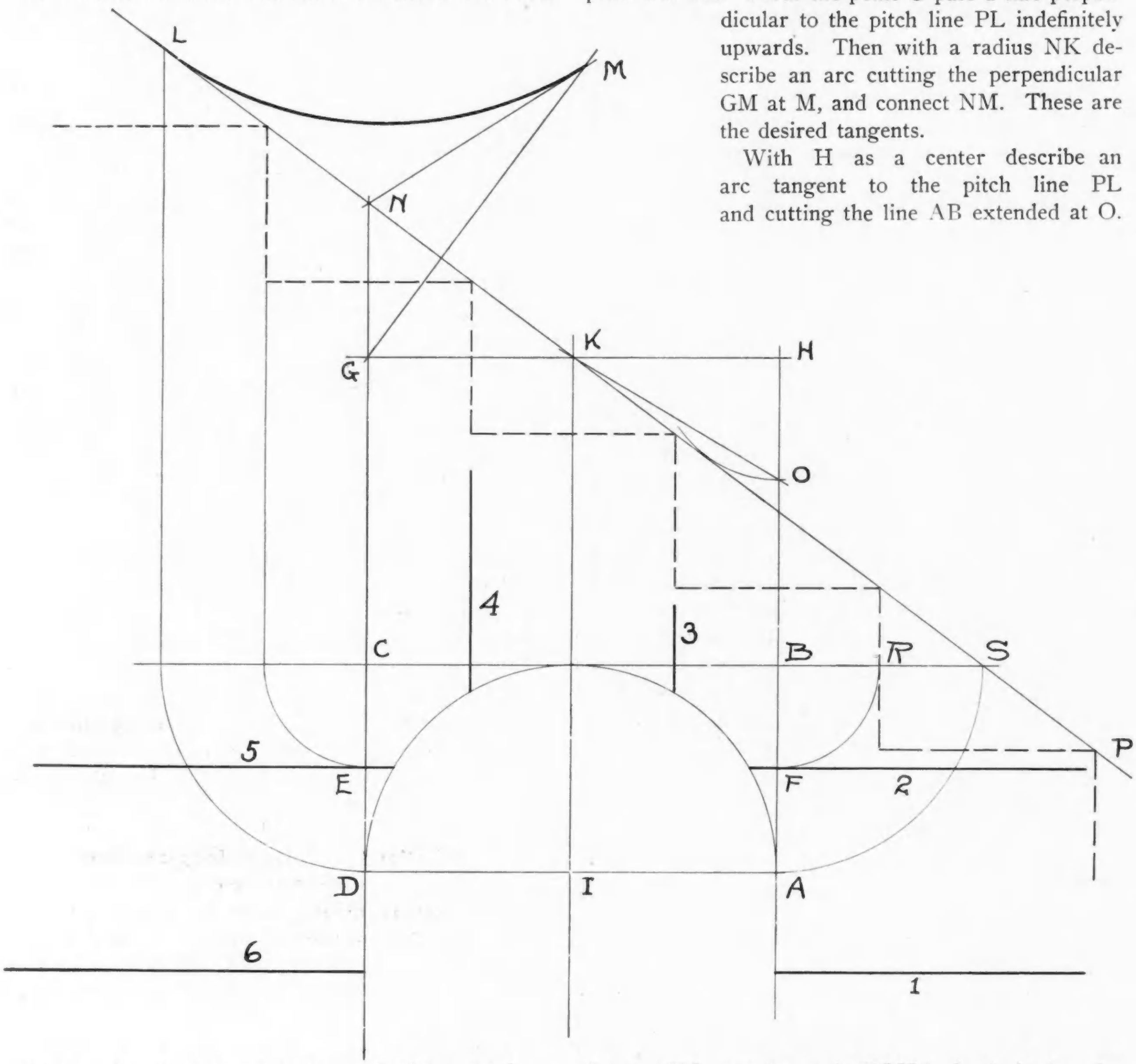
Constructing an Ordinary Stair

PLAN OF STAIR WITH TWO LANDINGS AND TWO RISERS BETWEEN THE LANDINGS—METHOD OF CONSTRUCTING HAND-RAIL

By Lewis R. Steinberg

FOR the problem this month we have a stair with two landings and two risers between the landings. The plan is laid off, locating the risers 1, 2, 3, 4, 5, 6, and the center line of the rail. It will be noticed that the risers 2 and 5 are one-half a tread from the center line of the rail at the end of the curve and that the risers 3 and 4 are one-half a tread from the center line of the rail on the sides.

After drawing the plan and the tangents ABCD, and with C and B as centers swing the points D and A respectively to the tangent CB extended both ways indefinitely. Also swing the risers E and F to the tangent in the same way. Then starting at P, with the rise at R and the pitch touching at S, lay off the treads and risers with the pitch line PL.



Extend the tangent DC until it cuts the pitch line at N, also extend the tangent AB indefinitely and draw the line GH parallel to the line CB cutting the tangent DC at G, the tangent AB at H, and passing through the point K where the center line IK intersects the pitch line PL. From the point G pass a line perpendicular to the pitch line PL indefinitely upwards. Then with a radius NK describe an arc cutting the perpendicular GM at M, and connect NM. These are the desired tangents.

With H as a center describe an arc tangent to the pitch line PL and cutting the line AB extended at O. Connect KO, and the angle KOH is the desired angle. The pitch line being a straight line, the tangents LN and NM will be equal for both sides of the curve, and the bevel KOH will also be the same.

The piece of rail is then worked out as was described in the last article by taking a block a little larger than the finished rail will be, laying off the center line as found, and marking off the bevels at both ends from the center line.

Planing Mill Work.

— J. Crow Taylor. —

Care of Planer Knives

ALL PARTS MUST BE PROPERLY BALANCED—HOW TO SET A PLANER KNIFE—CAUSES FOR THE TREMBLING OF MACHINE AND HOW TO REMEDY IT

SOMETIMES a carpenter who feels that he is master of the art of sharpening and caring for his own tools looks on the task of grinding, setting and caring for machine planer knives with a degree of apprehension almost akin to awe, and yet there is hardly any man better equipped primarily to tackle the job of caring for planer knives than the carpenter who has become a master of the art of grinding and adjusting knives in hand planes. There is, of course, some difference, or rather some variation from the work of caring for the bits in hand planes when one tackles the knives on planing machines, and yet when we get right down to the ground of this variation it is not so very wide, and some of the main principles that apply in the care and use of the hand plane hold good just the same when we pass to planing machines. But to these are added certain new elements that are derived from the action of machinery in motion, elements that are entirely aside from hand work, and must be studied from the ground up.

One important element that is derived from a machine in motion and one that every carpenter should learn early in the game when he tackles wood-working machinery, is the necessity of having all running parts balanced; and another is centrifugal force, the force which tends to pull a planer knife from its setting on the cutter head and send it out through the air like a chain-shot from a cannon. It is a well-known fact among machinery users, too, that when a planer knife comes off with the machine going at full speed it can do as much damage to life and limb, and property, too, as a shot from a cannon, and for this reason the factor of safety is usually made for strength when cutter heads are built and it is very seldom that a knife kept properly bolted down turns loose. This is mentioned in passing because sometimes through too much apprehension on the score of safety a new operator is impelled to overdo the job of tightening his bolts and the result is sometimes a broken bolt or one that is strained and cracked so that it breaks under operation and does some of the very damage that it is sought to prevent. With bolts in good condition, the main thing to watch out for in setting a planer knife on the score of its flying off, is to see that it fits down neatly on the cutter head and leaves no room for chips and shavings to start working in between the lip of the cutter head and the knife. With the knife fitting down neatly all along and your bolts all in good shape, all that is necessary is to tighten the bolts down good and firm without straining, and then after the machine has been in operation a few minutes, long enough to give it some little actual service, stop and go over the bolts carefully again so as to make sure that they are down firmly and that some of them are not loose. With this precaution the average planing machine will run right along without any serious danger of turning loose a knife while in operation, and it is best to forget all about it until you have occasion to set your knives again.

The lack of balance is the one element in the operation of the wood-working machinery that probably causes more trouble than any other one thing, and this is due in some measure to a general lack of appreciation of the importance of this element. Almost any man who claims to be anything of a mechanic will readily admit that pulleys, planing knives and all running parts of machines should be in balance, and yet they fail to apply this principle as diligently as they should, and this is especially true of men operating light planing machines where the facilities for grinding knives and keeping them in perfect balance are not as good as they ought to be. A man will argue to himself that just a little bit won't make any difference, and yet it is just this little bit that makes all the difference in the world in the smooth running of the cutter head of a planer. If your planer shakes and trembles, or your spindle rattles and shakes a little in the journals and makes heat and trouble, or if there is anything interfering with the smooth running of your machine, nine times out of ten it is lack of balance; it may be only a little and it may be difficult to detect it when you take the belt off and roll the cutter head over by hand, but the chances are it is there and is causing all the trouble. It may be in the knife, it may be in the cutter head itself, and then again it may possibly be in the pulley, but usually both pulleys and cutter heads are carefully balanced when they come from the shop and if there is any trouble it is because of some difference in the weight of the knives. Knives are usually made and handled in pairs, and, ordinarily with such planing machines as a carpenter will have in his shop two knives are enough on a cutter head, but whether two or four the problem of balancing is practically the same, only there is occasionally a chance of getting a knife from one pair confused with a knife of another pair in putting them on the machine and thus throwing the head out of balance, when in fact each pair of knives properly adjusted opposite each other will balance.

Let us assume, for example, that you have two knives on your machine and it is shaking a little, giving some indications of being out of balance. To test this matter take your knives off and try them in the knife balance scale, if you have one (which every man should), but if you have not take some scale that is very sensitive, weigh one knife carefully, then take it off and put the other knife on and see if they weigh exactly the same. If they do, and you want to carry the test farther, weigh the bolts that go to fasten each knife on along with the knife. Ordinarily as the machines come from the shop the bolts and the cutter head are all balanced up together so that all you need do is to make sure that the knives balance, but if you have made any changes in the bolts, have put in new ones, or even new washers, there is always a chance that you have affected the weight and the safest plan then is to weigh the bolts and washers for each knife right along with the knife, then you are sure that when the knives are put on the heads opposite each other they are in balance as far as weight is concerned and you must look farther if it does not cure the shaking in the machine. When we go farther and get into the algebra of knife balancing we find that it is necessary to have knives not only the same weight but the weight must be evenly distributed along the full length of the knife. For example, through careless grinding a knife might in time wear until it was very much narrower at one end than the other. Now, if its mate, that other knife that balances with it, happens to be ground the same way there is not so much harm done, but let us assume that the other knife gets ground narrower at the opposite end from which the first one is, in which case we will have a correct balance in the knives as a whole, but a faulty balance when they go on the machine, because at each end of the cutter head you have one heavy end and one light end, in other words the knives do not balance in the line of the circle around the cutter head at each end, and the fact is that in very high speed there is not only a strain on the cutter head but sometimes it leads to shaking and vibration similar to those which occur when knives do not balance in weight. However, where reasonable care is given to the grinding of knives so as to keep them the same width at each end there is not enough occasion for these fine points in balancing to make it necessary to go into the higher degrees of study in knife balancing in an ordinary machine carpenter shop, but you must keep an eye on the main point of balance. Grind your knives carefully so as to have them straight on the edge and the same width at each end, then carefully weigh them for balance after each grinding, and as stated above, if there have been any alterations in the original bolts that hold them to the cutter head, weigh the bolts that go with each knife along with the knife and then be sure to use them with the knife they are weighed with, and do not add to them or take away even as much as a washer, without doing the same thing on the other side.

If you find one knife heavier than the other, be it ever so little, take the knife and examine it and measure it for width, if you find it the same width the entire length, then take it to the grindstone and grind the soft side of the back edge, in other words, the top side of the back edge, for the entire length just as if you were going to start and grind a bevel on it. If the knife shows a little bit wide at one end, do most of this grinding at the wide end gradually tapering off toward the narrow one, but if it is the same width all the way along grind it as near alike as practicable the entire length so as to obtain as near as possible an even weight of metal all the way through and keep weighing from time to time so as not to get it too light, for it is an exact balance you want and if you get this knife too light you must give the other some of the same treatment to obtain a balance. Sometimes it is both practical and advisable to not touch the knife but work on the bolts and washers to get your balance. If there have been some new bolts put in the machine and some new nuts and some of the bolt heads or nuts are a little heavy there is a chance to grind away a little of the metal from these and make a balance, but where one has a new machine with bolts made in exact duplicate it is very seldom advisable to tamper with the bolts and attention should be confined to the knives themselves. With old machines where many of the bolts are homemade it is a little different, and there is room for one to exercise his judgment, always remembering that nothing should be done to impair the strength and holding power of the bolts for the sake of getting a balance, and above all, never leave a bolt out to get a balance, for then you are giving that other element, centrifugal force, room to get in and do damage.

This little talk on balancing is given precedence here, because it is not only a new element that comes along with the introduction of machinery for wood working, but also because it is a very important one and must be kept in mind all the time. It is not sufficient to just give it consideration once in a great while, nor should you wait until the shaking of your machine warns you that the knives are out of balance, but it should have attention every time the knives are ground or taken off the machine for any purpose whatever, before they are put on again. They may be all right, there may be no necessity after grinding them for doing any work to make them balance, but you don't know this until you put them on the scale and weigh them carefully and it is something you should never guess at, because the least bit of difference in weight makes a big difference in running, and the careful planing machine operator never thinks of putting a set of knives on the machine without first making an actual test of their weight for balance. If there are four knives instead of two, they should be handled in pairs, that is, taken two at a time and made to balance, and those that are balanced together should be placed on opposite sides on the cutter head so as to maintain an exact running balance. Of course, it would be a more correct job to have all four of the knives weigh exactly the same, though that is not ordinarily essential, but they must be balanced in pairs so that when they are put on the head no one side of the head will be heavier than the other. In other words, the head must have a perfect running balance, and should you use only one knife some old knife or a blank bar of iron must be made to balance with it and go on the opposite side.

Setting the planer knives on the cutter head of the machine partakes of the same nature of logic that applies in setting the bit in a hand plane, the lip of the cutter head occupying the same relation to the planer knife that the cap does to the bit in the hand plane. When you are setting the bit in the jack plane for example, to do what we call roughing off with as much ease and speed as possible you set the cap back from the edge of the bit an eighth of an inch or something like it, while when you come down to the smoothing plane, fore plane and others, in which smooth finish is the object more than anything else, you set the cap down very close to the edge of your bit. This is the idea you should take with you, too, when it comes to setting the knives on the planer, bearing in mind that the lip of the cutter head bears the same relation as the cap on your hand plane to the bit. In large establishments where they have different machines for different classes of work the knives on the receiving planer or surfacer which takes stock from the yard and dresses off the rough surface are set out more than those on the panel and other finishing planers. In a carpenter shop, however, where one machine must do a great variety of work. the best thing we can do is to strike a happy medium and set the bits out far enough so that they will cut freely and yet keep them close enough to the head to make a smooth job on cross-grained or any other stock that may come along. It is very rarely advisable to let the knives project more than an eighth of an inch beyond the lip of the cutter head and sometimes it is best to run them even closer than this. In fact, for right smooth work on hardwood, it may be found necessary to draw the knives back until the lip comes up very close, just as you would set your smoothing plane for finishing a hardwood board. To start with, however, you can generally figure on getting between one-sixteenth and one-eighth of an inch of knife extending beyond the lip of the cutter head on the average modern machine. If you have a square cutter head with no lip whatever showing but just a square edge to fit the knife to, it will be necessary to allow a little more extension than when there is a proper shaped lip to the head for the sake of taking care of the chips. Where there is a dial and pointer on the machine it is sometimes necessary to set the knives so as to conform to these, which is comparatively easy but takes a little more time. In such a case as this you set a knife on the machine as near in a correct position as you can arrive at by the knife edge and the lip of the cutter head, then take one strip, or two strips for that matter, of exact thickness and adjust your bit until the pointer shows the same thickness on the dial that you have in your strip, say you have an inch strip, adjust your bit until the pointer shows one inch on the dial, then passing the strip through until it comes under the cutter head, turn the head carefully by hand until the edge of the knife comes down to the strip and it will show you whether or not you have the correct adjustment, and if you have not you can set your knife out or in, as the case may require, until it just scrapes the strip after being thoroughly tightened up. Set your other knives by measurement as nearly like the first as possible and run the bolts down moderately tight but leaving them so that you can move the knife a little by tapping it with a hammer, then put each knife in succession through the same test as the first so that each may just scrape the strip through the entire length of the knife. As a rule, however, it is easier and more to the point to make the dial conform to the setting of the knives than it is to set the knives to conform to the dial. That is, you should ordinarily set the knives with whatever extension beyond the lip of the cutter head promises the best results and afterward test and adjust the pointer on your dial until it will properly indicate the thickness of the stock being planed. In either case, however, there are two points to observe, one is, that in setting the first knife, you should be sure and get the edge parallel with the bed of the planer just the same as you put the edge of the bit in one of your hand planes in parallel harmony with the face of the plane. Then, naturally to get the best results each successive knife must be set exactly like the first one throughout its entire length, so that when any part of the cutting edge of any knife passes by a strip, board or other gage laying on the bed of the machine it will show the same room under it as under every other part of every other knife. You can generally tell when you fail to do this, fail to adjust your knives properly, when you stop to whet or grind after they have seen service enough to make them dull, because any knife or any part of a knife that has not been set out far enough will show very little wear, while those that have been set out the farthest will show the most wear on the edge. It is too late then, of course, to remedy the faults in the width of setting, but it will furnish a guide for future action by telling you that you have not been careful enough in your work.

It is easier to be critical than correct.

PAINTING

EDWARD HURST BROWN

Painting the New House

GLASS SHOULD BE INCLUDED IN PAINTER'S CONTRACT—FULL DESCRIPTION OF HOW PLATE GLASS IS MANUFACTURED—DIFFICULTY IN MAKING LARGE SHEETS

ALTHOUGH it has become customary in many parts of the country for the window sash to be glazed at the mill and to come to the house ready glazed, there are several sections, notably in Pennsylvania and Ohio, where it is still customary for all glazing to be done by the painter and for the sash to be sent to the building from the mill unglazed. They are then fitted by the carpenters and sent to the paint shop for glazing. This method has almost always been found to give better satisfaction to the owner than when the sash is glazed at the mill, for glazing is essentially a painter's job.

To glaze a sash properly, the rabbets should first be primed with pure raw linseed oil and should then be back puttied with soft putty, or a putty composed of pure whiting, pure white lead and pure linseed oil. The glass is then set in the rabbet and is held in position by a sufficient number of glaziers' points—triangular pieces of zinc. The rabbet is then filled with glaziers' putty made from pure whiting and pure linseed oil, pressed well down with a putty knife and left smooth. Unfortunately, in order to save expense, much of the mill glazed sash is improperly primed by being coated with some cheap substitute oil, composed largely of rosin oil and petroleum; the back puttying in soft putty is omitted altogether, and the final puttying is done with a cheap putty made of marble dust and petroleum, or containing these ingredients in large proportion. While a good linseed oil and whiting putty becomes harder by time and will cling to the glass and sash indefinitely, a cheap putty of the character usually used by the sash factories will soon lose its cohesion and will begin to fall out piecemeal, leaving no protection from the weather and permitting the glass to fall out. Moreover, paint will not hold to the surface of such a putty, and houses of good quality otherwise are often sadly marred by the use of cheap putty in glazing the sash. It is not only the saving of a cent or two per pound in the cost of the putty itself, but a putty containing mineral oil can be worked much easier under the knife than a pure putty, hence the workman is able to glaze many more pairs of sash in a day by using it.

Many architects call for window glass to be free from all waves or bubbles and perfect in every particular. Now while this would be an ideal condition for glass, it is impossible to obtain sheet glass that will meet such a specification. Even plate glass can rarely be found that is absolutely free from minute bubbles, and from the very nature of things sheet glass must contain imperfections. If architects only understood the method of manufacturing it, they would not specify something impossible to obtain. The window glass blowers are among the highest paid labor in this country, but they work only a portion of the year, all the factories, by mutual agreement of the men and the factory owners, closing down in the summer months. In making window glass the workman stands in front of a pit, and taking a large lump of molten glass on the end of his rod begins to blow a cylinder, swinging it back and forth as he blows, in order to elongate it. Upon the skill of the workman will depend the size of the cylinder he is able to blow and the size of the resultant sheet of glass. As it is much more difficult to blow a large cylinder that is practically flawless, than it is to blow a smaller one, the relative price of sheet glass increases materially as the size of the sheet increases. When the cylinder is blown to a sufficient size, the rounded end is cut off and the hot cylinder is cut open lengthwise and flattened out by opening it on a metal table. It is then passed through the annealing oven in order to toughen it. Within the past few years a machine for blowing glass has been put in use in some of the factories, but as yet the machine-made glass is inferior in quality to that blown by hand. It is being perfected year by year, however, and undoubtedly the time will come when machine glass will supersede the other and when it will be freer from flaws than it is now possible to obtain. It is manifest that any irregularity in blowing the cylinder or in swinging it, or in fact almost any trifling cause will cause either a wavy place in the glass or a slight variation in the thickness of the sheet or else minute air bubbles in the molten glass. It is noticeable that the thinner the glass is blown, the freer it will be from imperfections, hence single thick glass can always be obtained clearer and cleaner than double thick or double strength, as it is termed. The single thick glass averages about one-sixteenth of an inch or less in thickness, while double thick will probably average from one-tenth to one-eighth of an inch thick.

After the glass has been annealed the foreman of the factory sorts it out into A grade, B grade, and so on. There is no recognized standard for A glass, the A grade of one factory being no better, perhaps, than the B grade of another; hence when an architect specifies "A glass" the term is practically meaningless. After being sorted the glass is packed in boxes containing as nearly as possible fifty square feet of glass of the size contained in the box. The price is always quoted by the box, and varies by the rate of discount allowed from a standard list. In the list several different sizes are bracketed together, and larger discounts are usually allowed from the list price on the first three brackets, or the smaller sizes, than are quoted on the other brackets.

Although it cannot be made absolutely free from occasional minute air bubbles, plate glass is practically perfect, and where price is no special object and the owner desires to have his house as perfect in every detail as possible, plate glass should always be used, although its additional weight will entail the necessity for the use of lead weights for counter-balancing the sash, in most cases.

In the manufacture of plate glass, the metal, as it is termed, is heated in huge pots, in large furnaces, which in the Pittsburgh factories are heated by natural gas. When the metal is sufficiently melted, the pot is lifted from the furnace by means of a travelling crane and carried over a large flat iron table, mounted on a track, and the molten glass is poured out upon the table. A huge iron roller is then rolled over the molten glass, flattening it out into a large sheet, of irregular outline and perhaps an inch in thickness. Any dross and foreign substances are quickly skimmed off the surface of the metal by a workman who stands ready, just before the roller reaches it. The truck is moved in front of an annealing oven that is ready to receive another sheet of glass, and some twenty workmen push the huge sheet from the table into the oven, where it stays until it is properly tempered. After the glass is taken from the oven, twelve workmen turn the sheet on end, and, supporting it with leather straps, carry it to the racks, where it is ready for the next process, the grinding and smoothing. The opaque plate of glass is laid on a revolving table, upon which two large circular discs revolve. The grinding is first done with coarse sand,, then with finer, and so on until the final grinding is done with emery of the finest grade. This grinding is done first on one side and then on the other, until the plate is very materially reduced in thickness, nearly one-half of it being ground away. But the glass is still opaque and needs to be polished to bring it to the state of perfect transparency which is necessary. This polishing is done on another table by means of discs of rubbing felt that are moved back and forth upon the glass by mechanical means, the polishing being done by the action of rouge, or red oxide of iron. Of course the operations of grinding and polishing are conducted while a stream of water is constantly flowing upon the plate. After being polished, the glass is taken into the cutting room, where the largest possible plate is cut from each sheet that can be obtained and avoid the flaws that occur somewhere in almost every sheet. At the Charleroi plant of the Pittsburgh Plate Glass Company, the largest sheet of plate glass that could be made four years ago, when the writer visited the plant, was 147 by 227 inches, but to produce a sheet of that size required weeks of trial, imperfections and breakage rendering it very difficult to obtain a perfect full-sized sheet.

In glazing ordinary dwelling house windows, the same method is pursued with plate glass as with ordinary window glass, but for the large size show windows bedding in rubber is required, and the glass is held in position by wooden or metal moldings.

Up to a few years ago French plate glass was considered to be the finest made, but the use of natural gas has made the American product superior to any imported plate glass.

Besides sheet and plate glass, there are many special kinds of ornamental and colored glass. But it is scarcely necessary to go into either the details of its manufacture or its uses, nor to more than mention the colored windows that are made up from small pieces of ornamental glass fastened together by means of "leads." These are flexible mountings made of lead, which are bent into position and then soldered together. The price of leaded glass varies so much that it is usually most satisfactory, where it is desired, for the owner to purchase it himself as a separate contract, or else for the contract to provide for a certain amount to be allowed for leaded glass, permitting the owner to select whatever he may desire within that amount, or if he orders in excess of the specified figure to charge it as an extra.

While the writer believes it is to the best advantage of the owner for the glass to be included in the painter's contract, as already mentioned, still every builder will find it advantageous to make himself familiar with the different qualities of glass and to keep himself posted on market prices. The fluctuations in this material are often very considerable, and depend on local conditions, jobbers finding it necessary to realize cash frequently cutting prices below the regular discounts. This frequently makes it possible for tne shrewd buyer to save considerable money on a large order for glass, if he keeps close watch on the market.

It pays to use a file as long as it's good; but when it's worn smooth, it is good economy to throw it away.

RESIDENCES

A Concrete Block House

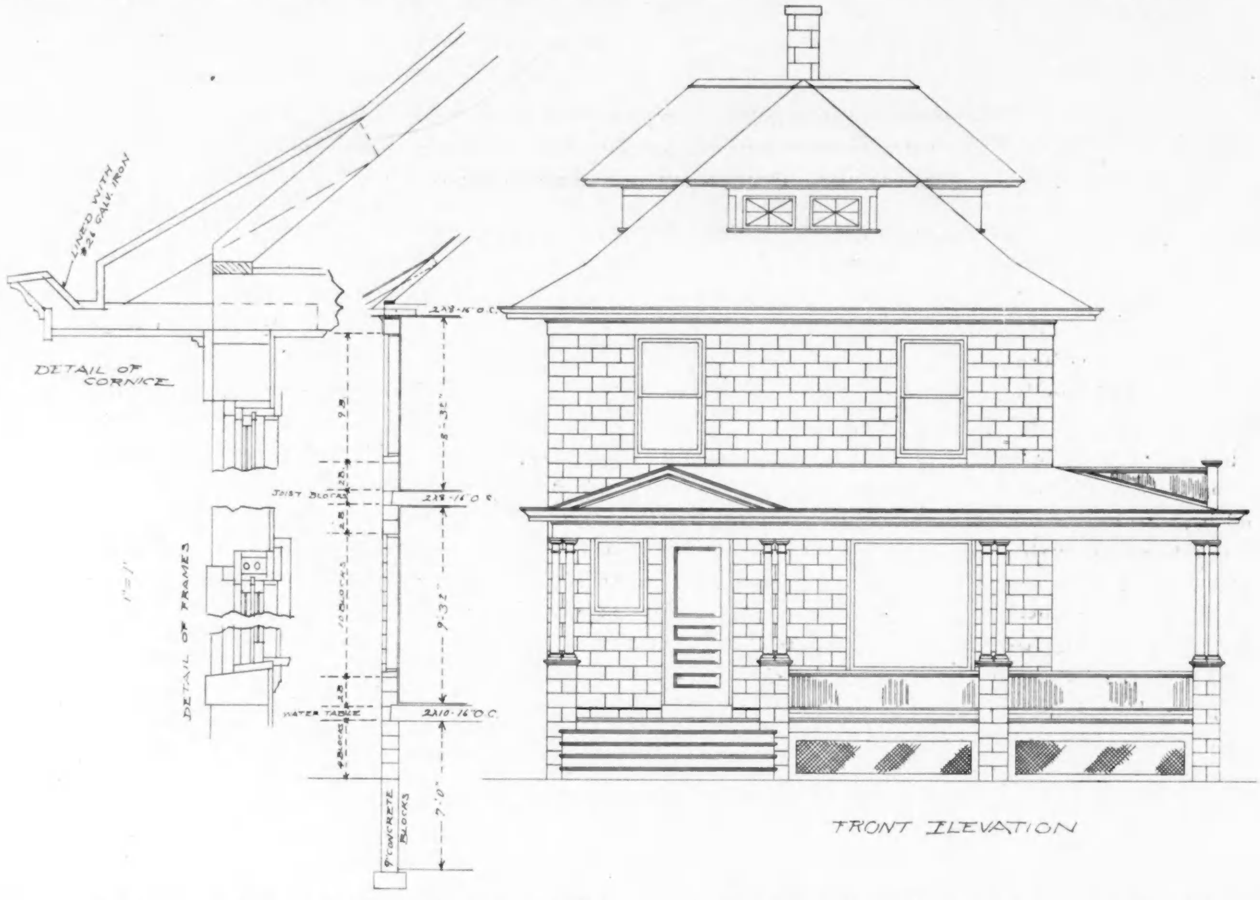
COMPLETE PLANS AND ELEVATIONS OF HOUSE RECENTLY ERECTED IN THIS LOCALITY—INCREASING DEMAND OF CONCRETE BLOCKS FOR BUILDING PURPOSES

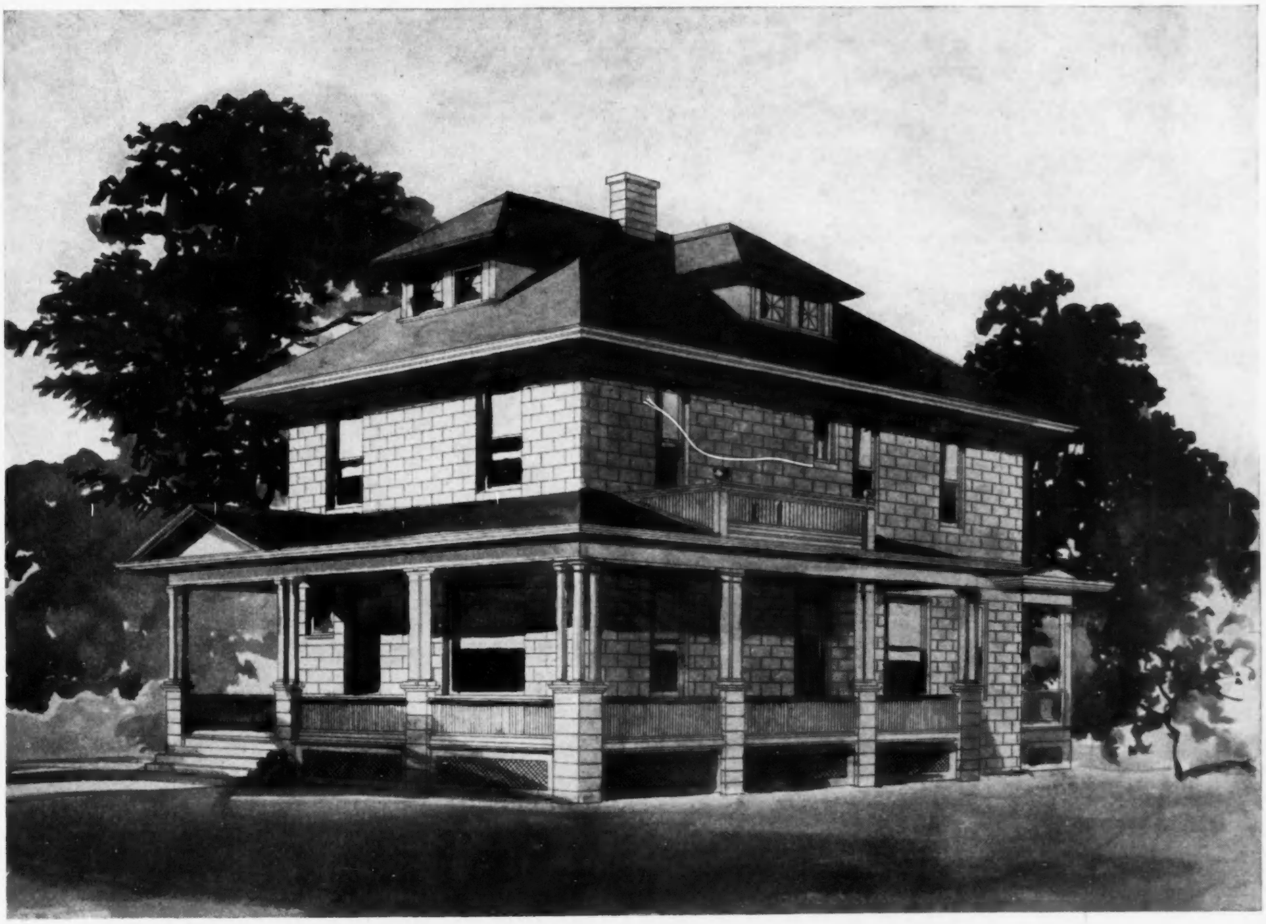
By G. W. Ashby

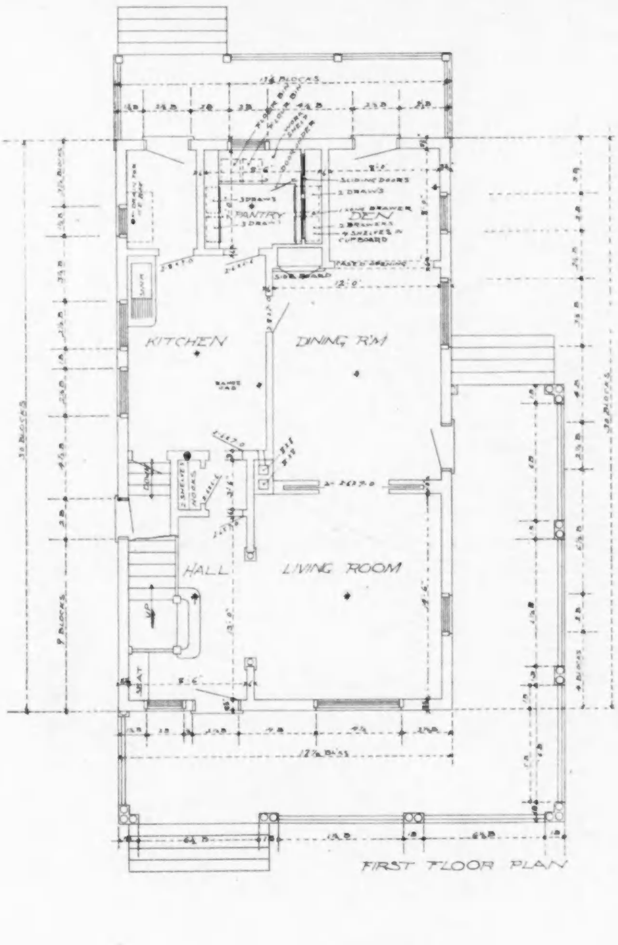
WITH the gradual growing scarcity of choice building lumber and the increase in price of same has caused the builders to look about for a substitute. This has partly been answered by the adoption of cement, and while cement has for many years been used more or less in the arts of building construction it has only been within recent years that extensive cement works have sprung into existence in many parts of our country. Millions of barrels of cement are being manufactured each year.

The uses for which it may be adopted are daily being pushed forward before the building public and the question naturally arises, Where will it end?

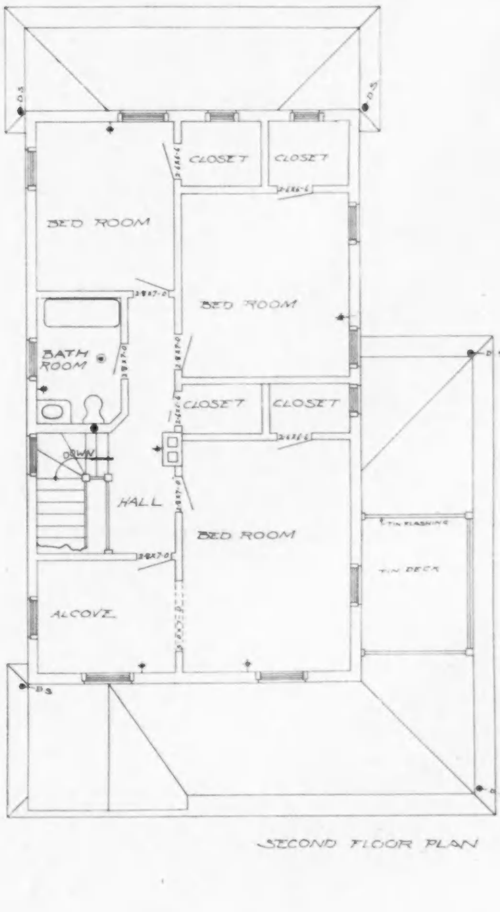
The railroad engineer formerly constructed the necessary culverts and bridges from the natural stone and timbers found along its lines, but to-day the wood is being discarded and the large stones are crushed into small bits and with the proper addition of water, sand and cement, the culverts, small bridges and retaining walls are being built with concrete, which are seemingly destined to stand for all time. Great tunnels are now also being constructed of concrete. The modern skyscraper with which this city abounds, rest securely upon concrete piling reaching far down to the natural terra firma instead of on tottering wooden legs (wood piling) which were in use a few years ago. But all this is not new. Let us look back to the eternal city of Rome. Here we are told that amid the







FIRST FLOOR PLAN



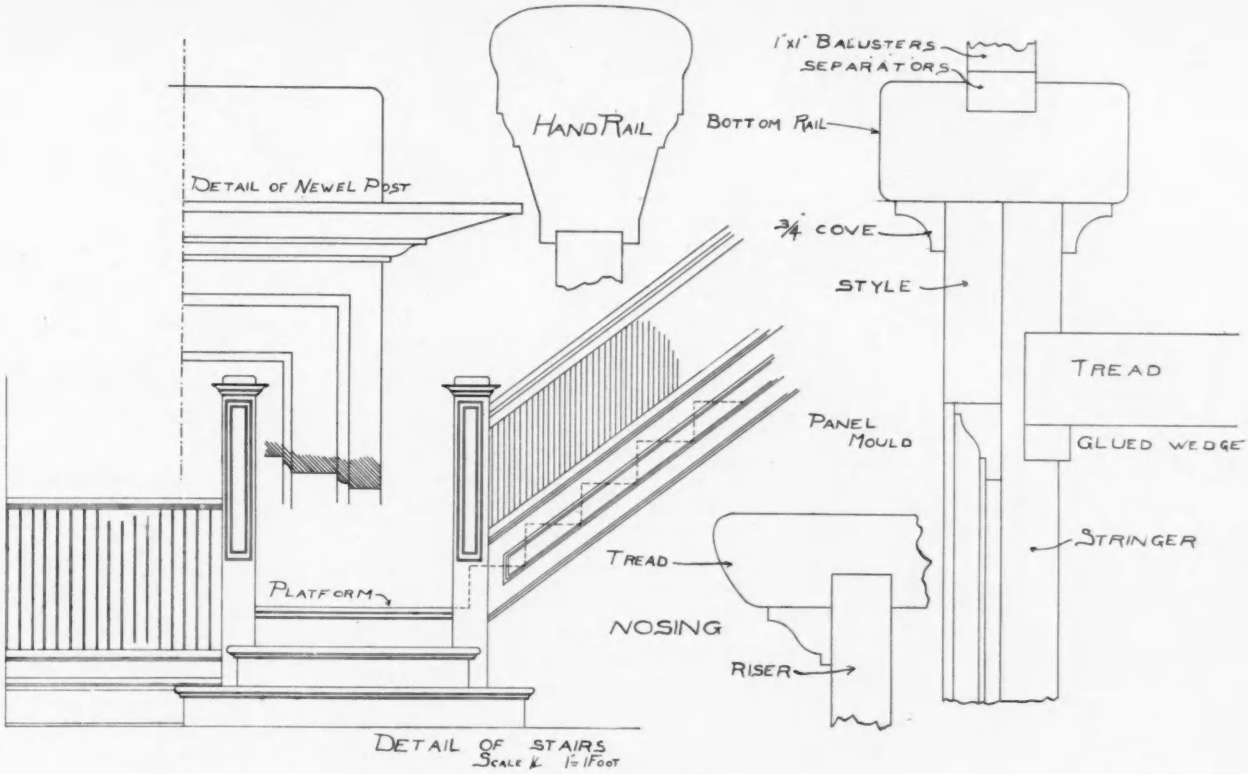
SECOND FLOOR PLAN

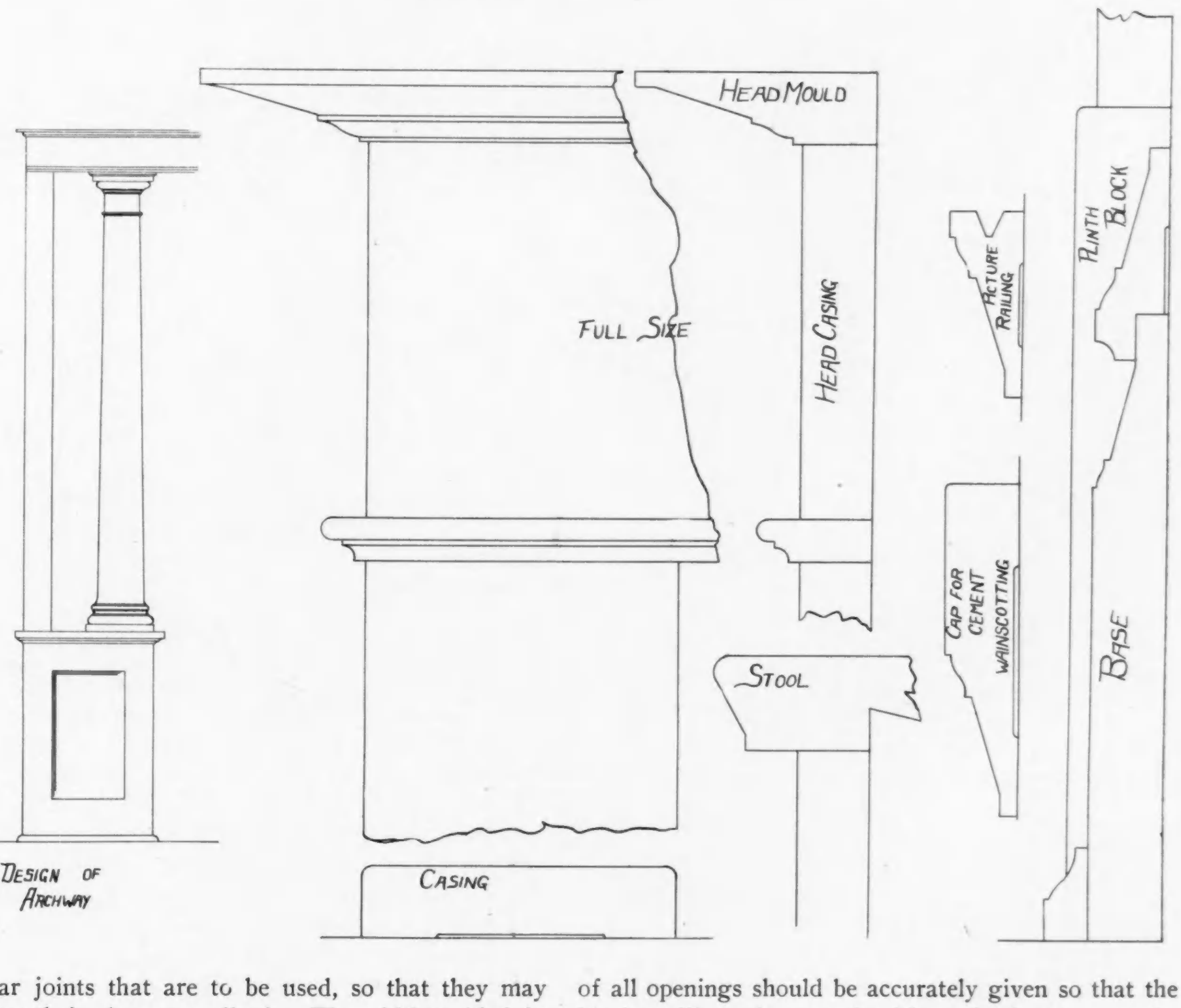
EAST ELEVATION

WEST ELEVATION

ruins of this ancient city are to be found great walls constructed of broken stone and cement that have stood the rigors of the elements for thousands of years. This serves as a reminder of the old saying, "There is nothing new under the sun." We are simply learning how to use it in the various arts of modern construction. Scores of cement machines for making various sizes and patterns of cement concrete blocks for building purposes are now on the market and few towns of 5,000 or less inhabitants but what can boast of one or more of these machines. The local architects are called upon to prepare plans for this class of buildings.

To do this successfully, they must know the exact size and style of the blocks and even to the size of the





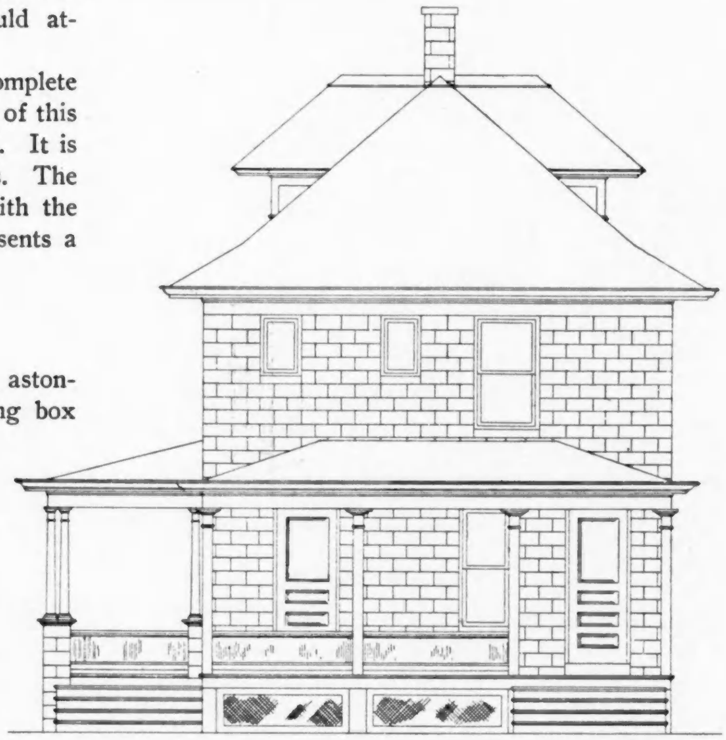
mortar joints that are to be used, so that they may prepare their plans accordingly. The width and height of all openings should be accurately given so that the blocks will work around without having to cut the same, which is bound to mar the architectural effect of the building.

This is an important point that should not be overlooked, and no one without experience should attempt it.

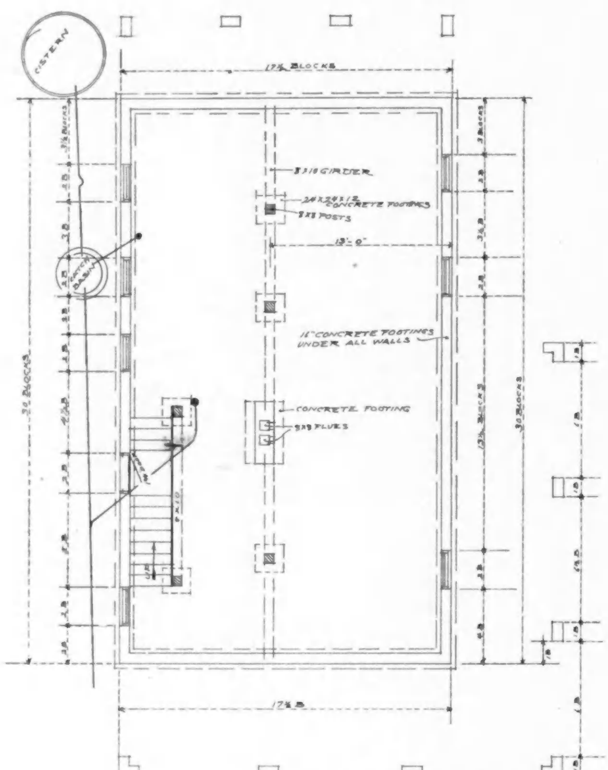
The accompanying illustrations shows a complete plan with a perspective elevation for a building of this kind which is now being erected near Chicago. It is furnished with all of the modern conveniences. The exterior wood-work is finished in harmony with the other work and with its moss green roof presents a pleasing homelike effect.

Speed in Driving Nails

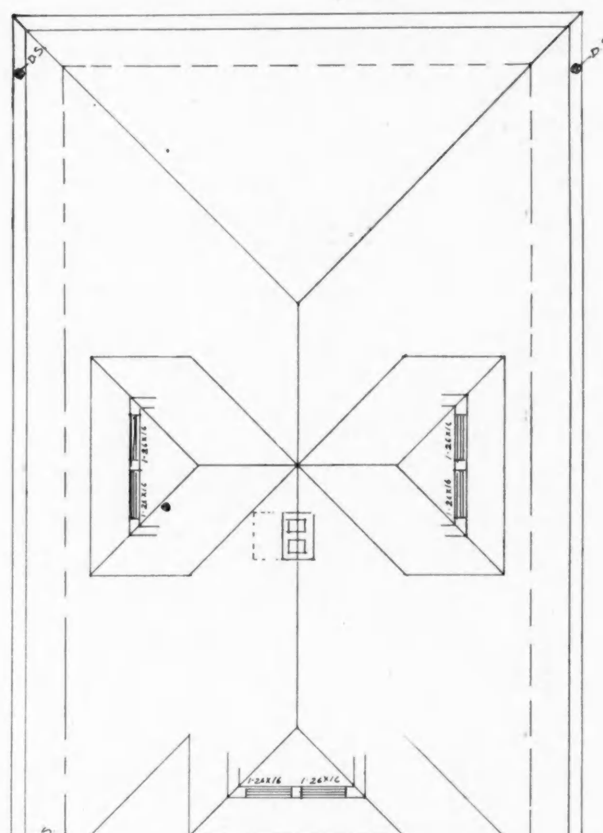
Speaking of driving nails, it would probably astonish the average carpenter to go into a packing box factory where there is any great amount of hand-nailing done and see the speed with which the expert hand-nailer drives. Six and eight-penny nails in the hands of the expert box maker go home at one stroke, not one stroke after the nail is started, but the starting stroke sends it home. It is not considered the height of speed for an expert hand-nailer in a box factory to drive a keg of eight-penny nails in a day, and those who profess to be at the head of the list claim an ability to drive a keg of six-penny nails in a day. This may sound like a fairy tale, but a trip to the hand-nailing department of any prominent city box factory will not only serve to demonstrate this fact, but prove an eye-opener to the average carpenter as to the average speed in nail driving.



REAR ELEVATION



BASEMENT PLAN



ROOF PLAN

CEMENT BUILDING CONSTRUCTION

FRED W. HAGLOCH

Hardening Concrete Blocks with Steam

SUCCESSFUL TESTS MADE BY VARIOUS PARTIES IN DIFFERENT LOCALITIES—WATERPROOFING QUALITIES OF SAME—COMPLETE DESCRIPTION OF HOW TO CONSTRUCT A WATERPROOF CEMENT TANK

IN MY last article I mentioned several attempts of curing (hardening) concrete blocks with steam that proved a failure, I shall now give a description of a system, that in four different localities and each managed by men who had no connection with one another, made it a success using the same identical method which they obtained by their own experience.

The stone were all made by the dry tamped process, either hollow blocks or caps and sills which, of course, were solid. These were placed in a room whose walls were practically air tight and only opened to admit additional blocks or to sprinkle, which was done six to eight times per day. The next morning without opening, steam was turned on and continued for a period of 48 hours, after which the blocks were removed to the yard and kept damp by spraying for two days longer, when they were pronounced fit for use.

At another plant the blocks were taken from the molding machine and placed in the shade for 24 hours and kept well sprayed, when they were removed from the pallets and placed in a tunnel built with hollow blocks and plastered on the interior with Portland cement and sand, the tunnel was closed and steam applied for from forty to fifty hours, after which they were pronounced ready for use. The interesting feature is that blocks thus hardened have a metallic ring when tapped with a hammer much the same as earthen ware or Bedford (Ind.) limestone and are much more dense near the surface.

The color of stone cured in this way is also a slight shade lighter than if made of the same material and cured without steam, but as to the durability or lasting qualities I can only say that the closest investigation fails to find that the product has in any way suffered injury, which is strong support to the theory that cement after having fully passed its initial set cannot be injured by a rise of temperature, besides the boiling test given cement effects only such cements that contain an excess of lime, hence to those using this process it would be well to bear the latter in mind when purchasing cement.

After carefully investigating the plants above mentioned I feel safe in recommending its use, but wish to add a few suggestions.

Blocks must be kept damp from the time they have been made up to the time steam is applied, and all blocks must be not less than twenty-four hours and not more than forty hours old when steam is applied· practical experiments may give a larger range but fo the present I do not believe it advisable.

As no two cements act the same by this process, too much care cannot be taken in selecting a high burned cement free from lime, or, if a low burned cement is used, see that it is of a bluish or greenish color, but do not get the impression that all dark cements are of a low burn, as the contrary is often true.

Cements containing an excess of lime will harden by this process, but I find sufficient evidence by testing such blocks that warrants my condemning them for buildings in our northern states, but in locations not effected by freezing temperature they would be admissible.

In testing blocks cured by the above process, I find that as far as waterproof qualities are concerned they absorb but six and one-fourth per cent of their own weight, against six and five-eighths per cent absorbed by blocks made of the same material and cured in the ordinary way.

Blocks cured in a room with but little additional air space, except the placing of narrow wood slats between blocks so as to allow the steam to circulate freely, are superior to those where the room was only partly filled.

I am placing a number of steam cured blocks where they will be exposed to the waves of Lake Erie, and I hope to report the effect our low temperature will have on them in one of the early spring numbers of the AMERICAN CARPENTER AND BUILDER.

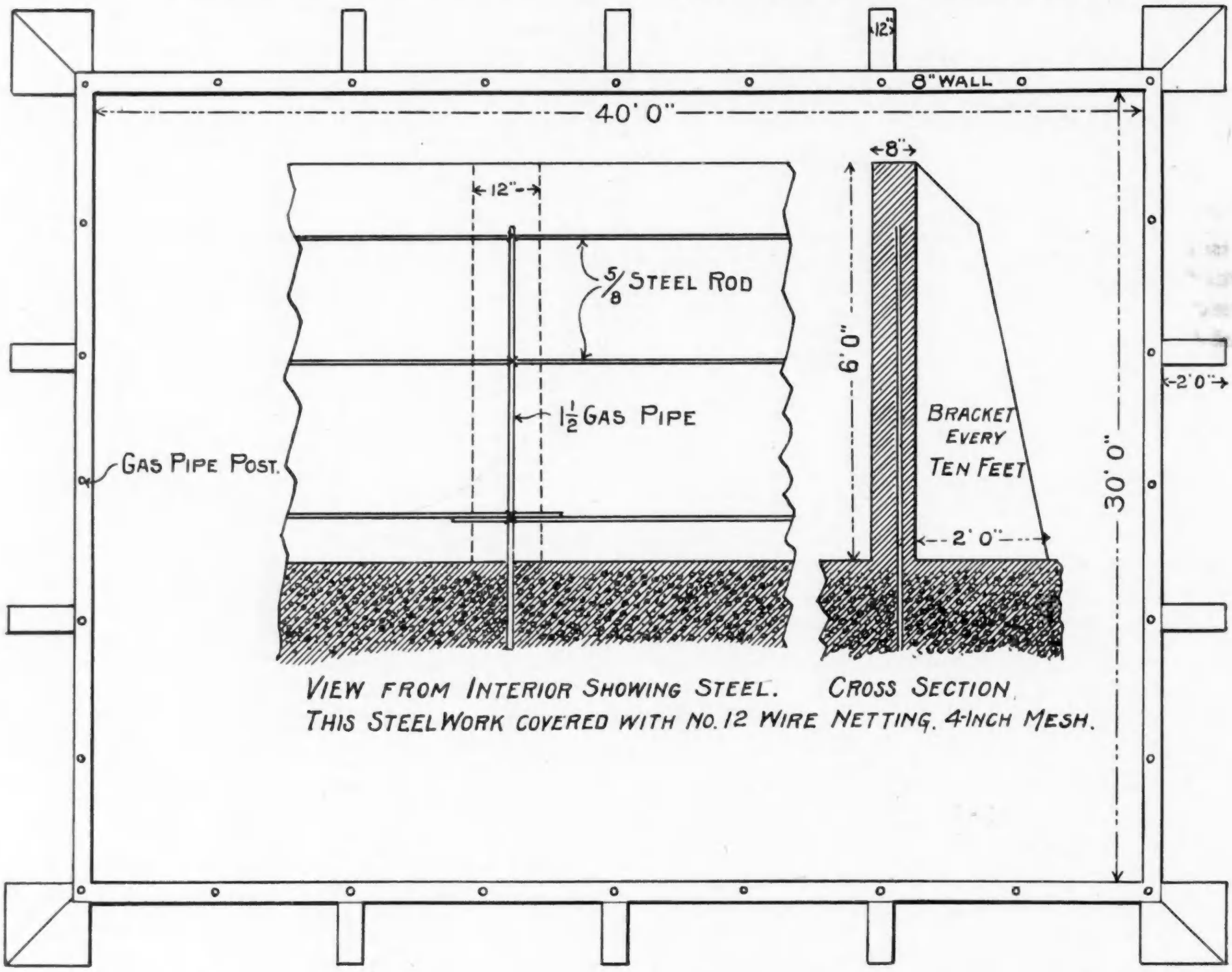
WATER-PROOF CEMENT TANK.

To the Editor:— Bay Head, N. J.

I am about to build a cement tank for a water company. Size to be thirty by forty feet and six feet high inside. This is to be built on top of the ground. I have been thinking of building it with a floor twelve inches thick and side walls two feet thick at bottom and sloping to twelve inches on top; and make my cement thin enough to be sure of its running together to make it water tight. This tank then will be plastered on the inside with good strong cement one inch thick both bottom and sides. As we have good sharp sand and gravel I think this will be all right. Will you please give me your advice on this? In what proportion should the material be mixed to insure its holding water and not cracking?

JOSEPH F. MORTON.

Answer: To build a tank thirty by forty by six feet high of solid concrete can be done with the walls as you suggest viz.: two feet thick at the bottom and tapered on the outside to one foot thick, using a mixture of one part Portland cement, three parts sharp sand and five parts gravel mixed with just sufficient water to make the cement plastic or "sticky," but do not make it thin enough to pour. It is true this would make it apparently more watertight, but in later years would not obtain as great strength. I enclose sketch for tank using a steel reinforcement which I believe to be far more advisable and less expensive; but before proceeding further let me impress upon you the fact that my experience has taught me to look for strength first and waterproof my work after the concrete has fully seasoned. To do this I suggest the following method and feel that you will make no mistake in following these instructions. First dig your foundation and place the footings for the wall and floor, then mix your concrete as follows: For foundation up to within four inches of your floor line use one part Portland cement, three parts sharp sand and two parts gravel (that will pass through a ring one inch in diameter), and four parts gravel (that will pass through a ring two and one-half inches in diameter), mix thoroughly and ram in position. Cover this with a three and one-half-inch course of one part Portland cement, three parts sharp sand and three parts gravel



(that will pass through a ring three-fourths inches in diameter), well mixed and thoroughly tamped in position. After it has hardened sufficiently build your false work with plank on both outsides and put in all pipe connections before beginning to place the concrete for the walls, as interference with the foundation after the walls are erected is not an easy matter to remedy. Mix one part Portland cement, three parts sharp sand and five parts clean gravel (that will pass through a one-inch ring), add just enough water to make it a little sticky and ram hard in position. Let all plank (false work) in position for at least three days after the cement work is completed. After removing the plank, plaster the exterior surface with a mixture of one part Portland or LaFarge cement and two parts sharp sand that has passed through a screen of sixteen meshes to the square inch, this will give it a finished appearance and will hold if the surface has been thoroughly wetted just before applying the plaster.

On the interior is where you must do your waterproofing and the following instructions should be closely followed. First apply a coat of plaster of the same composition as on the outside, but instead of troweling smooth it should be scratched rough with a kalsomine brush, while a second coat is applied before the first coat has fully set, this coat may be troweled but it is not essential. These two coats need only be one-fourth inch thick each but may be double that thickness, however, too heavy a coat will give considerable trouble in applying. After the cement plaster has become hard and dry the waterproofing may be applied which can be done in several ways. The cheapest and one of the best is to mix equal parts of refined tar (the same as is commonly applied to felt roofs) and Portland cement, mix until free from lumps and apply with a brush; and in two days the tank is ready for use. If the black color is an objection then we recommend the following which is known as Sylvester's process. Wash the surface with a solution of three-quarters of a pound of Castile soap to every gallon of water. Apply with a flat brush. The solution must be applied hot; the temperature must not be below fifty degrees Fahrenheit and the wall must be clean and dry. Let this remain twenty-four hours and apply a solution of a half pound of alum to four gallons of water. The temperature of this wash should not be below sixty degrees. If at the end of another twenty-four hours the water absorbs moisture repeat the two coats as before. Care should be taken not to have the soap solution froth while applying.

House of the Future

It is only within the last few years that concrete has been used as house building material. A number of large firms in the United States are now manufacturing concrete blocks, called reinforced concrete, for use in place of bricks or cut stone. Another form of this comparatively new building material is armored concrete, for the building of huge bridges or other large solid structures. In this work the structure is "armored" with steel rods and the soft concrete is poured into moulds around the rods and allowed to harden. Notable instances of recent armored concrete construction are the great railroad bridge across the Mississippi river at Thebes, Ill., opened to traffic only a few months ago, and the new McKinley High School building in St. Louis. The Thebes bridge is one of the wonders of modern construction.

Building houses with concrete blocks is a simpler method. The blocks are moulded by machinery made for the purpose, in whatever size and pattern may be desired. They are then laid like stone or brick and cemented with mortar. The Museum of Arts at the Lewis and Clark Exposition is made of concrete blocks. On the grounds are several smaller buildings, put up by exhibitors, of the same construction. The visitor may see the process of making the blocks, there being several concerns at the exposition which turn them out every day. The common black sand, so abundant in the western country, is used in connection with cement, and the blocks harden so that they are as solid as natural stone. It is held by some scientists that the great pyramids of Egypt, which have withstood the wear and tear of centuries, are built of concrete instead of stone.

The house built of concrete blocks certainly looks very durable. Any sort of ornamentation desired may be had, by making the mould of the proper pattern. One of the houses built at the Portland fair has the appearance of stone with the outer surface left rough. Another is smooth, taking paint readily.

Manufacturers of this kind of building material claim that it is much cheaper than cut stone, and they declare that is to be the popular material of the future, and that the cement or concrete house twenty-five years from now will be as common a sight as is the concrete sidewalk of to-day.

Cement Blocks Popular

So many uses are found for concrete in building operations that new applications of this material in order to secure permanence and economy of construction are being constantly recorded. One of the latest is from Liverpool, where dwellings made of concrete are being erected by corporations for artisan classes, the idea being that the cost of erection ca be reduced to a point that will enable rooms to be rented for a shilling a week. The material used consists of concrete blocks formed from waste crushed clinker obtained from the city refuse destructor plant, which is ordinarily employed in making concrete slabs for crosswalks and in pavement foundations. The structure of these slabs or concrete dwellings is re-enforced by steel framing, and they appear eminently strong and durable.

The cost of brick dwellings recently erected in Liverpool was in one case about $17,000, and in another about $11,000, for a block, while the estimated cost of a concrete block was but $6,000. In the actual erection, however, there was required a new and necessary plant which brought the cost to over $20,000, but the actual amount involved in the building was but $15,000. The engineer in charge is confident that with further experience the new method will be found most economical, and desires to erect five additional blocks. If dwellings for the masses can be provided at a substantial reduction on present cost, the use of concrete is bound to have an important influence on sociological conditions.

A little drop of oil, a little bit of care, saves a lot of toil, avoids a lot of wear.

Plumbing

WM. R. MARSHALL.

Water Supply for Country Homes

METHOD OF DELIVERING WATER AT ANY FAUCET IN HOUSE, YARD OR BARN—ADVANTAGES OF THE COMPRESSED AIR SYSTEM—ILLUSTRATIONS SHOWING HOW IT IS OPERATED

THE procuring of a water supply in the country depends largely upon the surrounding conditions. Of course, when the source of the water supply is at a higher level than the house, a gravity system is the least complicated, and very often the cheapest. When the house is located at a reasonable height above the water supply, which could be made to supply an eight or ten-foot head, the hydraulic ram could be used. Rams will work, and successfully, where the spring or brook is only three feet higher than the ram head, as the height or head

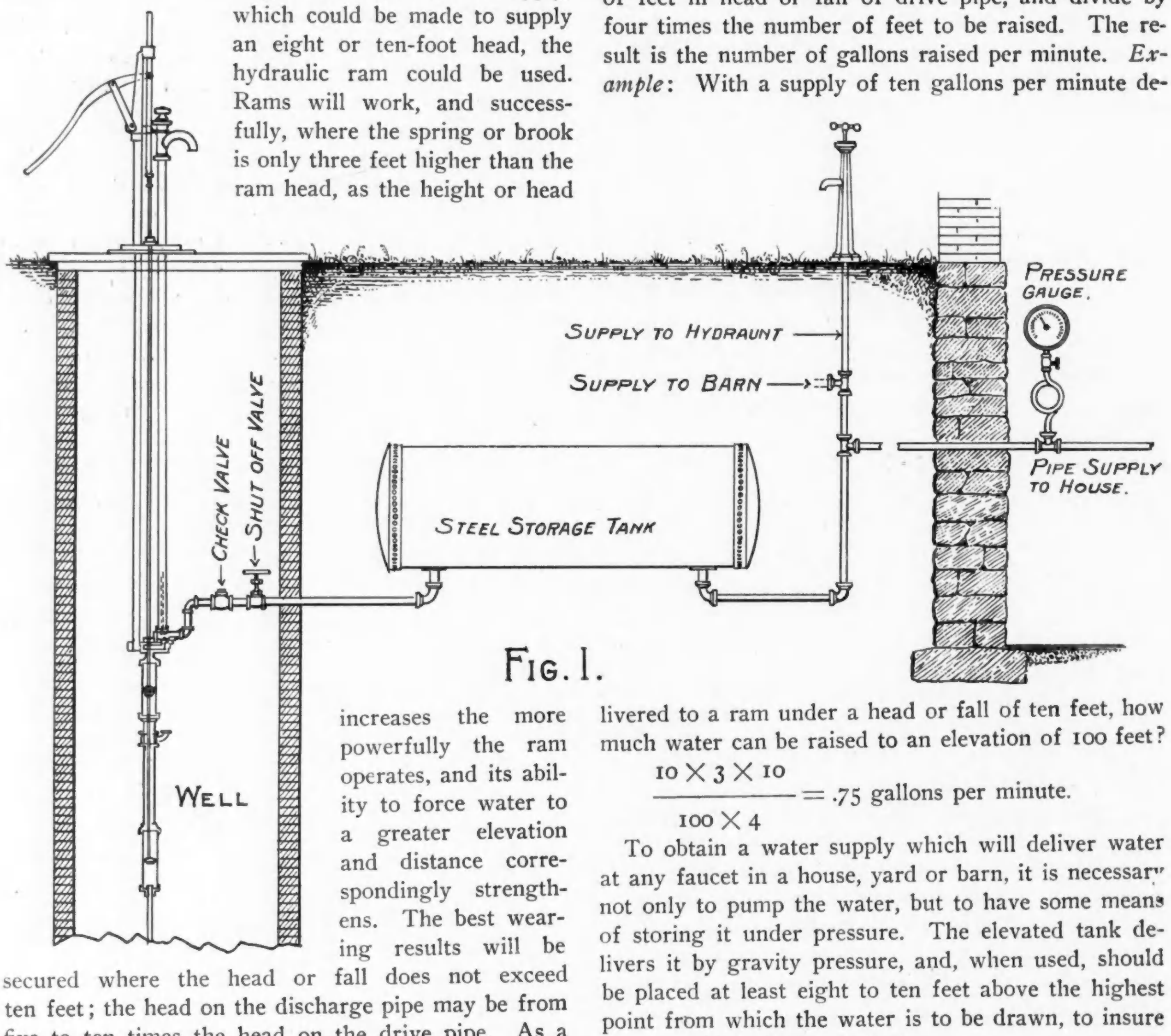


Fig. 1.

increases the more powerfully the ram operates, and its ability to force water to a greater elevation and distance correspondingly strengthens. The best wearing results will be secured where the head or fall does not exceed ten feet; the head on the discharge pipe may be from five to ten times the head on the drive pipe. As a specific example: We might say a fall of ten feet from brook or spring to the ram is sufficient to raise water to any point, say 150 feet above the machine, while the same amount of fall would also raise water to a point considerably higher, though the quantity of water discharged will be proportionately diminished as the height and distance increase.

RULE FOR ESTIMATING DELIVERY OF WATER

Multiply the number of gallons supplied to the ram per minute by three, and this product by the number of feet in head or fall of drive pipe, and divide by four times the number of feet to be raised. The result is the number of gallons raised per minute. *Example*: With a supply of ten gallons per minute delivered to a ram under a head or fall of ten feet, how much water can be raised to an elevation of 100 feet?

$$\frac{10 \times 3 \times 10}{100 \times 4} = .75 \text{ gallons per minute.}$$

To obtain a water supply which will deliver water at any faucet in a house, yard or barn, it is necessary not only to pump the water, but to have some means of storing it under pressure. The elevated tank delivers it by gravity pressure, and, when used, should be placed at least eight to ten feet above the highest point from which the water is to be drawn, to insure a respectable velocity of discharge.

COMPRESSED AIR SYSTEM

The principle of delivering water and other liquids by pressure of compressed air is very old, but it was not until recently that this principle was employed to furnish domestic water supply.

One of the greatest advantages of the compressed air system is that it does away with the elevated tank, and there are a great many defects in the elevated tank system. If placed in the attic, it is not high enough to afford a sufficient pressure to be any protection against fire. Another objection is the weight of the tank, when filled with water, is very liable to crack the plastering and to leak. Another serious defect of the elevated tank, when placed in an attic or on a tower is the exposure to weather; in the winter time it freezes and in the summer time it becomes warm.

In the compressed air system the tank is placed either in the ground below the frost line or in the basement, and the water is pumped into the bottom of the tank with a force pump, which may be operated by hand, windmill, gas engine or hot-air engine. Another opening in the bottom delivers water to the faucet in the house, yard or barn. As the water is pumped into the bottom of the tank the air above it, not having an outlet, is compressed. This pressure is increased and maintained by an automatic air valve. The tank is practically indestructible, and, unlike the elevated tank, requires no expense after it has been put in. When the tank is one-half full of water, the air which originally filled the entire tank will be compressed into the upper half of it and will exert a pressure of fifteen pounds to the square inch, and if a straight supply pipe was run from the bottom of the tank, this air pressure would force the water to a height of thirty-three feet. For ordinary elevation the best results are obtained by maintaining in the tank excess air pressure of ten pounds; that is, enough air to give ten pounds' pressure when the tank contains no water. Thus equipped, a tank will deliver two times as much water as otherwise. In a system of this kind the advantages are obvious. It does away with the elevated tank, delivers water at an even temperature all year around. The tank and pipes leading to and from it are protected from the weather. A pressure of fifty pounds is easily obtained, which equals the pressure from an elevated tank one hundred and fifty feet high. This affords first-class fire protection and enables the country residents to have all the sanitary conveniences of a city home. A double system of this kind can also be installed; one for furnishing well or drinking water to the fixtures, and another one supplying soft water from the cistern.

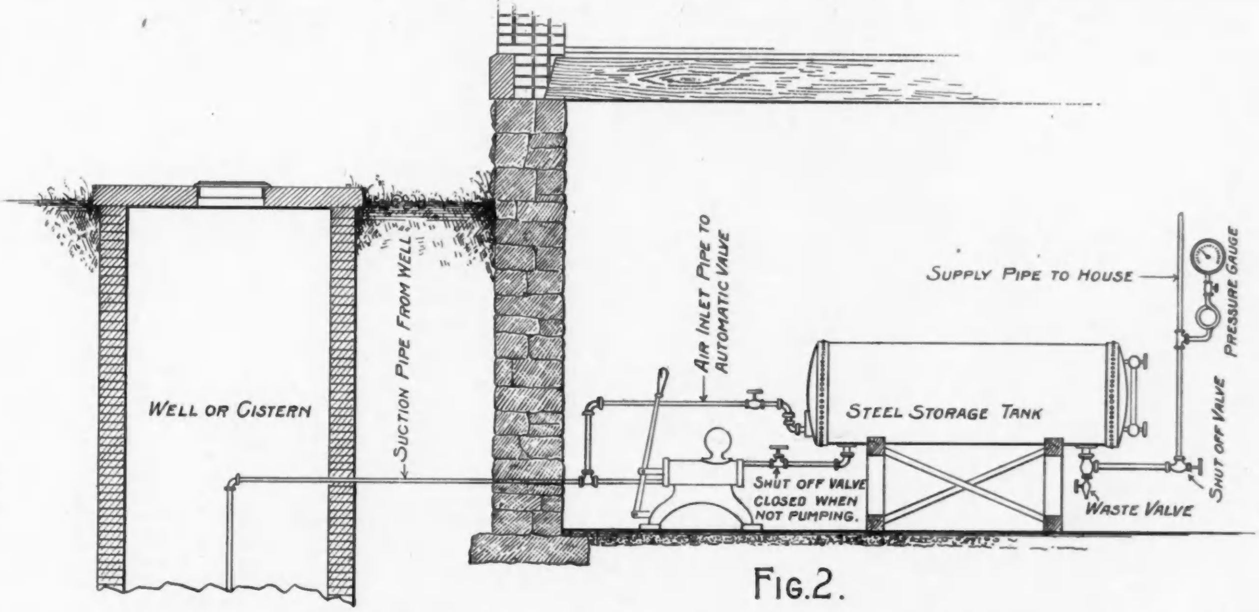


FIG. 2.

In Fig. 1 we show a steel storage tank buried in the ground below the frost line; water is pumped into it by hand or windmill. This pump forces both air and water into the tank at the same time. A connection run to surface near the house to a yard hydrant with hose connection furnishes water for sprinkling and fire protection; another branch supplies water to the barn, under pressure.

In Fig. 2 we show a steel storage tank placed in the basement and supplied with a hand pump. These two illustrations will serve to give some idea of the extent to which a system of this kind can be put to use.

Skyscrapers Rust-Proof

According to a Chicago architect the steel skyscrapers of that city will never decay from rust. He cites facts developed by work on the addition being made to the Fair building. Steel construction that had been in place there for eight or ten years was found to be free from rust or other disintegrating influences. The process of fire-proofing, now accepted by buildings in this country, also prevents rust. The girders in the Fair building were found to be in perfect condition, and authorities can see no reason why the next ten or fifty years would make any difference, as the steel is protected against all dampness.

MANUAL TRAINING

IRA S. GRIFFITH

Something the Boys Can Make

MATERIALS AND DIMENSIONS TO USE IN MAKING A SLEEVE PRESSING BOARD AND A BREAD-BOARD—BEST TOOLS TO USE IN CONSTRUCTING SAME

PLANING a broad surface smooth and level is rather a difficult operation. Beginners ought, if they have conscientiouslymade the things described for them in the preceding numbers of the magazine to be ready to attack this problem.

The sleeve pressing board, Fig. 1, is for the purpose of slipping into a sleeve while the iron is applied to take out the creases.

The bread cutting board, Fig. 2, is given also because the tool operations are similar to those used in making the sleeve-board. It is used as a block upon which to lay the loaf in cutting bread, in order to keep the knife from cutting the table.

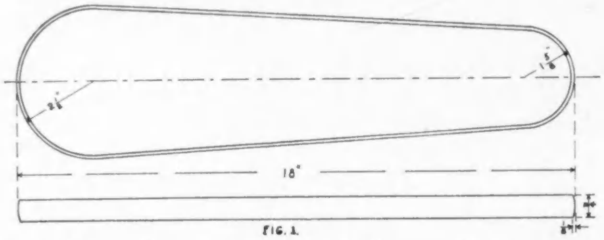


FIG. 1.

Soft pine should be used for these pieces. It is close grained and can be kept clean more easily than the coarse grained woods. The main reason for using pine in these problems is because of the ease with which its surface can be planed. A boy has not the strength to plane the surface of hard, tough wood until he has first learned something about it in softer wood.

For the sleeve-board, cut a piece of stock about five and one-half or six inches wide by eighteen and one-half inches long. For the bread-board, the stock should be eight inches wide by fifteen and one-half inches long.

Plane one of the broad surfaces of the sleeve-board smooth and level. In doing this place the board on the top of the bench with one end against the bench stop.

Carpenters have various ways of holding in place the boards whose surfaces they wish to plane. Some have bench stops with teeth which sink into the end of the board when it is shoved against the stop and thus keep the board from moving with the backward stroke of the plane. Some carpenters use a tail-vise and the pressure is applied at the ends of the board. Beginners usually try to hold the piece by placing it in the side vise. This will not do as the pressure on the sides of the board cause it to cup or curve; and, though its surface be planed ever so level while in the vise, it will not be level when the pressure of the vise is released.

Whatever manner of holding the board is used the plane should be lifted at the heel on the backward stroke enough to keep the bit from being rubbed by the surface of the board.

It will be necessary to use winding sticks on this surface. Winding sticks are two pieces of wood having straight, parallel edges. They can be made by squaring up accurately two pieces, each one inch wide, by one-half an inch thick, by sixteen inches long. They should be beveled, as shown in Fig. 3. The bevel edge and its opposite must be straight and parallel.

A good way to test the sticks is to place them on some known level surface; sight, or look, across their top edges. See if they agree; that is, if they can be made to appear as one edge. Reverse one of the sticks and if they still agree the sticks are true. If they do not agree, find where the trouble lies. See if the bottom edges are straight then set the gauge and test to see if the top edge is everywhere equidistant from it.

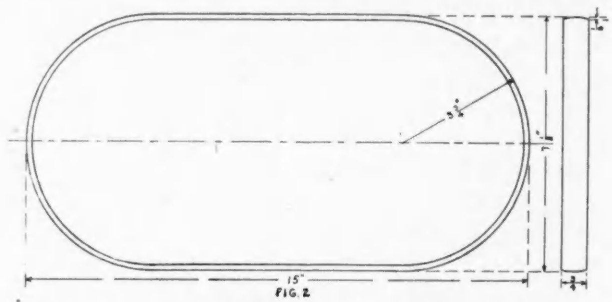


FIG. 2.

To plane the surface, begin at the forward end of the board and gradually work across and back.

After having planed the forward part of the board, it will become necessary to stop the forward movement of the plane on the surface which has already been smoothed. This must be done in such a way as not to show where the plane was lifted from the board.

To do this gradually lift up the heel of the plane, keeping the toe on the board when nearing the stopping place. This feathers the shaving in such a manner that no abrupt markings are made.

The plane blade must be in straight; that is, one side must not project below the plane bottom farther than the other. The corners of the blade should be slightly rounded so as not to catch the wood. The blade should be set no deeper than is necessary to take off a thin shaving.

Test the surface of the board frequently while planing by laying a winding stick across and along it;

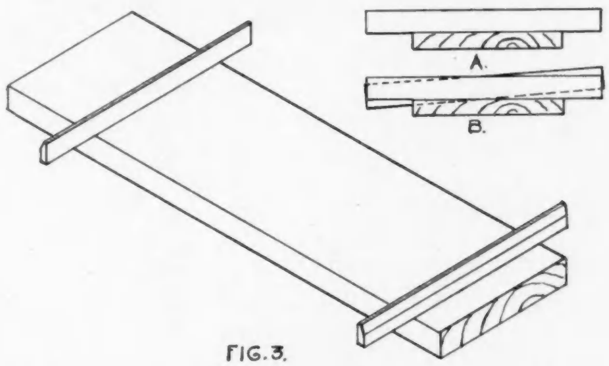


FIG. 3.

holding them between yourself and the light to see if any light comes from under the winding stick.

It is quite likely that the winding stick when laid across the board shows a level surface, but it will be necessary to apply another test before calling the surface level. This is done by placing the two sticks as shown in Fig. 3 to see if the surface has wind or twist. If the edges agree as in A, Fig. 3, the board is level. But if one of them takes the position indicated by the dotted lines in B, Fig. 3, the board is warped and it will be necessary to plane down the high corners.

After having planed one surface smooth and level, set the gauge to three-quarters of an inch and gauge on the two edges and ends of the piece. Gauge from the planed surface, after having marked it xx for the working face; then carefully plane the second surface to these gauge lines.

The laying out of the sleeve-board introduces a new line, the center line. Draw lightly with pencil a line down the middle of the working face, using a straightedge and drawing from end to end of the board. Mark on this line two points eighteen inches apart. Set the compass, or dividers, with lead pencil attachment, to two and one-half inches. Place the lead point on one of the points just marked and, holding the other prong on the center line, describe a half circle. Again, set the compass to one and five-eighths inches and in a similar manner describe a half circle through the other point made on the center line. With the winding stick or any other straight-edge connect the circles by drawing lines tangent to them. A line is tangent to a circle when it touches the circle without passing through any part of it.

The board can now be placed in the vise and the outline cut by means of the turning saw as was done in making the coat hanger. Smooth to the line, using the plane and spoke-shave and testing with the try-square.

Set the pencil gauge, the gauge whose point is of lead instead of steel, to one-eighth of an inch and gauge on both broad surfaces, all around. Also gauge a line in the middle of the edge by setting the gauge to three-eighths of an inch.

With the spokeshave, gradually round the edge from the gauge mark on one surface to the mark on the other leaving the mark on the middle of the edge untouched. Finish with the scraper.

With the sandpaper on a block, smooth the broad surfaces, rubbing in the direction of the grain. Holding the sandpaper free, finish the rounded edge. Notice the drawing that where the curved edge joins the broad surfaces the corner is sharp, sandpaper so as to keep it that way on the board.

The surfaces of the bread-board are prepared as are those of the sleeve-board. The thickness is the same—three-quarters of an inch.

The center line is marked at points fifteen inches apart. The compass is set to three and three-quarters inches for each end.

It is not advisable to put any kind of finish on either the sleeve or bread-board for obvious reasons.

The more ambitious boy can improve his sleeve-

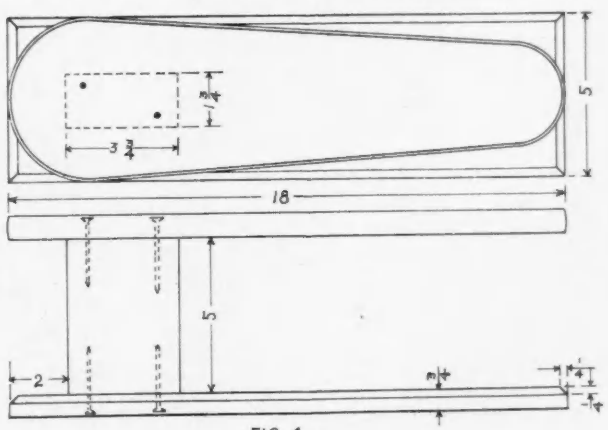


FIG. 4.

board by attaching it to a base. Square up a piece of two-inch stock to one and three-quarter inches thick by three and three-quarters inches wide, by five inches long. Make a second piece for the base three-quarters of an inch thick, by five inches wide, by eighteen inches long. Bevel the top of this piece to one-quarter of an inch on top and edge. Fasten the pieces together with nails as shown in Fig. 4.

Would Not Be Without It

I am very much taken up with your publication and would not care to be without it now. Everyone to whom I show it thinks it is the best of anything they have ever seen in that line.—F. R. Marrs, Wolford, N. D.

FARM BUILDINGS

HENRY H. NIEMANN

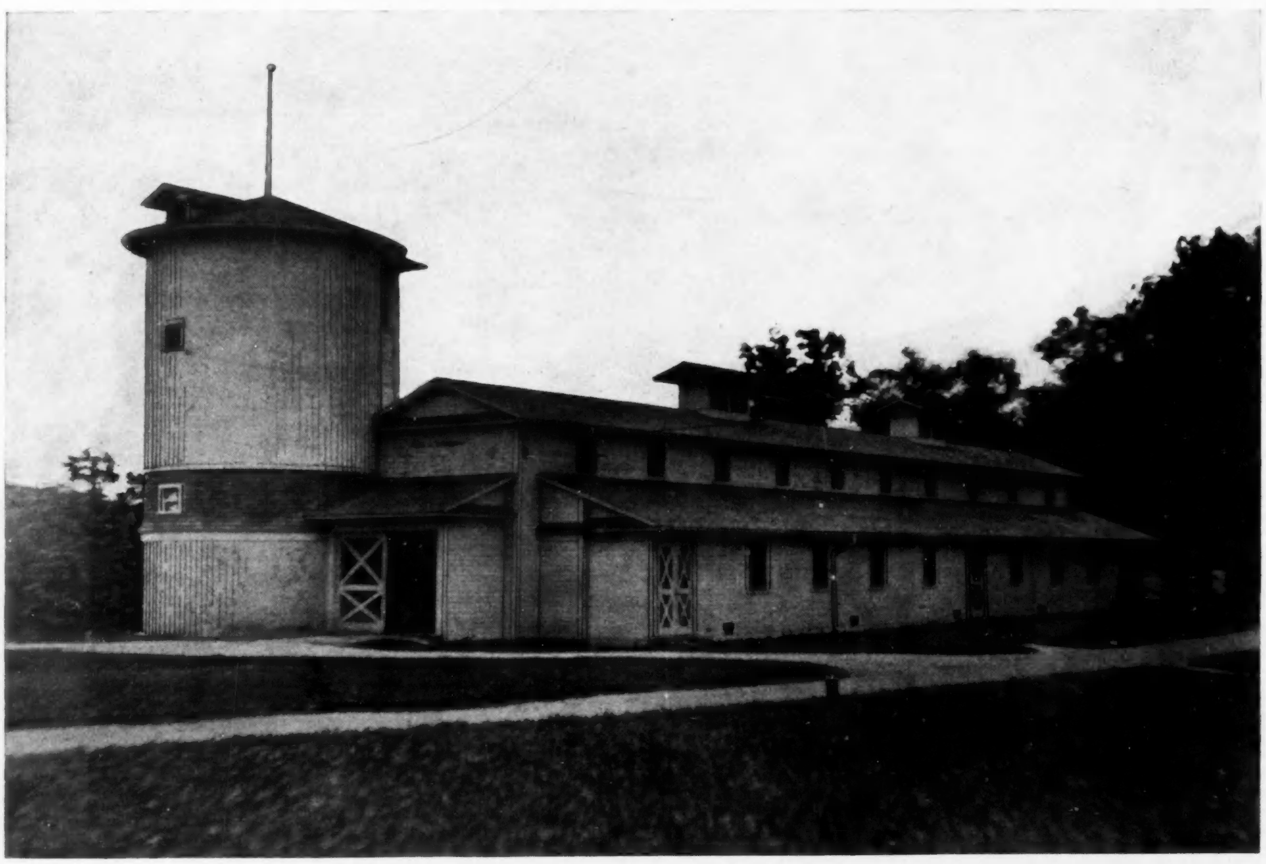
A Model Cow Barn

SHOWING THE FLOOR PLAN AND CROSS SECTION WITH THE DIMENSIONS OF THE VARIOUS POSTS AND TIMBERS—CONSTRUCTED ALONG THE MOST SANITARY LINES

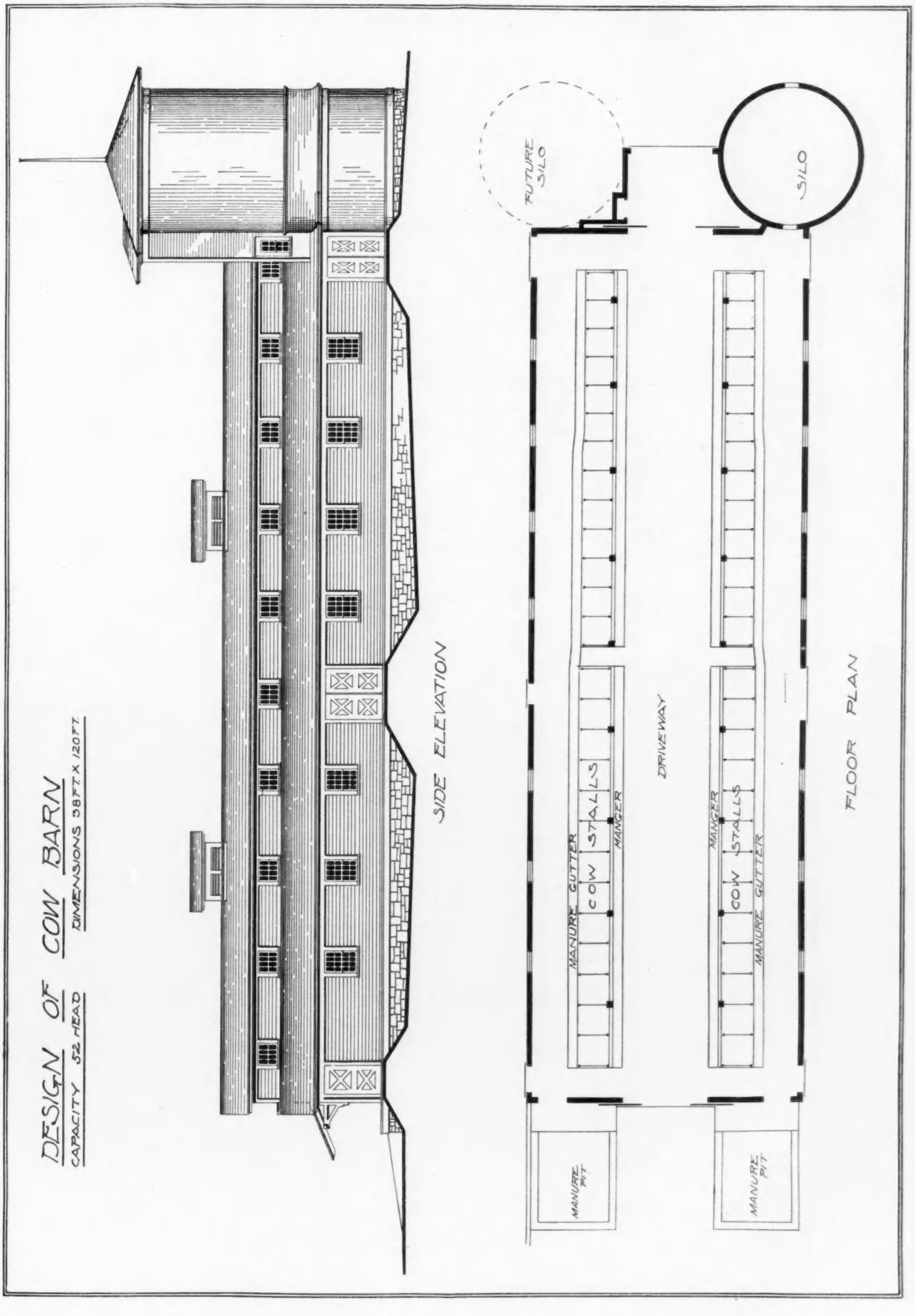
THIS month we are illustrating the fourth of the group of farm buildings built on George B. Robbins' farm near Hinsdale, Ill.

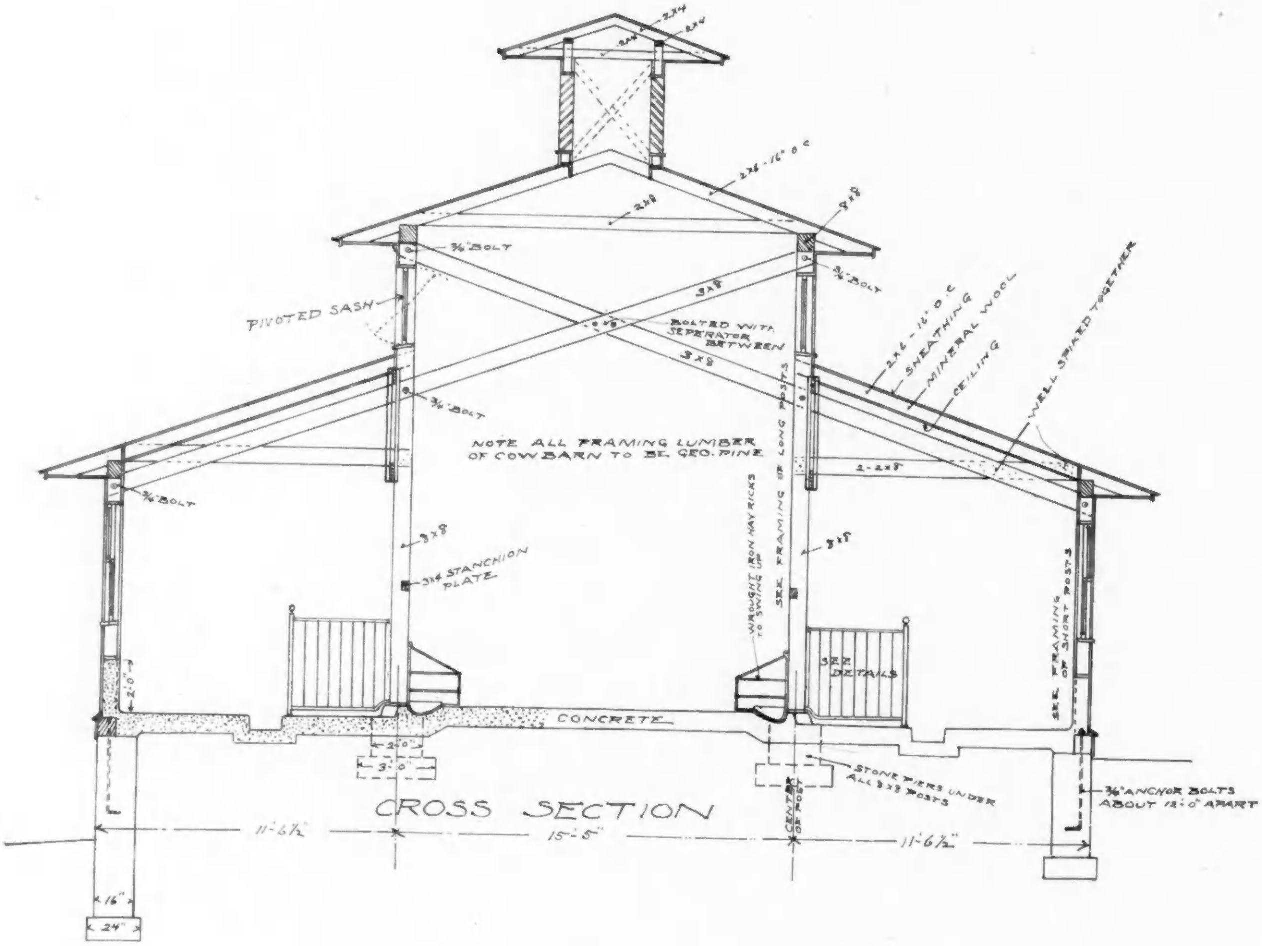
The building illustrated in this article is for the dairy barn, showing the floor arrangement, side elevation, cross sections and a half-tone photograph of the buildings in perspective. The size of the building is 38 feet 6 inches by 142 feet, with a capacity for the housing of fifty-two milcn cows. The building is now being increased to double the present capacity by an extension to the rear end and the addition of another silo as indicated by the dotted circle in front. The plans show it to be a well constructed building as well as in the arrangements for which it is designed, nothing being spared for the comfort of the animals and in the arrangement for their proper care.

The entire floor space is made of concrete, including the manger and manure drains which carry the liquid manure back to the pits. These drainages are also connected with a sewer drain so that the wash water from the floors, etc., can be turned into same, thus saving the liquid manure for fertilization purposes. The mangers are also connected with the sewer drain so that these can be readily cleansed. This also serves as a watering trough whereby all of the cows in each row of stalls can be watered at the same time.

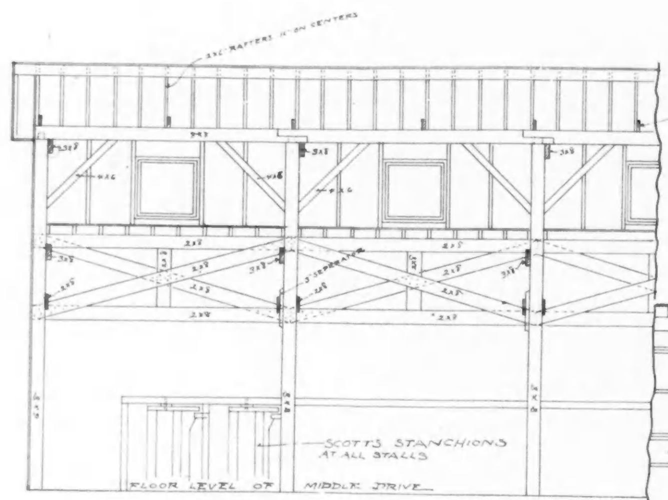


A space two feet high between the studding of all of the outer walls is filled in with concrete and finished with a smooth face of concrete with a curve at the floor line, thus leaving no chance for the collection of germs or animal matter in the sharp angle that would otherwise be formed. The stalls are made of

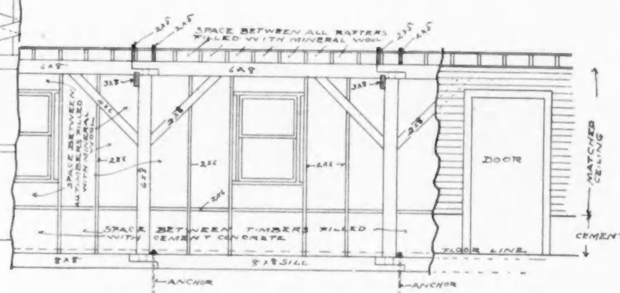

DESIGN OF COW BARN
CAPACITY 52 HEAD
DIMENSIONS 38FT x 120FT
SIDE ELEVATION
FUTURE SILO
SILO
MANURE GUTTER
COW STALLS
MANGER
DRIVEWAY
MANGER
COW STALLS
MANURE GUTTER
MANURE PIT
MANURE PIT
FLOOR PLAN



CROSS SECTION



SECTION SHOWING FRAMING OF LONG POSTS



SECTION SHOWING FRAMING OF SHORT POSTS.

iron and set in the cement. Each stall is furnished with individual wrought-iron hay racks made to swing up when not in use. The cement finish of the floors in the aisles and stalls are made sufficiently rough to prevent the cows from slipping. A wide driveway extends through the center of the building to admit the hauling in of loose hay or other feed.

The silos are located at the front, the feed being loaded into carts and wheeled to the feed mangers. The light and ventilation questions have not been overlooked as will readily be seen by a glance at the plans. Careful calculations were made for the proper cubic feet of breathing space for each animal, thus helping to make the sanitary conditions as near perfect as is possible to be obtained in buildings of that nature.

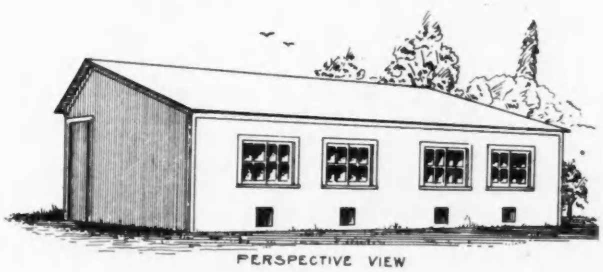
The building is well constructed and the whole neatly painted in appropriate colors becoming to the group of buildings to which it belongs.

Practical Poultry Houses

DESIGN FOR AN INEXPENSIVE HOUSE TO BE USED IN CITIES—A SCRATCHING-ROOM HOUSE TO ACCOMMODATE FROM FIFTEEN TO TWENTY-FIVE BIRDS

By R. B. Sando

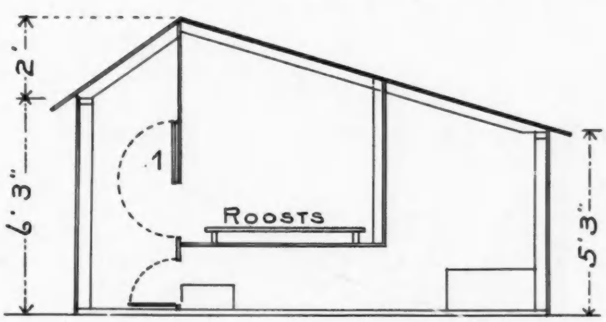
THE poultry house of which plans are herewith presented is designed to meet the demand for a house having a hall in the rear of the pens, from which the greater part of the work may be done without entering that part of the house occupied by



PERSPECTIVE VIEW

the fowls; and a house that can be converted into an open shed or used as a closed house at will. This so-called scratching-room house is economical to build, is thoroughly practical, and many houses on this plan, or modifications of it, are in use on large poultry plants and farms.

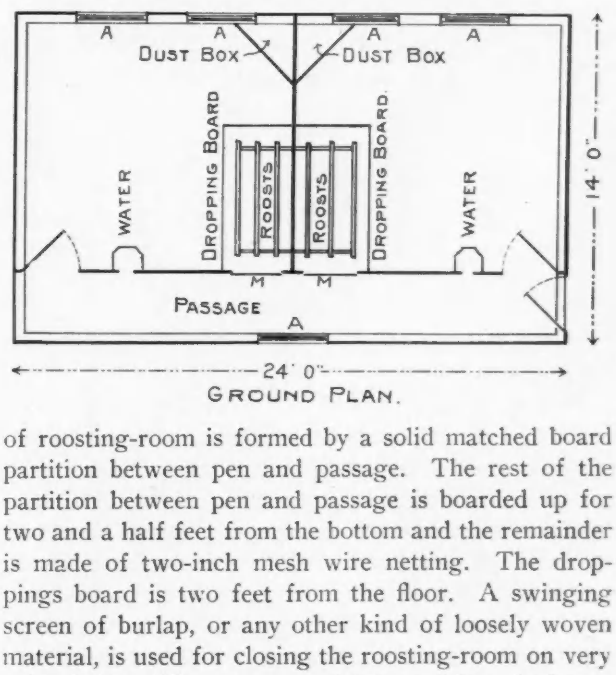
The house is convenient and labor-saving, as nearly all work, excepting changing litter and dust and opening and shutting windows, may be done without entering the pens. The entire floor space of the pens, except the space occupied by the dusting boxes, can be



SECTION.

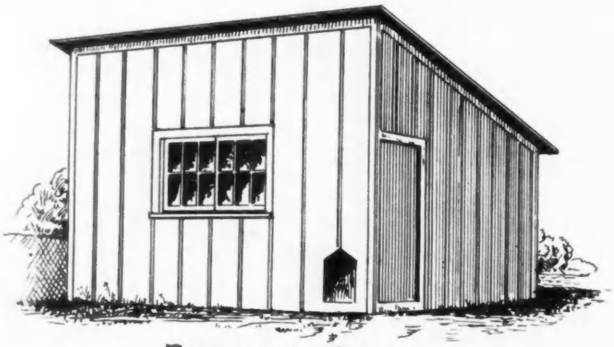
used by the fowls as a scratching-room. By opening the sliding windows, each pen is practically converted into an open shed, containing a protected roosting-room. Closing the windows gives a well-lighted closed house.

The plan as given is for a single-section, two-pen house, fourteen by twenty-four feet; but the house may, of course, be made any length desired, without changing in the least either the exterior or interior arrangement. As shown in the ground plan, the house is divided into two pens, each eleven by twelve feet, with a passageway three feet wide in the rear of the pens. The pens are separated by three feet of boards and a wire netting partition. That portion of the partition which forms the back of each roosting-room is solid board partition from floor to roof timbers. Each pen contains a roosting-room, of which the droppings board, three by six feet, forms the floor; the back is formed by the partition between the pens; on the side next the windows; the droppings board is supported by a matched board partition and stud from the roof to the edge of droppings board; in the rear the wall



GROUND PLAN.

of roosting-room is formed by a solid matched board partition between pen and passage. The rest of the partition between pen and passage is boarded up for two and a half feet from the bottom and the remainder is made of two-inch mesh wire netting. The droppings board is two feet from the floor. A swinging screen of burlap, or any other kind of loosely woven material, is used for closing the roosting-room on very cold nights. Whatever material is used is tacked on a wooden frame, and hinged to make a door closing in the open front of the roosting-room. When not in use it is hooked up against the roof timbers out of the way. The dusting box is made by fitting an eighteen-inch or two-foot wide board in the grooves at the corner of pen, as shown in cut. The nests, four in each pen, are on the floor beneath the droppings board and close to the partition between the hall and pen. A door in the partition between pen and passage opening to the nests opens downward, bringing the nests directly to hand. M is a door about two feet deep which swings upward and opens into the roosting-room; it is used to reach roosts and droppings board from the hall for cleaning. It is also very convenient when it is desired to catch a fowl on the roost at night. The water pans set in a cage hung to the partition, and are



PERSPECTIVE VIEW

open to the walk from the rear and may be filled from that place without entering the pens. Those doors which open from the passage into the pens are made of matched stuff at the bottom and of wire netting at the top. A are windows, two in each pen and one in the passageway for each two pens. The roosts are made in the form of a frame and swing upward against the partition, where they are hooked out of the way when cleaning the droppings board. The eighteen-inch square exits which allow the fowls to gain access to the yards, are worked by a line and pulley from the hall. The windows slide horizontally in groves, and each is provided with a screen of fine-mesh wire netting which slides independently. The rear wall of house is boarded up on the inside of studs.

A house built according to these plans will furnish very roomy quarters for fifteen breeding birds in each pen. If used for a colony of layers or for young stock, it could easily accommodate twenty-five birds, if an additional roost were supplied. It makes a warm, convenient house, warm in winter and as cool as any (cooler than many) poultry houses in summer. Used as it should be with the windows thrown open whenever possible, without permitting it to storm directly into the house, it possesses all the advantages of an open shed.

The material necessary for the proper construction of this house, with earth floor, would cost about $28.

CITY POULTRY HOUSE

In Fig. 2 is shown a simple design for a cheap city poultry house, ten feet square on the ground; height in front eight feet, in rear five feet. Such a house will accommodate from ten to twenty hens, according to breed, amount of yard room, etc. The only openings in the house are the door in the east side, the window

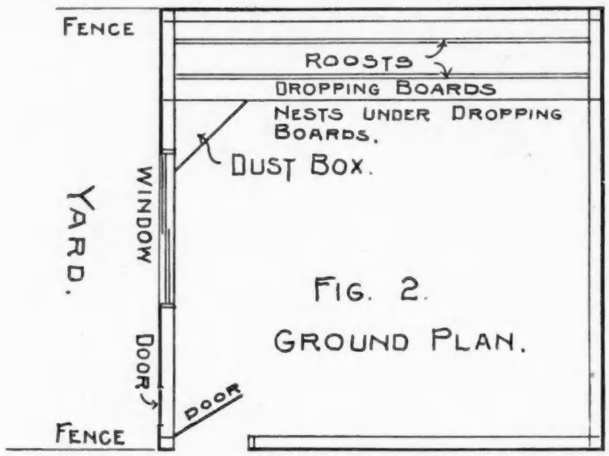


FIG. 2.
GROUND PLAN.

in the south front, and the small door giving the fowls access to the yard. It is best, of course, to make the sides out of matched stuff, but when, for various reasons, this cannot be done, the front and east side may be boarded up and down with boards one foot wide, dressed on one side; the joints between the boards to be covered with battens. The west and north sides and the roof are of boards covered with building paper.

Fabrics as Wall Decorations

HISTORY OF TAPESTRIES—VARIOUS KINDS NOW IN USE—WHY MORE ADAPTABLE TO CERTAIN ROOMS AND MORE DESIRABLE THAN PAPER

By Sidney Phillips

OUTSIDE of mural paintings, the earliest wall decorations we have any knowledge of are undoubtedly fabrics or tapestries. In medieval days the ladies and the maid servants stayed at home weaving tapestry hangings representing either historical or religious subjects, while the knights and their attendant squires went off to the Crusades. These pictorial tapestries were used to hang upon the walls of castles, palaces and monasteries, many of them being preserved to this day. The greatest artists of the period of the Renaissance did not disdain to furnish cartoons for tapestries, and the productions of the French government factory at Gobelins are famous for their beauty. Yet all of these were made slowly and by hand, the result necessarily being costly and beyond the reach of any but the wealthiest. Wall paper was originally designed to take the place of tapestry hangings, and the earliest wall papers were either pictorial or their designs closely followed those of embroidered tapestries. This character gradually became lost and designs in which gold was largely used came into extensive vogue, but of recent years many wall papers have been made that very closely represent tapestries or woven fabrics, the effect generally being obtained by the use of an overprint of parallel or crossed lines, which at a little distance so closely resemble the woven threads that the eye is deceived.

In the dwellings of the richest classes, both in this country and abroad, woven tapestries are very largely employed as wall hangings, many of them costing as high as twenty to fifty dollars a yard, the usual width of the material being fifty-four inches. These goods are most generally silk or silk and linen tapestries or damasks, and in order to use them as wall decorations it is necessary to stretch the material over frames, made very similar to the frames upon which canvas is stretched for oil paintings. The goods are tacked to the frames, being pulled tight to insure smoothness. In using fabrics in this way, the edges of the frames must always be covered or hidden by mouldings or by panel stiling of some kind, and the tacks, if they are driven in the face, and not in the edge of the frames, must be concealed by gimp. Within the past few years fabrics made of jute or cotton goods have been introduced to take the place of the more expensive silk tapestries, and to be used in the same way. These are made both in two-toned or self-toned effects, in which the entire piece receives the same dye, the pattern showing by reason of the difference in texture. Other materials of this character are woven in quite elaborate colors and designs. Chintzes and cretonnes, in which the pattern is printed on a plain cotton background, are also extensively used for wall hangings, and the cost of these as well as the jute fabrics is by no means prohibitive. The great objection to all soft finish goods used as wall hangings is that the work of stretching them on frames is expensive and troublesome—it necessitates the use of mouldings, and the space left back of the fabric acts as a dust collector, and moreover, the material sags with the weight of pictures hung against it. It is essential, to give the idea of firm support to a wall, that its apparent surface should not yield to a slight pressure or weight. Of course, the older tapestries being themselves pictures, no one thought of hanging smaller pictures against them.

A few years ago it occurred to a firm of decorators in Philadelphia, all of whom were artists, that ordinary burlap or bagging might be pasted upon a wall and decorated by painting upon it. They did this quite successfully and when the Art Club in that city was built, about 1890, they were employed to hang the art gallery walls with burlap, which was stained and then clouded with bronze powder. The effect of this was so good that the use of burlaps as a wall hanging began to come into general favor, but at first only the rough bagging was obtainable. One or two manufacturers saw the possibilities in the use of burlaps and began to offer dyed burlaps to the decorators. These met with a ready sale, but the decorator was obliged to first size them in order to prevent the paste from striking through and marring the effect of the fabric. Before long, ready sized or prepared burlaps were placed on the market under different trade mark names, and these materials can be cut and hung upon the walls almost as readily as ordinary wall paper. The chief precautions to be used are that the walls should be glue sized and the paste should be mixed stouter than for ordinary wall paper.

Besides the ordinary burlaps, this material is now made in several fancy weaves and in widths varying from 36 to 218 inches, so that no joints are necessary if it is run round the room instead of up and down. Of course a skillful and experienced paper hanger is needed to hang these wide goods.

In addition to burlaps, cotton duck and buckram in various colors are used for wall hangings and come sized and prepared ready for pasting. These goods are not only sold in plain colors, but they are also decorated either with stenciled or painted patterns, or they may be painted or stenciled upon after they have been hung upon the wall.

Burlaps, either plain or decorated, are very little if any more expensive than high-grade wall papers, and their texture gives them a soft and pleasing effect on the wall that is impossible to obtain by means of any paper decoration. Moreover, the little imperfections that occur in the weaving add rather than detract from their decorative effect, because they take away from the too mechanical stiffness the goods otherwise would have.

Another fabric material that is coming into vogue for wall decorations is a special kind of oilcloth, made very much like table oilcloth except that it is printed in designs suitable for wall decoration. As the colors are oil colors and as the material is washable, it is specially useful as a wall hanging, particularly in all those localities where soft coal smoke so soon discolors a wall. A similar material is made having an embossed surface and a paper back, so that it can more readily be pasted without injuring the embossing. This closely resembles tiles or stamped leather, and as it is washable it is just as well adapted for bath room or vestibule walls, at a much lower cost, and what is equally important, without the weight of tiles or the muss and dirt of tile setting.

New Tape Measure

Pat was busily engaged laying brick one day, when the foreman came to him and said:

"Pat, go back to the end of the building and measure the length of the foundation for me."

Pat vanished, and after a stay of some duration, returned.

"Well, Pat," said the foreman, "did you measure it?"

"I did," answered Pat.

"How long was it?" was the question.

"Altogether," answered Pat, " 'twas as long as me rule, me arm, an' two bricks."—Lippincott's.

Baseball is played on the diamond, but that is no reason why it shouldn't also be played on the square.

Correspondence.

Finishing Bar Tops

To the Editor: Lander, Wyo.

How can I finish up bar tops both hard and soft wood, so they will have a finish that will not stain?

O. L. MIDDLEKAUFF.

Answer: If the bar top is made of hard wood, it should first be filled with a good paste filler that should be stained to match the wood. If the natural color of the wood is not desired, it should be stained before it is filled. After the filler has become partially set, it should be wiped across the grain with burlaps to rub the filler into the pores of the wood and to remove any superfluous filler; and after it has become dry it should be sandpapered lightly with the grain, and should then receive at least three coats of grain alcohol shellac. Each coat should be sandpapered lightly or rubbed with curled hair before applying the next succeeding coat. The final coat should be rubbed with pumice and oil until a perfectly smooth and level surface is obtained, and should then be polished with rotten stone and sweet oil. The treatment for a bar top made of soft, close grained wood is exactly similar to the above, except that the paste filler is omitted, the shellac being applied as soon as the stain has dried. Of course, if a water stain is used, the grain of the wood will be raised, requiring sandpapering after the stain is dry. To keep bar tops in good condition mix one part (by measure) of strong vinegar with two parts of boiled linseed oil, and after cleansing with lukewarm water, apply this mixture with a woolen cloth, well saturated, and rub briskly over all parts of the top until polished. Another method of finishing a bar top, whether of hard or soft wood, is to fill the wood with a paste filler, after first staining it if desired. And after the filler has been well rubbed into the grain of the wood and allowed to dry, the bar top is polished with any of the rubbing and polishing oils made for polishing furniture, or the mixture of vinegar and boiled oil may be used. It is well to apply this with a woolen cloth and then to polish by means of a piece of rubbing felt stretched over a wooden block that can be held comfortably in the hand.

EDWARD HURST BROWN.

Decorations For Dining Room

To the Editor: New London, Conn.

I am finishing a dining room in dark cypress with plaster panels to a height of three feet six inches, and am at a loss to know just what decorations would look best. What would you suggest?

JAS. H. LANE.

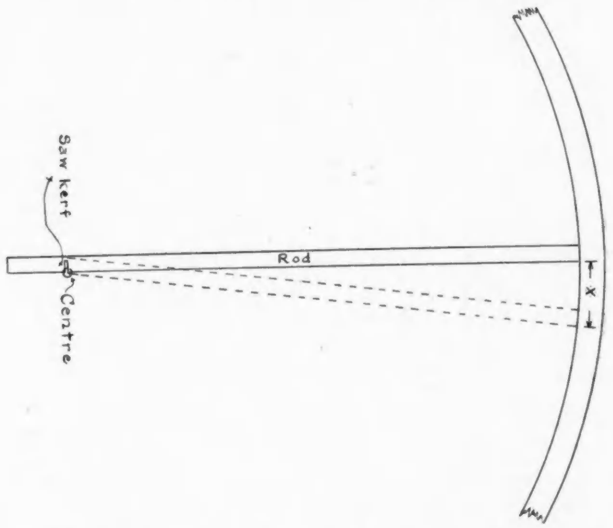
Answer: We are not exactly clear what our subscriber means, but presume that the wainscot is formed by means of applied stiles and rails of cypress, leaving the intermediate plaster panels undecorated. These panels would look well if filled with either a plain or figured burlap or similar fabric in either red or green; or a Japanese leather paper may be used if the panels are large. Lincrusta could be used to give the effect of carving, and stained the same color as the woodwork. The upper part of the wall should be treated with a plain fabric or with a self-toned paper running up to about twenty-four to thirty inches below the ceiling, where it should be capped with a combined plate and picture rail, or a wider shelf, on which steins, ornamental plates or other bric-a-brac may be displayed. Above this the frieze may be hung with a figured paper in harmonious coloring or one of the pictorial friezes could be used. These can be obtained in many beautiful designs. Another treatment for this upper portion of the wall would be to use a plain ingrain paper of a lighter color than the side wall—for example, a light tan could be used with a red side wall—running this paper out some eighteen inches upon the ceiling, where it should be separated from the center panel of the ceiling by a narrow moulding. The ceiling could be tinted a deep ivory. Such a room would be refined in color effect, and would act as a pleasing background for any pictures or other decorations.

EDWARD HURST BROWN.

Sawing Kerfs

To the Editor: Fredericton, N. B.

In the August number of your interesting journal is a query and a reply as to the method of finding the distance between saw kerfs for bending a board round a curve. Subjoined is a simple sketch of a method given me many years ago while a student in a technical college. I submit it to



your readers for what it is worth and, beyond saying that I have found it answer very well, do not vouch for its scientific accuracy.

Take a rod and saw a kerf in it at the center, from which the curve was struck. Hold the short end beyond the center quite still, then move the end of the rod round the curve until the saw kerf closes, and the distance traversed by the rod along the curve gives the distance apart of kerfs.

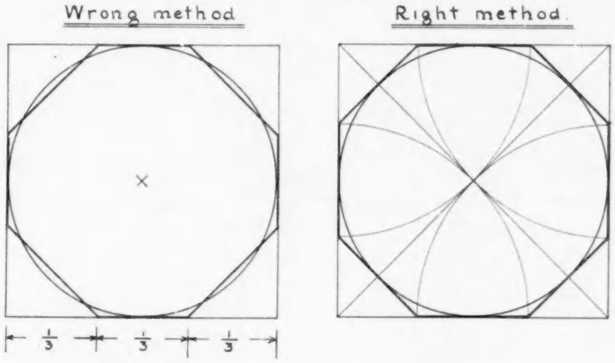
T. B. KIDNER.

Forming An Octagonal Prism

To the Editor: Fredericton, N. B.

I have read with interest Mr. Griffith's able articles on simple woodworking models for boys, but may I point out one slip the author made in the August number?

On page 131, in speaking of the round rod for the plate rack, he says, "If you are unable to secure a rod one can be made by squaring up a piece of stock to three-quarters of an inch each way, then gauging with the pencil gauge



set to one-quarter of an inch. This will make an octagonal prism or eight-sided solid when the four corners have been planed to the gauge lines."

An octagonal prism obtained in that way would have four of its faces wider than the rest. The correct way is to set the pencil gauge to one-half the length of the diagonal of the end of the piece of squared stock.

The accompanying diagrams will serve to demonstrate this.

T. B. Kidner.

A Square Pitched Roof

To the Editor: Patten, Maine.

Will you give me the correct figures of a square pitched roof for a building twenty-two by twenty-eight feet long, and what rise to the foot? Some of our carpenters have different ideas regarding square pitch. Jos. R. Palmer.

Answer: Pitches are reckoned by the proportion given the span of the common rafters, as one-fourth, one-third, one-half, etc., meaning that the roof has a rise of that proportion to that of the span. Referring to the question of square pitch, many carpenters apply this term to the half pitch, because the angles of the rafters rest at ninety degrees with each other and therefore make a square angle at the peak, but this is not a proper term to use in designating this pitch. The figures to use on the steel square are as follows: Twelve and twelve give the seat and plumb cuts of the common rafter, and seventeen and twelve that for the hip or valley. These figures also give the side cut of the jack, the seventeen side giving the cut while the twelve side will give the cut across the face of the roof boards to fit into the valley or over the hip. For the side cut of the hip, take seventeen, and nineteen and seven-twelfths, the latter will give the cut across the top of the unbacked hip, or if it has been previously backed, use the same figures as for the side cut of the jack. The lengths for a building twenty-two feet wide would be fifteen feet and six and two-thirds inches for the common rafter, and nineteen feet and seven-twelfths inches for the hip, which should be taken on the top backing line. If the jacks are set on two-foot centers the common difference will be practically two feet ten inches. Or if they are set on one foot four-inch centers the common difference will be one-third less.

A. W. Woods.

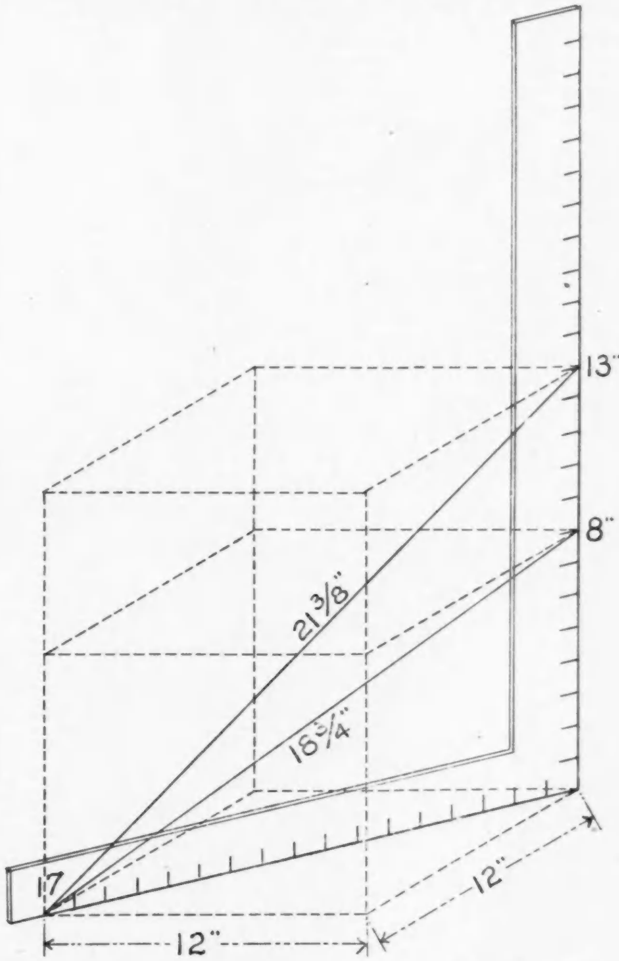
Length and Cuts of Hip Rafters

To the Editor: Paterson, N. J.

I wish you would explain if the figures 17 and the rise of the roof will give the length and cuts of all hip rafters where all parts of the roof are same pitch, or will it only cut those that are less than square pitch?

Wm. Linnigen.

Answer: We have answered this question several times in previous numbers of this magazine and will now answer it by the use of an illustration. All of the cuts and bevels about a roof are contained in some parts of an imaginary cube. In the accompanying illustration, we show a cube twelve inches square at the base. From this, it will be seen that the diagonal of the base is shown as being 17 inches on the tongue of the square in connection with the same. However, the real length is only 16.97+ inches, which is so near 17 that it is nearly enough as far as the cuts are concerned. This applies to the seat cut of the hip rafter so long as the adjoining pitches of the roof are the same, regardless of the pitch given the roof. In the illustration, we show two pitches, that for the 1-3 pitch or 8 inches rise to the foot, and



13-24 pitch or 13 inches rise to the foot. The solid lines from 17 on the tongue to these figures on the blade represent the position of the hip and the figures on the same represent their corresponding lengths per foot run to that of the common rafter. Seventeen taken on the tongue and these lengths (18¾ and 21⅜) taken on the blade will give the side cut of the unbacked hip for the respective pitches, the blade giving the cut. There is much more that could be said about this illustration pertaining to cuts in and about the roof. We will not take up space now to explain them, but will do so later on in connection with our regular articles.

A. W. Woods.

Quarter Sawing Oak

To the Editor: Boyne City, Mich.

Would you please inform me as to what system is used in quarter sawing oak? I have never seen this done and hear of several ways. What I want to know is in what shape they cut the log. S. A. TINKESS.

Answer: Quarter sawing is simply the manipulation of the log on the carriage to the saw, cutting the same into board so that the grain of the wood runs from perpendicular to obliquely with the face of the board, showing the edge instead of the flat grain. If the log is worked into boards

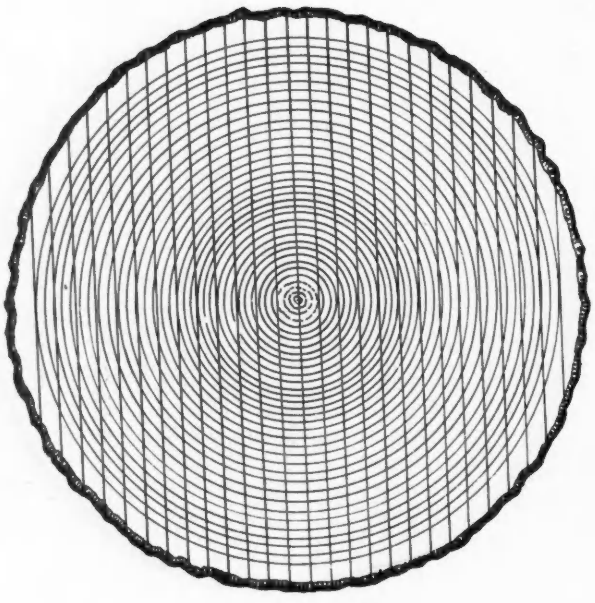


FIG. 1.

parallel with one another, as shown in Fig. 1, only a portion of the log will be cut into what is called quarter sawed boards, but if the log is first quartered as shown in Fig. 2 (hence the name), and these pieces again sawed into boards as

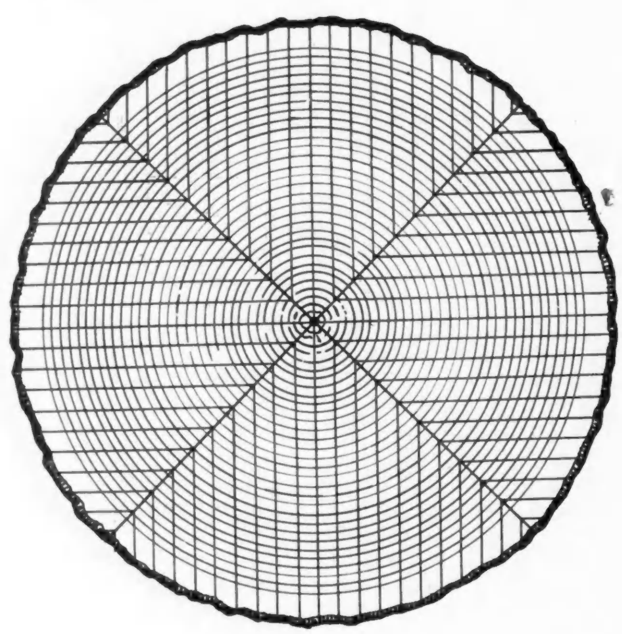


FIG. 2.

shown, then most of all of the log will have been quarter sawed. The same result may be accomplished by first sawing the log into halves, then turn one of these pieces on the carriage so that the sawed side will rest at an angle of 45 degrees with the saw, then saw the same into boards up to the original center of the log. Then turn the piece until the last cut again stands at an angle of 45 degrees and proceed as before and continue until the whole piece is worked up into boards. A. W. WOODS.

Explaining Board Measure

To the Editor: White Stone, Va.

I would be very glad if Mr. Woods would explain in your next issue the meaning of the figures running parallel with the blade of the square. F. P. SCHAEFER.

Answer: There are squares and squares; in other words, there are many squares that contain figures on the body of the blade for various purposes.

A few years ago we were called on to prepare drawings for the patent office for a square to contain a rafter table on the blade of the square. After the drawings were filed in the patent office the applicant was cited to more than a dozen squares on which he was infringing on the rights of others. This led to an investigation of the claims set forth by the different patentees, some of them dating back for a number of years. Most of these were found to contain a lot of figures more or less confusing and otherwise impracticable. If these parties had known the true use of the right angle formed by the blade and tongue of the square and the simple scale thereon, they would not have applied for letters patent for their invention and would have been both wiser and wealthier.

Besides the squares referred to, many others have been patented, but very few of them have ever been placed on the market. However, some of them were, and it may be one of these squares that our friend possesses, but we presume the one he has contains the board measure which has been stamped on most all of the squares for these many years. The fact that it has not yet become generally known by the men for whom it was intended shows it to be of but little importance. In fact, we can not now, after more than twenty years' experience among builders, recall a single instance where we saw this board measure referred to to find the contents of a board. Yet it is simple and easy to learn and is as follows: Always look under 12 on the blade for the length of the board and move to a point under the desired width and the figures recorded there represent the contents of the board in feet and inches in lineal board measure. Thus, a board nine feet long and nine inches wide contains six feet and nine inches or six and three-quarters feet. A. W. WOODS.

Water-Proof Concrete Blocks

To the Editor: Cunningham, Kans.

Please tell me if there is any successful and practical way of making concrete blocks practically water proof when they are made on a side face machine. J. B. THOMPSON.

Answer: No machine makes blocks water proof in the full sense of the word, but a block made face down is less absorbent if care has been taken in making than a side face made block. I contend, however, and practical tests have in every instance supported the belief, that to properly season a cement block it must be more or less porous, besides a wall may be made of water-proof blocks and moisture pass through the mortar joints; therefore I contend that the practical way is to make as sound a block as possible and water proof after the wall is built. Then we have the opportunity of successfully carrying out our intentions. This can best be done by applying either dheydratine, anahydrosal or silicated carbon on the exterior surface or by the use of Sylvester's process, which is described in my reply to Mr. Joseph F. Morton's inquiry in this issue. FRED W. HAGLOCH.

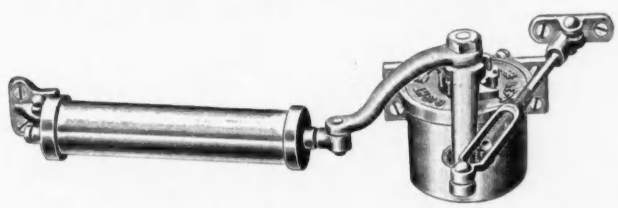
New Tools for the Carpenter and Builder

INTERESTING DESCRIPTIONS AND ILLUSTRATIONS OF IMPORTANT MACHINES AND MATERIALS THAT ENTER INTO HOUSE CONSTRUCTION IN ITS MANY PHASES AND DETAILS

Pneumatic Door Check

This pneumatic check is more reliable than liquid checks. It is more durable. It needs no repairs. It has no oil to leak. The spring has no initial tension and therefore can be easily removed and replaced. This check is superior to all other pneumatic checks, inasmuch as it is more compact and neater in appearance. The cylinder is closed at both ends, thus protecting the washer from grit. In that it can be reversed from right to left or vice versa by the simple moving of the arm to the side and without changing the main arm or spring.

The spring in this check is of coiled wire, being the most durable form. It works on the shaft without the use of collars and without initial tension. It can be wound by a wrench either left or right as required. The air cylinder is



made of brass and is closed at both ends. The check is placed about the centre of the door, thus eliminating the strain on both the door and the hinge. The working parts of this hinge are all made of malleable iron and steel. The check can be attached to the outside of a door by the use of brackets. The regular finish of the check is gold bronze with the air cylinder highly polished and lacquered. Other finishes furnished at special prices. This check is warranted against all imperfections in workmanship and material, but we cannot accept responsibility when a check too small in size is used for the door to be controlled. The Oscar Barnett Foundry Co., of 101 Hamilton St., Newark, N. J., manufacturers of this pneumatic check, will be pleased to furnish full information to all subscribers of this magazine who write to them.

"Hercules" Blocks in Great Demand

The General Electric Co., of Schenectady, N. Y., are now having a large building erected by J. J. Turner, Amsterdam, N. Y. The stone for this building is being made entirely on the Hercules Machine, which is manufactured by the Century Cement Machine Co., Rochester, N. Y.

Bittinger Bros., Plymouth, Mass., have just erected a large printing establishment by the Hercules method.

One of the largest and most beautifully designed churches in Canada is now being built by W. T. Waller, Napanee, Ontario, Canada. The blocks, water tables, sills, and ornamental work for this building were made on the Hercules machine.

Final Cost of a Roof

First cost is what most people consider; but final cost is what keeps the big army of roof repairers all over the country going all day—and overtime. You never know when the last item of *final cost* is going to arrive on a shingle, slate, tile, or other fragile or combustible roof. And you never know what the item is going to be. Most time the bills are inside of a few dollars, a charge for precautionary repairs; but they come with a persistent and exasperating regularity, even if they are small.

The final cost of Cortright Metal Roofing is calculable because of entirely original methods of making the best roofing possible from the best material for a roof. This means the best tin scientifically treated at every step of manufacture to give the greatest resistance to the weather—rain, snow, frost, ice, wind, heat.

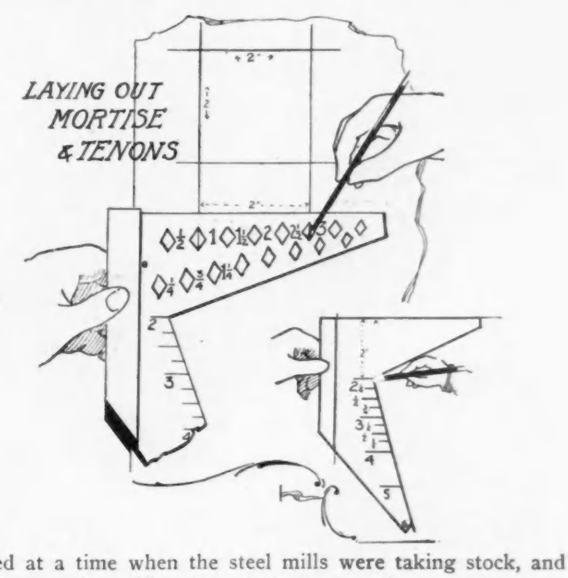
Cortright Metal Slates or Victoria Shingles make a roof that lasts without repairs because there are no exposed edges of tin, either from stamping, cutting or nail holes—no rust; because the interlocking device makes it absolutely water proof and air tight, free from rattling or danger of blowing off—wind proof, and free from the effect of contraction and expansion—no cracking of paint, no tearing of nail holes; because there is no place on it for water to enter or rest—rain and snow proof; because it is the only roof that does not require an expert roofer to lay—any competent mechanic can put on a Cortright roof—it is nearly fool proof.

The Lightning Estimator

"The Lightning Estimator" is the title of a book being placed upon the market by the Bradt Publishing Company of Jackson, Mich. The tables found throughout the book are based on the cost and material used on the entire work of a leading builder for years. Contrary to general rules for estimating, the tables given are based upon the actual cost of the work, the profit being added when the job is estimated complete at cost. It is not the intention to give a table for every kind of construction, but enough are provided to enable any one to make similar tables for any slightly differing methods of building. A set of tables and rules for estimating carpenter work are offered that are different from any others on the market. More useful information is given in a brief but right-to-the-point way.

The New Universal Square

In regard to the delay in supplying the trade with the larger sizes of their squares, The Duby and Shinn Mfg. Co., of New York, desire to explain that the reason is due to the fact of its being necessary to have a specially prepared steel, which when they began manufacturing, they did not know would be needed. To make matters worse for them, their order was



placed at a time when the steel mills were taking stock, and making repairs. This forced them to wait more than two months for a supply.

They have, however, now completed a large number of the larger sizes, and will soon be caught up on their back orders, and in a position to supply all demands.

Expansion Bolt and Screw Hanger

The Star Expansion Bolt and Screw Anchor are the finest things known for making quick and secure fastenings. The Star Screw Anchor is made in one piece—nothing to get lost; permits the screw to cut its own thread, and will fit any size and style of wood, machine, or special screw. When it is up it never loosens until you take it down; the screw can be replaced any number of times.

The Star Expansion Bolt is made in two parts and is extremely simple. It is very strong and will resist the greatest strain or most severe vibration. Can be used with any lag screw; no special cut or length of thread required.

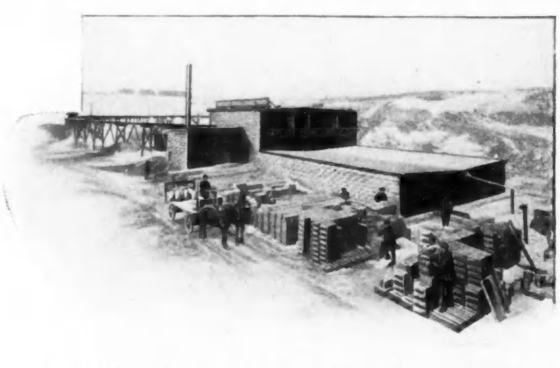
There is no other way of making absolutely secure fastenings to brick, stone, concrete and such substances with so little labor and expense as by the use of Star Expansion Bolts and Star Screw Anchors. Every one who has used them is satisfied. Give them a trial and you will wonder how you have ever done without them. Subscribers should send for a circular more fully describing them. If you state you are a reader of the American Carpenter and Builder and address the Star Expansion Bolt Company, corner of Washington and Cedar Sts., New York, N. Y., the company will be pleased to send you samples and full information.

A Serious Drawback Overcome

In all the waves and changes of progress in construction no other material has made such enormous strides in the same length of time as has cement block construction, due to the fact that no other material has been found that can compete with it for permanence, durability and cheapness.

While admitting its many points of excellence over any other material, the most serious obstacle that the contractor meets with who wishes to bid on a modern building thus far has been a lack of variation in cement block facing to produce the artistic effect that the architect desires.

The makers of the machine shown elsewhere in this issue claim that this machine, simple in appearance and construction, will make upwards of 1,000 varieties of block facing without the cost of an additional plate. This makes it possible to



estimate intelligently on any type of cement construction that any architect may desire to produce, because the contractor can figure to a very small fraction just what it will cost him to deliver the finished blocks and with the full assurance that he will meet no work that he cannot produce easily.

The machine is easily portable, viz., it is compact and does not require many parts to handle any job, and may be taken to the work, set up and the blocks made on the job, or it may be set up in a small space—a back yard in summer or a small room in winter. Two men with very little experience and this machine, the makers claim, will turn out 400 sixteen-inch stone every working day of ten hours.

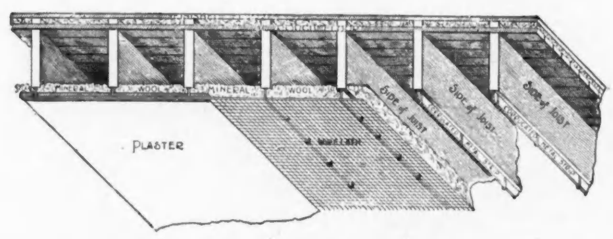
The Battjes Building Material Co., the makers of this machine, have been engaged in the cement construction business for a long term of years and will gladly advise with any builder whether using their machine or not. They operate a large number of their own machines in their own plant at Grand Rapids, Mich. Business has come to them in such a volume that Mr. Battjes says we feel that we can afford to be generous to those who wish to start in the business of cement block making.

Semi-Fireproof Construction

By the use of mineral wool applied, as shown on cut below, the cost of ceiling, including lath put up and two inches of mineral wood on same, would be from 50 to 60 cents per square yard, according to locality.

Specification for Ceiling—Fur below the bottom of each joist, longitudinally, with a metal furring strip not less than one inch wide, said strip, if corrugated, to be of No. 20 gauge band iron, and if not corrugated, to be of No. 10 gauge band iron. After fastening said furring strips, lath the ceiling with metal lath; the lath must be put on running crosswise of the joists; and fill on top of lath with two inches of mineral wool. The furring strips and lath to be fastened in place with staples long enough to drive at least one inch into joists. Any kind of wire or metal lath can be used with this ceiling. Lath with an open mesh, such as the Roebling lath or expanded metal lath, can be put on with the least trouble, for the reason that the staples can be driven more readily.

Mineral wool is placed upon the metal or wire lath, carefully packed underneath the joist, and extending up between



them to any desired height. The wool should be put in place before plastering, and it will be found the most economical to put it in when the lathing is done. The lath is plastered underneath as usual. The mineral wool is soft and pliable, and the plaster forms a perfect key when applied after the wool is placed.

Mineral wool is entirely non-combustible. And no degree of heat possible in a burning building will consume it. The plan of construction here illustrated and described, if the walls are also protected, will make a building practically fireproof. This form of construction also thoroughly deafens the floor and ceiling, so that sound will not pass through them.

"The Cement Worker's Hand Book"

"The Cement Worker's Hand Book," by W. H. Baker, Wadsworth, Ohio. Cloth. 4½ by 6½. 86 pages. Price 50 cents. We believe that every one interested in cement construction should possess this book. It is simple, practical and comprehensive and the twenty years of experience of the author makes it safe. The book is in five parts.

Part 1 treats on commercial cements, their chemistry, methods of making, etc. Part 2 tells of mortars in their various forms, formulas, mixing and handling; Part 3 of concretes, common and reinforced, nature and methods; Part 4 of cast

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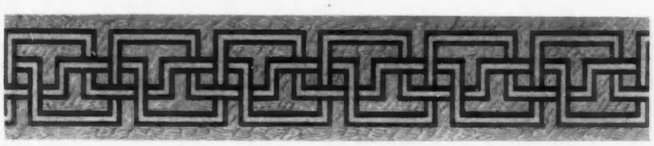

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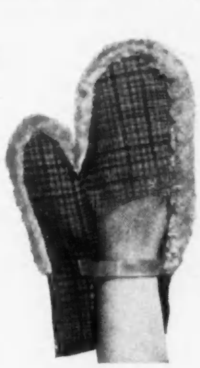

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products, monolith and portable wares, covering an extensive range of work, such as foundations, floors, walks, fire proofing, cisterns, steps, building blocks, tanks, posts, etc.; Part 5 a practical note on cement work and how to overcome the defects most common, how to make forms, how to measure ingredients, how to color, how to test cements, how to determine cost, etc.

On the whole, we think it a most complete and timely book on this subject at this time of great cement activity. The book is in its second edition and has been sold in all parts of the English-speaking world.

Handsome Sash Bars and Posts

Next only to strength and safety, light is the great end aimed at in our modern construction, and the proper setting of plate glass presents quite a problem to the architect and builder. In accomplishing this end the "Petz" corner post and transom bar has made a fine record and won distinct recognition. This does away with big, unsightly and obscuring pillars and posts. It possesses great strength, holds the largest and heaviest lights of glass securely and firmly in position, takes up small space, does not obstruct the light and leaves the entire window for purposes of display. These posts and bars are made from one and three-eighths to two and one-half inches in diameter, in many styles and finishes, to cover every possible need of the contractor or builder. They are finished in copper, brass, bronze, German silver, nickel plate, oxidized copper, antique brass and gun metal. The "Petz" corner post and transom bar is made only by the Detroit Show Case Co., Detroit, Mich. A postal addressed to them by any of our subscribers, at 491 Fort St., Detroit, Mich., asking for Circular No. 77, will receive prompt attention and more information about this up-to-date method.

Ancient Painted Tiles

The use of painted tiles for decorative effects dates back as far as 3300 B. C., the walls of the palaces of ancient Egypt being covered with them. The Persians, again, modeled pictures in low relief upon the narrow edges of large flat bricks built into the walls of houses in their capital of Susa; the Louvre, in Paris, contains the original of one such frieze representing a procession of black archers with dresses and armor colored in brilliant enamels. The knowledge of enameled pottery lingered on in Persia through all the great changes of empire, and Persian workmen, or Arabs trained by Persians, carried the art of tile making and painting far and wide, until their characteristic effects of blue, green, purple and white were familiar in countries as distant as Spain and India. As used in Mohammedan mosques, says an exchange, the decorations were applied more in the form of tiles than of bricks. Large surfaces were covered with the regular courses of tiles in repeating patterns or with ornament broken up into panels.

When we dislike a thing in others, let us see that we ourselves do not practice the same.

Well! Well! Get in Line!

HOW?

By using the Coryell Cement Block Machine. When we ask you to get in line, we mean get in line with a block that will make a hollow wall, so that when your customer asks you if you can build a hollow wall, you will not have to evade the question by saying: Our or my machine makes a hollow block. A hollow block is all right as far as it goes, but they will not make a hollow wall. Now if you want to avoid trouble with moisture and frost, use the Coryell Block, which is better than all, for it makes a hollow wall.

Our catalogue can be had for the asking.

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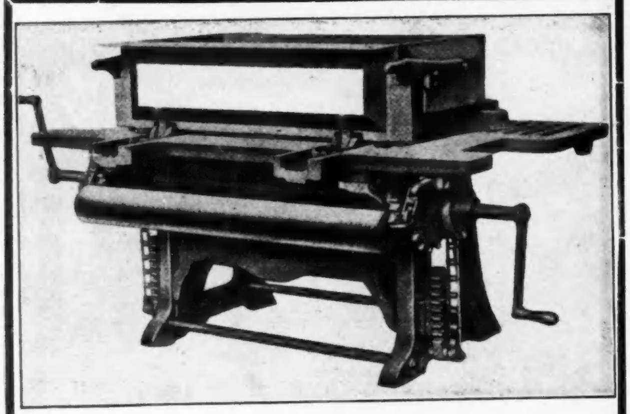
82 N. Main St. WHO MANUFACTURE AND SELL THE MACHINE ADRIAN, MICH.



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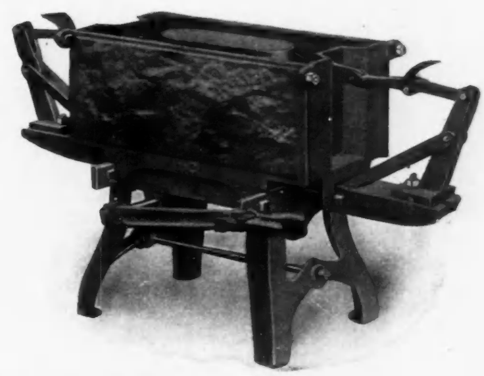

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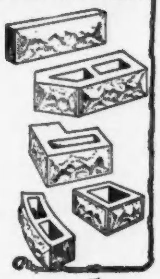

WE SELL THE MACHINE, YOU MAKE THE BLOCKS

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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.

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

No gears or chain to clog or break.

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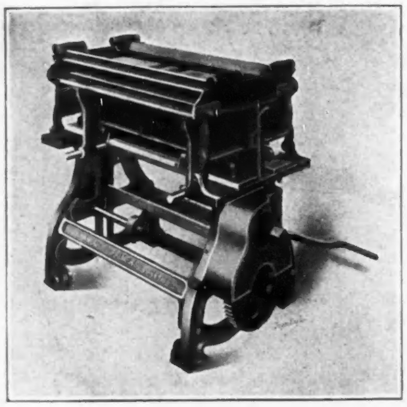

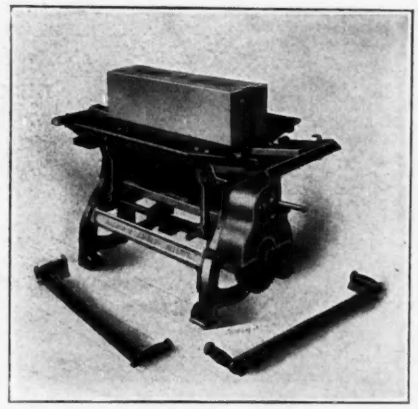

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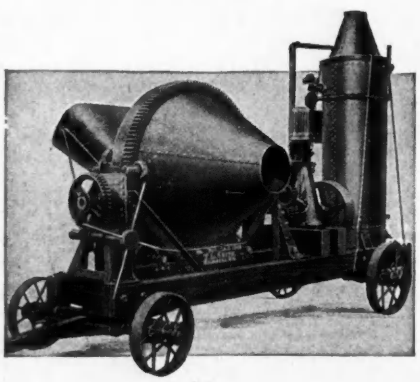

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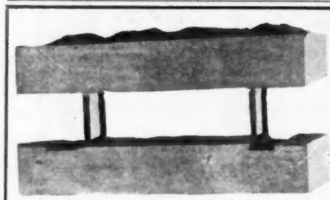

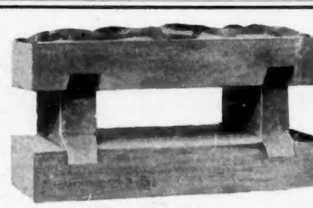

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Makes the only reinforced ***steel bonded*** block and the best bridge block on the market. It makes them in all sizes and in many designs all on the one size wooden pallet. The most complete portable machine on earth. Equipment includes plates for sills and lintels up to 60 in. long. The exceptionally low price will interest you. ***Machines sent on trial.*** Also molds for sewer pipe, well curbing, tanks, manholes, etc.

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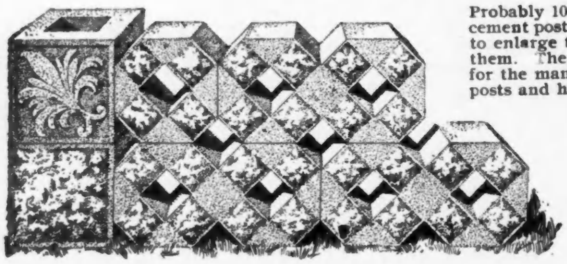

Probably 10,000 persons contemplate engaging in the manufacture of cement posts or cement building blocks this year. Many more propose to enlarge their plants or perfect their equipment. You are one of them. The **cost** is an item of importance. Before buying a machine for the manufacture of cement building blocks, porch blocks, fence posts and hitching posts, write for my new catalog and learn about the **Sand Pallet** and the **economical** system of making them.

By using the **Sand Pallet** you cut out the cost of wooden or metal pallets. This item alone will save you $200 to $500 on a small outfit to make 150 blocks per day. This amount is more than I ask for an outfit to make 25 varieties and sizes of stone, posts, lattice and piers. Besides this, the other kind of machine costs more than mine. You will be **right** when you adopt the Crouch System.

J. M. KEITH, 1190 West 4th Street, Des Moines, Iowa.

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,

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Write for catalogue to the

STEWART CEMENT BLOCK MACHINE CO.

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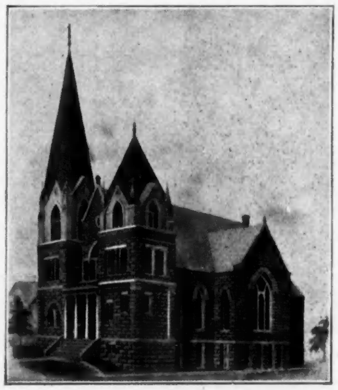

CONCRETE STONE MADE BY NATIONAL BUILDING BLOCK MACHINERY CO.

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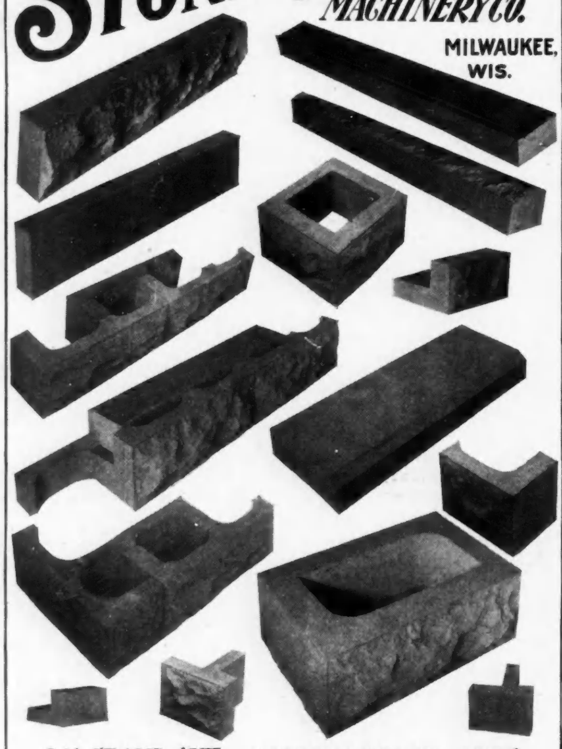

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THE WINGET CONCRETE BLOCK MACHINERY

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Do you want a machine that combines all the advantages of all the others of that kind; a machine that will make all the sizes and shapes of blocks that all the others combined will make and make them more quickly. Then secure a *Winget 1906 Model*. It is the only *Universal* block machine.

First, as an UPRIGHT machine, it has never been equaled. Second, as a FACE DOWN machine it is the most rapid and practical ever devised. Third, as a TWO PIECE block machine it excels, as on it two blocks are made at once. Throughout it is distinctively automatic. One simple lever fully controls all movements of the machine and with the greatest speed. It is most widely and easily adjustable to the greatest range of sizes, shapes and designs of block. More complete information regarding this wonderful machine can be had by the asking.

The Winget Company also has other styles and sizes of like machines, besides a most perfect mechanical Concrete Mixer, a Power Tamper and a Cement Brick Machine. With these machines you will always be a leader. For full information address the

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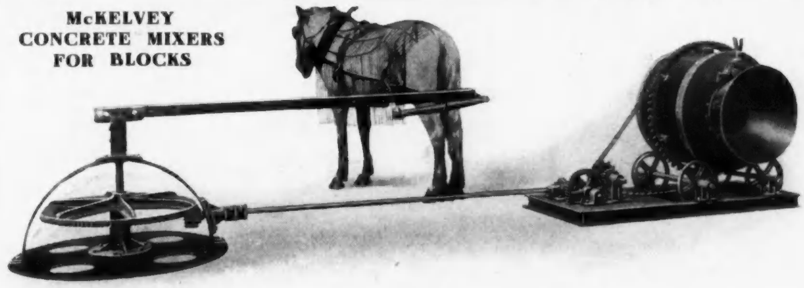
McKELVEY CONCRETE MIXERS FOR BLOCKS



A simple, economical and efficient batch mixer, complete with power.

We build mixers of various sizes, with any kind of power, including hand power.

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"TEN MACHINES IN ONE."

Absolutely the Best.

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NORMANDIN HOLLOW CONCRETE BLOCK MACHINE

and its product, is universally recognized by the leading architects, contractors, engineers, builders, railroads and cement workers **AS THE STANDARD.**

Hundreds of Normandin machine plants in operation. The Hollow Block business is **permanent** and **profitable, broadening** in extent **every day.** It's not a **question of material** but it is a **question** of **machine.** The Normandin is what you want, take no substitute. **INVESTIGATE** for yourself, in fact "*look before you leap,*" get value for your money. **Don't get a machine because it's cheap** and be handicapped when you get a contract for an up-to-date building, because you can't make the blocks wanted—Normandin Blocks are standard.

The Normandin machine is "**ten machines in one,**" designed to save labor, material and expense. *Adopted and used by the United States government engineers.* "The Normandin must be right." The most practical machine ever manufactured. Has won over all competitors. **We are pioneer block machine manufacturers,** and have just the machine you want. **We know what the trade demands,** consequently we build our macnines right. Thousands of Normandin Blocks being used daily. Send for full printed matter to-day.

Styles and Variety of Stone Unlimited.

Style "C" Normandin Block Machine—(Open) and its **Product**. HIGHEST AWARDS Universal Exposition, St. Louis, 1904, for superior excellence.

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BE YOUR OWN BRICK MAKER

LARGE CAPACITY — 5,000 BRICK PER DAY
SKILLED LABOR UNNECESSARY. SIMPLE AND INEXPENSIVE

Seaman's Cement Brick Machine Co.

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ESTIMATE INTELLIGENTLY

you can do this on any class of work that an architect or customer may require because you can figure within a very small fraction just what it will cost to deliver the goods with a

"BATTJES" CEMENT BLOCK MACHINE

labor-saving, simple, direct and efficient it does the work, and it makes practically an unlimited variety of blocks at no additional expense for plates.

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Send for a copy of the "**CORNER STONE.**"

The Battjes Building Material Company
GRAND RAPIDS, MICHIGAN

We Move the Machine NOT THE BLOCKS

Saves labor of off bearing, loss by damage; obviates necessity for heavy and expensive iron pallets. Reduces cost o plant and cost of operation. Every one knows that concrete should not be disturbed after it is molded 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.

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FACTS CONCERNING THE

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All parts are machine finished and every block guaranteed perfect.
Makes all forms, **Solid or Hollow Blocks.**
Has fewer parts and works easier than any other machine.
No Springs—No Cogs—No Wheels. Simplicity and **durability** its strong points.
Either **Wood or Iron Pallets** for all kinds of work.

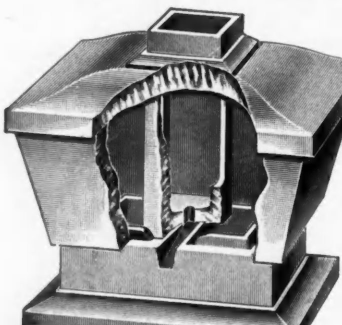
THE SCHEIFFLER, Continuous Automatic Proportioning Mixer

The only Mixer that will automatically proportion in any amounts from 1 to 2, to 1 to 10, and **will not clog** with Cement.
Made in all sizes; any kind of power required.
Used for all kinds of **Street and General Contract Work.**
Hand Machines are fitted with pulley power—can be attached.
Are especially adapted for **Concrete Block Manufacture.**

HARTWICK MACHINERY CO.

228 Washington Street :: JACKSON, MICHIGAN

CONCRETE CHIMNEY CAPS



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Useful, Durable, Inexpensive

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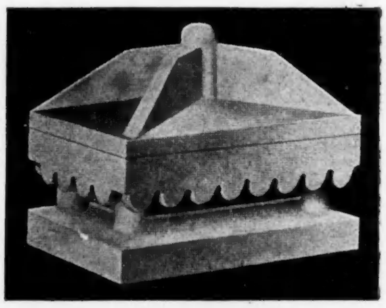
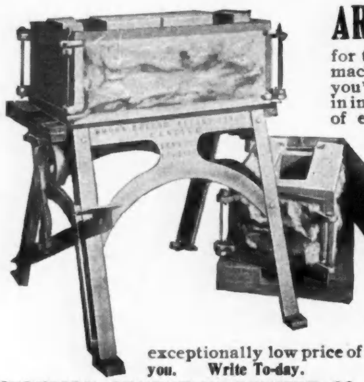


Old Style



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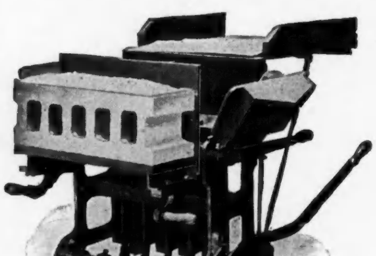
SUPERIOR CEMENT MACHINERY CO.,
183 E. Washington St.
CHICAGO, ILL.
D. GOODMAN, Mgr. Agents Wanted.

The Standard Sand & Machine Co.



BEST in the world. No experiment. Been on the market since 1903 and successfully stood the test. Ask for catalog "A" and prices.

The Standard Sand & Machine Co., Cleveland, Ohio.

CONTENTS FOR OCTOBER, 1905

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FRESH INVESTMENT FIELDS

NO COMPETITION

MIRACLE STAGGERED AIR SPACE BUILDING BLOCK MACHINE

EXHIBIT "A"

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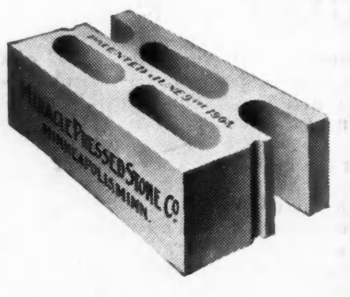
Just at this time no safer or more profitable investment is open to the progressive energetic man of small means as in The Great New Industry, Concrete.

No safe business where the amount of the investment is so small offers as large a percentage of Net Profits as in supplying the demand for

THE BIG 3 CONCRETE PRODUCTS:

MIRACLE Staggered Air Space Building Blocks
MIRACLE Cement Sewer Pipe and Tile
MIRACLE Cement Sidewalk Blocks

WE DO not want to be misunderstood. In this business which is so new the possibility of investors not receiving complete facts is apparent. In any other business a man would be sure of the source of his information. Nowhere possibly could you go to get more accurate information about "The Great New Industry, Concrete," than of us. We have compiled, at a great expense, our New Catalogue "K," which is a most comprehensive guide to the prospective concrete manufacturer, being the sum total of that part of our knowledge and experience gained after many years in the various kinds of cement construction which we feel will be valuable to both beginners and concrete manufacturers wishing to make the best product at the minimum cost and maximum profit. Catalogue "K" also tells all about MIRACLE Machinery Appliances and Tools used in every kind of concrete construction—tells why they are the best made for the user. In it we name prices—you must get our prices—but most of all the reason why our machinery, etc., is better. If you want to know anything about concrete in particular ask MIRACLE.



Write for CATALOGUE "K"

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MIRACLE CEMENT SIDEWALK TILE MACHINE

Miracle Pressed Stone Co.

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