THE NATIONAL BUILDER

Vol. XLII
No. 3.
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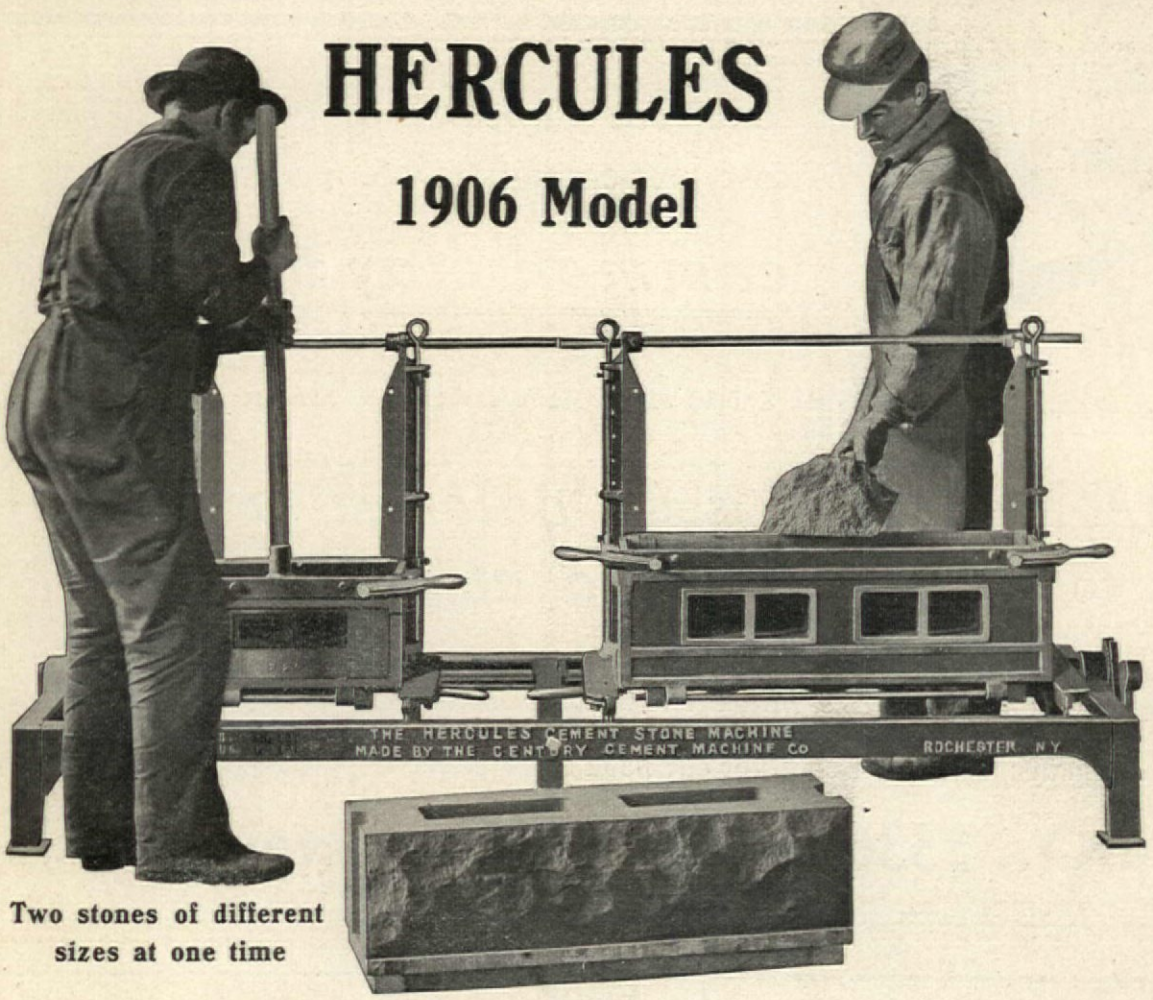
CHICAGO,
Mar. 15
1906

At The Cement Users Convention



Two stones of different sizes at one time

The Hercules Was the Star Performer

At the Cement Users' Convention in Milwaukee in January the **HERCULES CEMENT STONE MACHINE** was the star performer.

Cement men had to see the Blocks, Ornaments, Cornices, Lintels, Etc., made right before their eyes before they would believe that a simple constructed machine like the Hercules could turn out such a wonderful variety of shapes and sizes.

They were astonished—they were amazed and no wonder. They saw a machine so simple in construction, that not a cog, a chain, a spring, a bolt nor a pin entered into its make-up.

They saw the adjustments so easily and quickly made that many who had heretofore been prejudiced in favor of other machines freely admitted that the Hercules had them all beat from every point of view.

Skilled labor is not required with a Hercules, for the machine is so simple that any man with ordinary intelligence can operate it.

The Hercules, by a clever combination, can make two stones of the same size and design, or of different size and design, at one time; an arrangement that cuts the cost of labor in two, doubles the capacity of the manufacturer and saves the cost of purchasing two machines. Tamping is done directly on the face, which means a clear impression of the design, and gives the stone a more natural appearance.

Tamping on the face allows a 2 to 1 composition for facing, and 5 to 1 for backing, which means a great saving. It also allows the making of the mixture more wet which means a stronger stone.

The Hercules will produce more stone and stronger stone in much less time and for much less money than any other machine.

The Hercules is the only Machine that can make this variety

NEW CATALOG JUST OUT

We have issued a book (**costing us over 20 cents each**) which is brimful of things you ought to know about cement stone. It is beautifully illustrated and should be in the hands of every cement stone manufacturer. It's yours, **free. Book B.** Write for it to-day—it means money for you.

The CENTURY CEMENT MACHINE CO.

178 WEST MAIN STREET, :: :: :: :: :: :: ROCHESTER, N. Y.

IMPORTANT NOTICE: As we publish several catalogues of other machines, such as porch-column machines, curbing and gutter machines, cement tools, etc., it is essential that you mention the above book by letter **B.**

The Polygon Improved Concrete Mixer.

The **Cheapest Hand Power Concrete Mixer on earth.** Cheapest because it produces better concrete in less time with less labor than any mixer made. It is roller bearing which insures ease of operation. There are plenty of mixers that will mix some kinds of concrete, but to use a mixer that will mix all kinds you should use a **POLYGON IMPROVED.** There is some satisfaction in using a mixer that will turn out uniform concrete.

It is a recognized fact that a hand power concrete mixer having inside obstructions or machinery to do the mixing will clog and produce a poor quality of concrete, for the simple reason that in order to make a hand power machine operate easy you must reduce the speed; when the speed is reduced to below ten revolutions per minute the inside mixing blades are of no use, and are detrimental to the machine.

The **POLYGON IMPROVED HAND POWER MIXER HAS NO INSIDE MACHINERY.** It changes the material from one end to another twice in every revolution of the drum. No stopping to load or dump; contents are in plain view of operator during mixing process; **Buy up to date machinery. Get THE IMPROVED.** We build 23 different sizes and styles, mounted to suit you. **Let us book your order.** Write

Baldwin & Scholes Mfg. Co.,
45-51 Lafayette Bldg., - WATERLOO, IOWA.

Right on Top

Where they are seen and admired by everyone.

Made of Cement and in DIFFERENT COLORS.

Absolutely Waterproof. Our **Roofing Tile Machine** will manufacture enough roofing in one day to make it pay you to go into the **Cement Tile Roofing Business.** Write for our illustrated catalogue and be ready for the spring trade.

***The* Leusch Manufacturing Company**
Waterloo, Iowa

WATERLOO CONCRETE BRICK AND BLOCK MACHINE CO.

Our machine makes a block at less expense than any other machine because it makes more blocks with the same labor.

ONE movement of the lever operates the entire machine.

Our block is patented. It has the "handhole," making a double and continuous air space.

No gears or chains to clog and break.

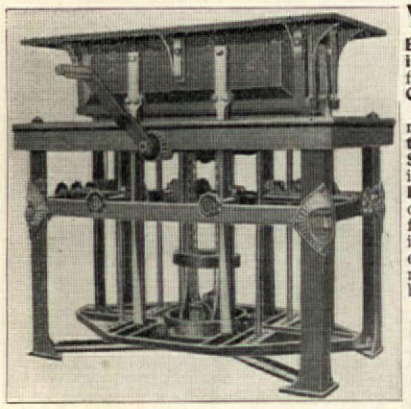
The brick attachment makes 18 bricks at one time as easily as a block.

Makes 91 sizes and styles blocks including circle, octagon, hollow, porch pier and brick. **Write for Catalogue "C"**

O. H. SWEENEY, Secretary
101 E. Fourth St., Waterloo, Iowa

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

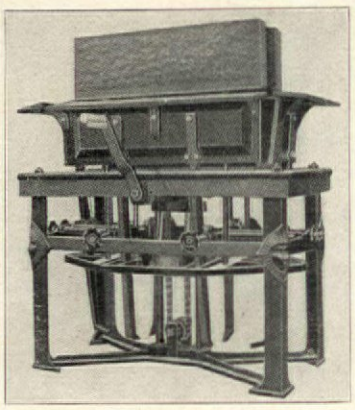
SILVERA & GADSDEN, Savannah, Ga., Southern Agents



You Want to Make Money?

Every Man is **looking** for the **best opening** to better his condition. You cannot find a better **money making** business than **CEMENT STONE.**

To make the **most money possible** you need the **right tools. We can furnish them** because we have been in the **Cement Stone Business** for **years and know** what is needed, besides we have erected **more large Cement Stone buildings** than any other company in the U. S. The magnificent Auditorium and Exposition building of the Texas State Fair at Dallas was erected last summer of stone made on our machines. It is the finest Cement Stone building in this country.



Our Proposition

We will furnish you with a **complete outfit** consisting of 1 **Automatic** Stone Machine, 1 Beatsall Concrete Mixer, 1 **Beatsall** Gasoline Engine, 3½ H. P., 1 Beatsall **Fence** Post Machine, 1 Beatsall Window Cap and Sill Mold, and 1 Chimney Mold, all for $600.00 F. O. B. **Waterloo, Iowa. Order now** and insure **prompt delivery** for **spring trade.** We carry a **full line** of cement workers' tools.

Write for what you need.

Waterloo Automatic Stone Machine Company
WATERLOO, IOWA - - Dept. A

WATERLOO CEMENT TILE MACHINERY COMPANY

WATERLOO, IOWA

Manufacturers of

The Schenk Patent

Drain Tile & Sewer Pipe Machine

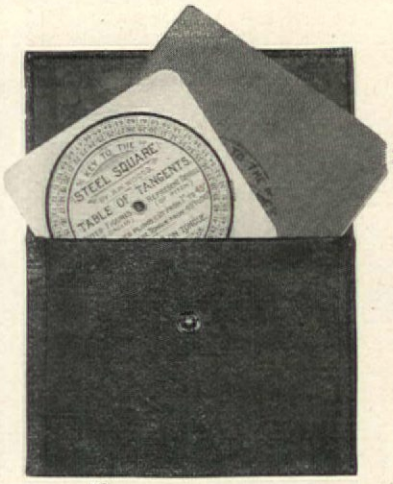
Capacity 3,000 Tile per day, 4 to 12 inch

STEWART CEMENT POST MACHINE

Also Dealers in and Manufacturers of All Kinds of

Cement Working Machinery

Office: 318 Lafayette Building



IT'S

EASY EASY EASY

With Wood's Key to the Steel Square

If you want a useful article that will make your work more simple you should not be without one of these tools.

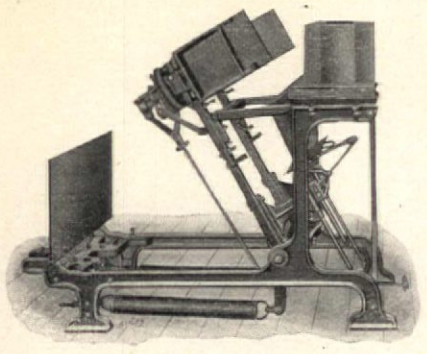
Wood's Key to the Steel Square

Has been tried by thousands of Builders and not found wanting. It is a wonderful instructor as to the uses of the square in obtaining cuts and bevels for all kinds of work.

Made of celluloid and put up in neat leather case of pocket size, so that it can readily be carried on the job. It is a snap at our low price of $1.50

Send your order at once and it will be shipped prepaid to your address

Porter, Taylor & Co.
358 DEARBORN ST., - CHICAGO



In buying a Block Machine the average purchaser has had no experience, but it is generally conceded that the most natural way to mould Building Blocks is with the face down, thus producing a more dense face and more natural in the rock designs.

Few can afford to make a mistake, so avail yourself of the experience of others and investigate the merits of the

Automatic Block Machine

before buying. It is already an established success.

The construction is in accordance with mechanical ideas and designed as a labor saving machine, with almost unlimited speed. Its operation is entirely automatic.

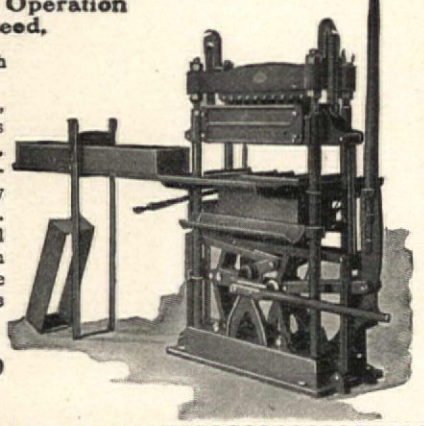
Write us for catalogue F.

Automatic Building Block Machine Co.

118 Liberty Street — **Jackson, Michigan**

The HELM Cement Brick Press

10 Pressed Brick at One Operation
10,000 Per Day, Guaranteed,

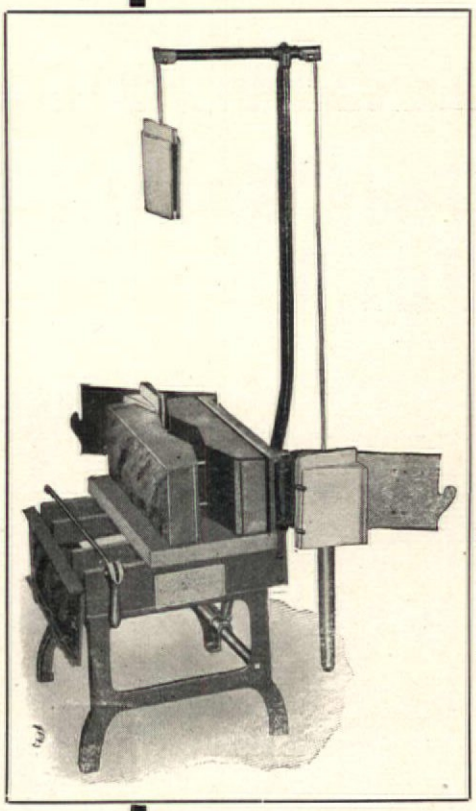


with less labor and expense than with any other hand machinery.

We offer a wonderful proposition, enabling anyone with limited means to engage in a profitable business, having unlimited demand. The success of our machine is measured by years, not days. It is used and proven. Don't buy an experiment, you will get nothing. Buy the **Helm** and you get something for a very moderate cost. Information you cannot buy is given in folder "C."

Helm Brick Machine Co
TRAVERSE CITY, MICH.

The Anchor Concrete Stone Machine



Makes the only Continuous Air Space Block.

Makes the only Frost and Moisture Proof Block.

All Blocks 8, 9, 10, 11 and 12 inches wide are made on the same

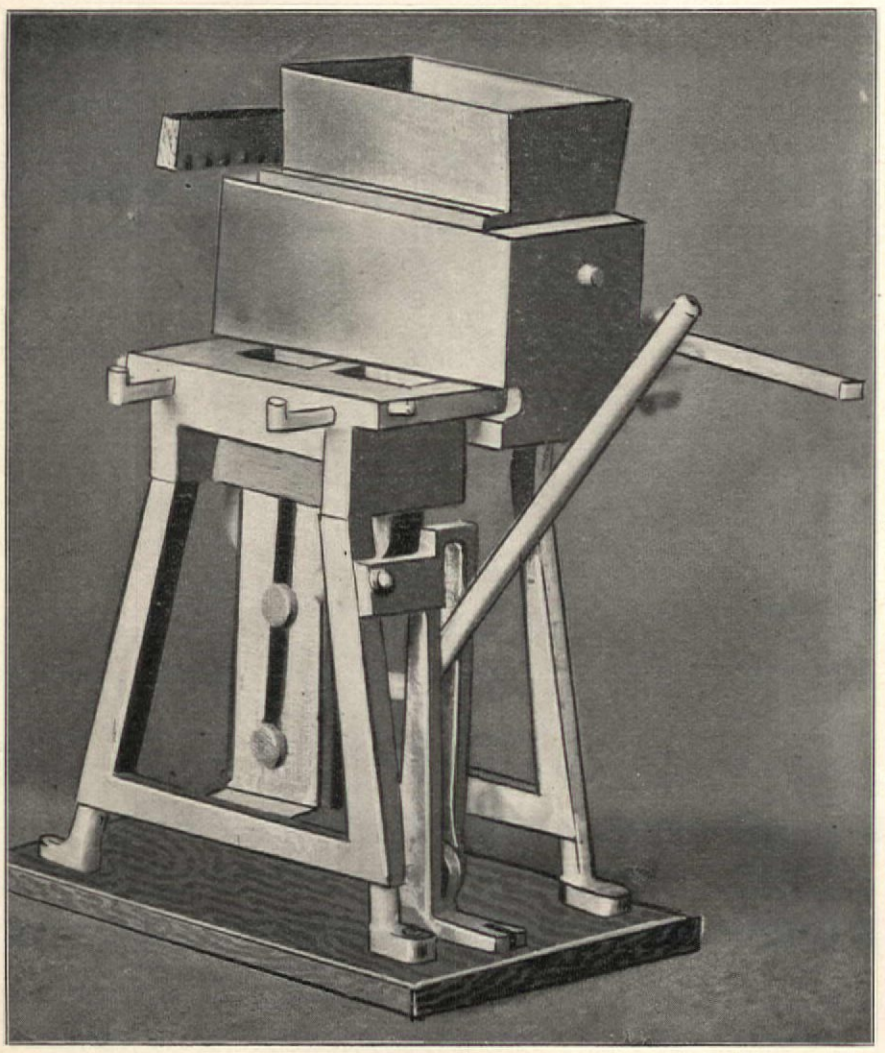
SOLID WOODEN PALLET

without changing a plate or the use of a wrench.

Fully Protected by Patents in the United States and Canada

WRITE FOR INFORMATION AND PRICE TO THE

Anchor Concrete Stone Co.
ROCK RAPIDS, IOWA



The INTER-STATE CEMENT BRICK MACHINE

IS NOW ADMITTED TO EXCEL ALL OTHERS

WHY IS THIS TRUE?

Because it is so constructed as to be used with either the wet or dry process in the making of brick.

Because it is the most simple, strong and practical, will make more brick with less labor than any other machine.

Because, if necessary, it can be operated by one man.

Because it has no cogs or wheels to clog with cement and sand, thereby saves time.

Because it is so simple that there is nothing to get out of repair.

Because it can be so adjusted as to make any thickness of brick desired.

Because this machine will actually make from 7,000 to 9,000 brick per day.

Because it makes brick, such as are wanted in the construction of a building from bottom to top.

Because when you become acquainted with it and know its price, you will buy no other.

And on its merits we sell it.

THIS IS THE MACHINE TO BUY

For full information and further particulars, address

L. M. PRATT & CO.
BELLEVILLE, - KANSAS

The National Builder.

{ Builder and Woodworker, Established 1864.
{ National Builder, Established 1885.

CHICAGO, MARCH, 1906.

Vol. XLII, No. 3

With Which is Merged THE INTERSTATE ARCHITECT of Cleveland.

THE NATIONAL BUILDER

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INDEX.

NOTES AND COMMENTS.

An increase in wages aggregating more than $1,000,000 a year was secured by the union carpenters of Chicago last month, through a three-year agreement with the Carpenters' and Builders' Association. By the terms of the contract the men are given an advance from 50 to 55 cents an hour for the first year, with a further increase to 56½ cents per hour for the last two years of the agreement.

About 10,000 members of the union are benefited by the increase and the advance for the first year means $1,000,000, allowing the average time worked to be 250 days. On account of the building boom last year the average time worked by the carpenters was more than 250 days and the officers expect an even more prosperous season this year. The agreement is subject to ratification by a vote of the membership both of the union and the association of employers, but that is considered a mere formality, as the contract was signed by the full committee of five from each side.

In other respects the contract signed is much the same as that in force last year, except that the man have gained some minor advantages in working conditions. The new agreement goes into effect April 1st. The contract stipulates that the men shall not be required to work with non-union men in their own craft. Sympathetic strikes to assist other unions are prohibited, as has been the case for several years.

The National Brick Company has signed a closed shop agreement with the Brickmakers' Union. It was the evidence given by Mr. Webster last summer that caused the indictment and conviction of officials of the Illinois Brick Company and of the Brickmakers' Union. Mr. Webster has always fought the union and for several months President Charles Hank has been waiting for an opportunity to "get even" with the man who procured his indictment. The opportunity came when the National Brick Company opened one of its yards in Evanston last month, as Mr. Webster is president of that company and was therefore concerned in the agreement, as it covers the three yards of the company, which is starting out as a rival to the so-called brick trust. The other two yards are located in Maynard, Ind., and Chicago Heights, but neither is ready to start the manufacture of brick. They are expected to be in readiness to open in a week or so.

It is not asking too much to inquire of our architects why more use is not made of our own history in the adornment of buildings, especially those devoted to public business. There are rich subjects in our career as a nation that might be symbolized in a most picturesque and appropriate manner. American architects and artists seem to dread any national decoration, if it may be so called, and it is probably accidental that the ornamentation of the Capitol at Washington was made to show American products and American subjects in place of the characteristics of some played out European power.

SOMEWHAT HUMOROUS.

The following amusing rhyming "skit" upon the general conditions of a specification appears in the current issue of the Architectural Association Journal. The gifted poet does not disclose his identity:

A Specification of Works
To be done for Sir Anthony Shirks,
Knight, G. C. M. G.,
At Ye Olde Hollie Tree,
Near Slough, in the County of Berks.

CONTRACTOR. Hereby I name you the Contractor,
It's a job you'll be sorry you're let in for,
As you will agree when you come to know me,
My decision is binding and quite correct,
For I am his honor, the Architect.
His honor, the Architect!

ARCHITECT. For I am John Jones, of Mosteley-at-Sea,
Yet I am the man whom you must respect,
For I am his honor, the Architect.
His honor, the Architect!

DRAWINGS. The Drawings, as you may possibly see,
Are numbered from one to twenty-three;
And whether they're right, or whether they're not,

DIMENSION. Dimensions must always be checked on the spot.

COPIES OF DRAWINGS. A copy of any or all you select
Will be sent by his honor, the Architect.
His honor, the Architect!

INSURANCE. The Contractor the works shall safely insure
In an office that's certified healthy and pure.

FOREMAN. A competent foreman he also must keep
Day and night on the ground, and he never must sleep.

RELICS. The Client will have the ownership

OWNERSHIP OF. Of coins or relics that anyone finds.

MATERIALS. The materials and all the workmanship
Must be of the best of their different kinds.
For I shall not pass a single defect,
As I am his honor, the Architect.
His honor, the Architect!

DISPUTE. If any dispute on the works should arise
Between you or the client or even your wives,
And they, or yourselves, come to blows or black eyes
Why you've always an arbiter honest and wise.
My decision is binding and quite correct,
For I am his honor, the Architect.
His honor, the Architect!

BUILDING CONSTRUCTION FOR COTTAGES.—X.

BY J. A. F. CARDIFF, ARCHITECT.

Windows.—We have for consideration this number the construction of a double-hung sash frame in a double-plastered wall, with mosquito screen and blinds outside of the sashes and ample space for window shades on the inside stophead.

In locations exposed to severe cold weather and penetrating winds the double-plastered wall is particularly desirable. The wall is constructed in the usual manner with two-by-four-inch studs, doubled at openings. The outside is sheathed with matched or shiplapped boards laid horizontally or diagonally, preferably the latter way, and the sheathing paper is then put on, being well lapped at all corners and around all openings. On top of this the shingles, clapboards or other covering material is placed.

RESIDENCE, BY ARCHITECT JAMES GAMBLE ROGERS.

The inside of the wall is lathed and plastered two coats—scratch coat and brown coat. One-inch by two-inch grounds are nailed to studs as indicated at "A." A one-inch air space is then formed by the furring strips "B," and the wall is again lathed and plastered, this time with three coats of plaster. All spaces around head, sill and jambs of window frame should be well filled up with scratch mortar.

Fig. 57 is a section through the head of window; Fig. 58 a section through the jamb, and Fig. 59 a section through the sill.

An isometric view (Fig. 60) shows the construction and the relation of the different parts a little more clearly.

Fig. 61 illustrates another method of double plastering a wall. In this case furring strips "F" are nailed to the studs as a bearing for the lath and are placed so as to allow a one-inch space between the inside plastering and the back plastering.

OVER AN ENTRANCE.

I truly hope that all who come
Herein may think "'Tis like a home!"

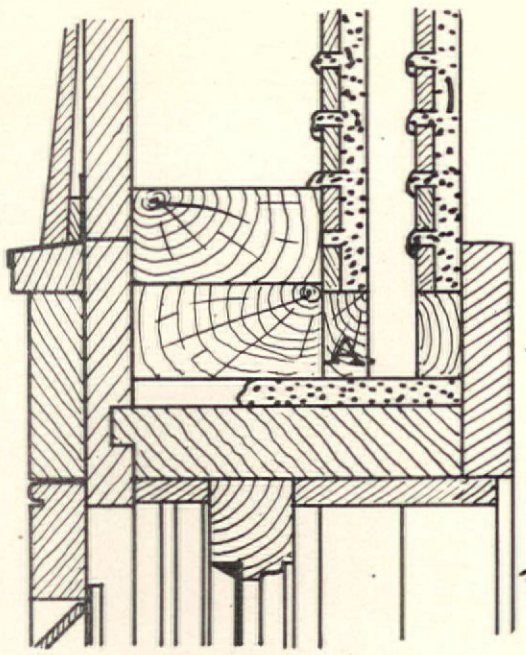


FIG. 57.

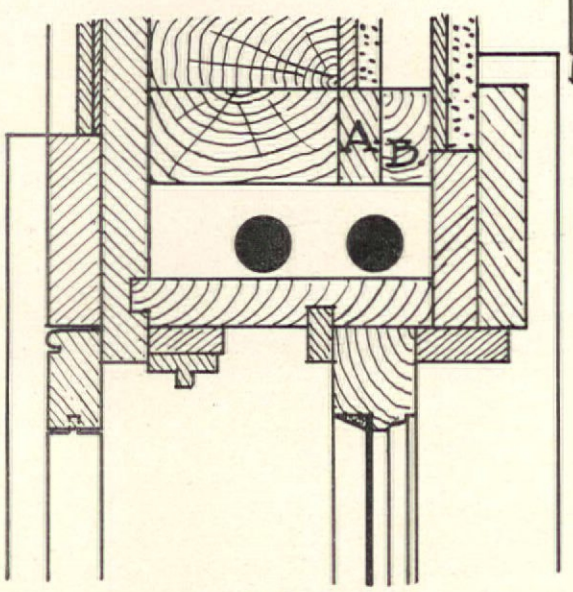


FIG. 58.

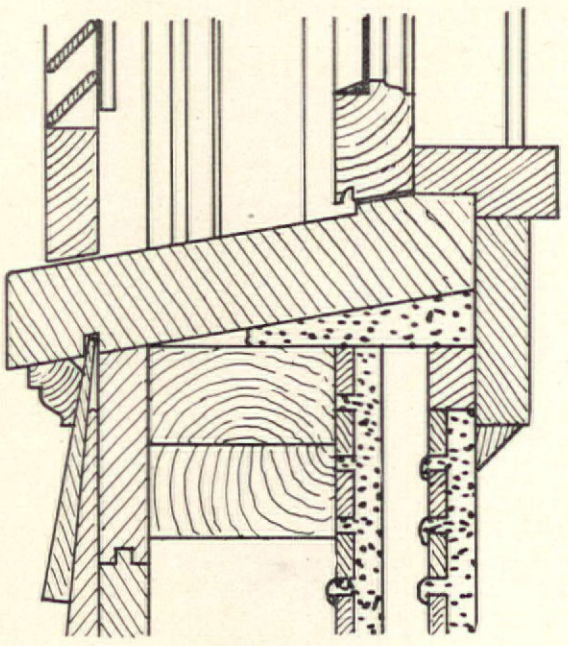


FIG. 59.

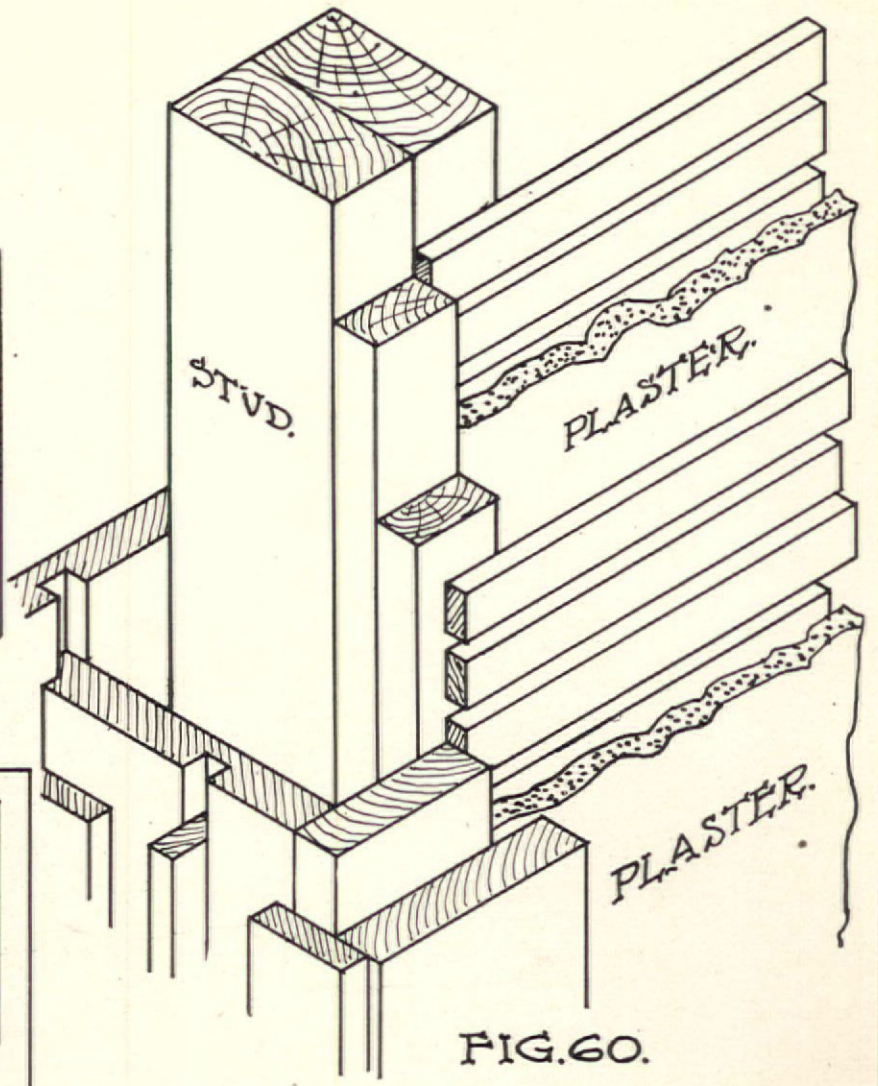
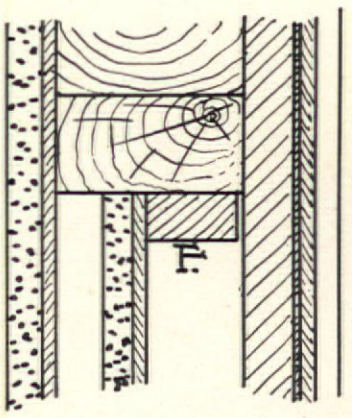


FIG. 60.



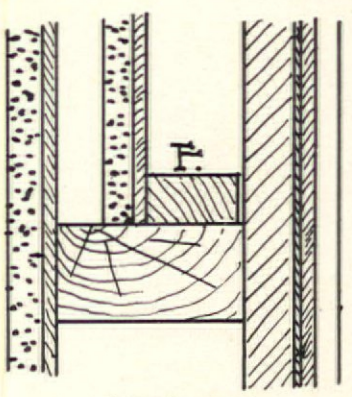


FIG. 61.

J. A. F. CARDIFF, ARCHT.

PLATE X.

FIRE-RESISTING BUILDING MATERIAL

BY F. W. HAGLOCK, CLEVELAND, OHIO.

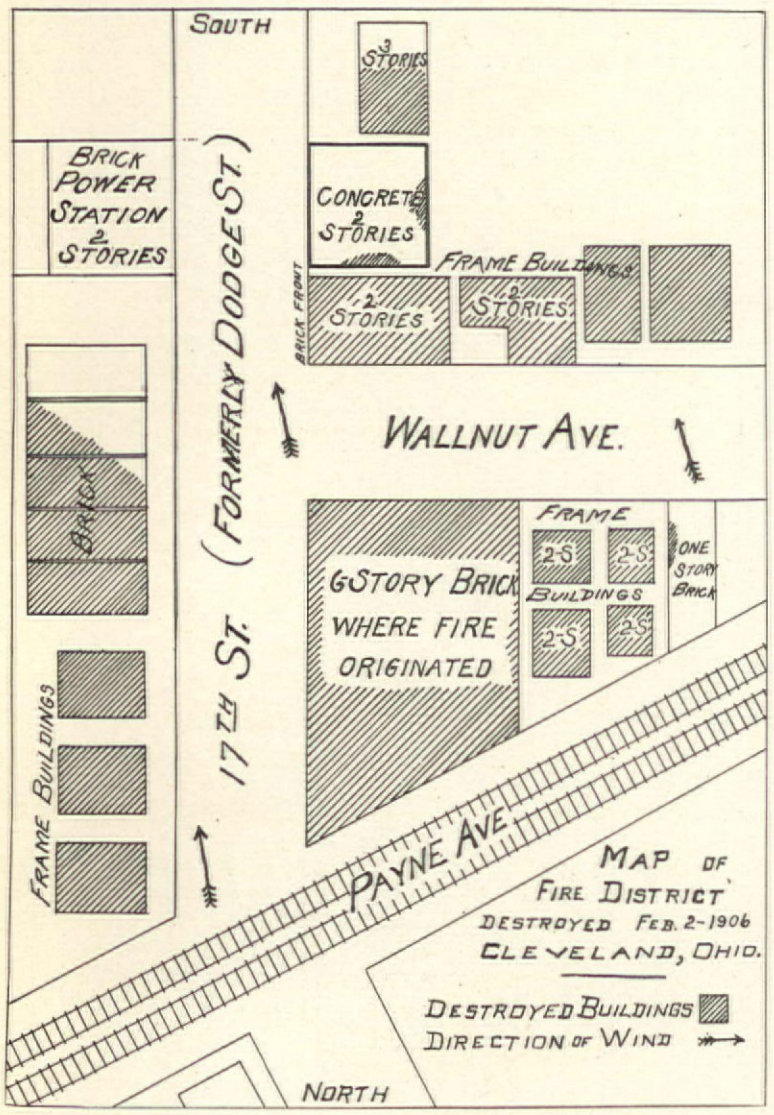
On Friday, February 2, 1906, a fire destroyed nearly $300,000 worth of buildings in less than four hours. My personal knowledge of the make-up of all the buildings in the vicinity, together with the opportunity of being on the scene during the destruction, enabled the gathering of data and such other information of interest to the builders generally, which I will state in brief words.

Twelve-inch walls built of red brick and lime mortar crumbled and fell within the time of the fire.

Twelve-inch and a few eight-inch brick walls, laid in cement mortar, withstood the heat, but were so badly injured as to be condemned for future use.

Terra cotta had been used only as a trimming and was only slightly injured.

Sandstone trimmings were all rendered worthless, some being reduced to a powder.



Steel construction involved was all of a light character and was badly warped.

An eight-inch wall built of concrete blocks bore the brunt and was injured to the depth of half an inch, the surface being charred, but by scabbing and plastering it over it will be as durable as ever.

Carefully observing the plat, the reader will notice that the fire originated in a six-story brick building whose interior construction was principally wood. This building occupied by a knitting works, enabled the fire to spread so that in a few minutes it was a solid mass of flames from basement to roof, and the wind bore heavily to the southeast in the beginning and shifted to the south within two hours, consuming a two-story frame building adjoining the concrete building in one hour and twenty minutes.

The flames bore hard against the concrete wall, whose height is twenty-one feet, and over this building, partly destroying a frame building on the south, the concrete building being invested by the firemen protecting the adjoining buildings.

The concrete building was nearing completion, and but one section, occupied by a grocery store, which stock was damaged by water only.

In erecting this building during the winter months I had used four styles of concrete blocks, and I found but four blocks having been cracked through, all of which were of the long-core type.

Even though this concrete building was in the direct path of the flames, and its woodwork badly burned at the openings, at no time did the firemen or myself find it necessary to vacate.

MIXING CONCRETE.

F. W. HAGLOCH.

Mixing.—There are various methods used in mixing concrete and the first object of the student is to study the requirements in mixing, and see that the process of mixing gives the proper results.

Object.—The object of mixing concrete composition is to uniformly mingle the various size grains of cement, sand and aggregates, thus making a composition as free from voids as possible and at the same time allowing the cement to unite all other particles.

The old saying you can not mix too much is not always reliable unless the process of mixing is perfect, but we have many processes of mixing that excessive mixing will cause the heavier particles to settle when over mixed; we also have mixers that fill the composition with air after same has been uniformly mixed and the machine allowed to continue.

Mixing machines operating continually (constantly receiving and constantly discharging) are rarely ever found to over mix; all processes of hand mixing in flat mortar boxes rarely ever injure composition, but the gravity and rolling mixers are subject to overmixing by allowing the cement to commence setting before being detected, as the influx of air into a well mixed composition makes careful attention necessary to discover the setting of cement.

The chief defect of any mixing process or machine is that of not mixing the entire composition uniform, and can readily be detected by even an inexperienced eye, as well mixed material is of uniform color and smoothness throughout and if the color is not uniform it lacks sufficient mixing; but if the color is uniform and the size of grains of the composition appear to vary in spots it has been over mixed.

It must be remembered that over-mixing is a rarity, but it is very detrimental, and on high class work over-mixed composition should not be used, as the cement having begun setting the mixing greatly reduces its strength in a very few moments.

In constructing an artificial stone building the builder discovered that all stone made on a certain day began crumbling, although the same material and proportion gave the same color as other stone whose hardness and durability could not be questioned. A close examination with a small lens (microscope) revealed the fact that the cement had gathered itself into small clots or pebbles and these pebbles refused to cement themselves to the sand, which indicated clearly that the cement had begun setting long before process of mixing was discontinued.

It is rare indeed to find an instance of over-mixing so clearly proven, but the fact that these stone began crumbling before placed in the wall (six weeks after they were manufactured) led to a close investigation of the cause, which revealed the fact that a lack of workmen at that particular time resulted in leaving the composition in the mixer fully twice the length of time required, and being a power mixer the workmen found it convenient to run same continuously and take the composition as they required it.

The student is next instructed to carefully study the following methods of mixing concrete:

Hand mixing for all concrete work is best accomplished in a mortar box sixteen feet long, seven feet wide and ten inches high, which for permanent work should be made of concrete, but a well made plank box will do.

The cement and fine sand is placed in one end and drawn to the other by two men, one using a heavy garden rake and the other a mortar hoe, and again drawn back in the same manner; next add the coarse sand and repeat the process, and again add the aggregates and continue drawing from end to end until the mass is of uniform color throughout; then shovel same along the one side of the box and while one man throws a shovelful along the other side of the box let another sprinkle same, never failing to sprinkle every shovelful separately, then continue with the hoe and rake until a uniform color is obtained which, owing to the moisture, will be darker than the dry mixture.

The color of concrete is always the same, as the color of the materials when uniformly mixed dry. Thus to know the color of finished season (hardened) stone mix your materials identically as you intend to use them and such, mixed before the addition of water, will be the color of the finished product.

IRON AND STEEL IN ARCHITECTURE—XII.

BY CHARLES A. MILLER JR., ARCHITECT.

Riveting.—In previous papers we have mentioned the use of rivets, their proportions, how they are driven, etc. Not less in importance is the manner of preparing the work for the rivets. The practice for this varies considerably between this country and European countries, and, while both sides have their points of superiority, there are ertain economic reasons which have great weight with the owners, if not with the engineers who design the structures. In general, it may be stated that the European countries are in favor of drilling all holes for the rivets, while in this country the practice is to punch the holes by means of various forms of presses or punches. Theoretically, the drilled work is superior to the punched work, as with most steel the tendency of the punch is to damage the plate in the neighborhood of the hole. The action of the punch seems to harden the metal around the hole, and if the punch is not in first-class shape the plate might even be cracked. There is a belief that the drill can be placed with greater accuracy than the punch, but if the holes are not very carefully entered and marked deeply there is still danger of the drill creeping out of line even further than the punch would be set by a careful workman. The damage to the plate by punching can be entirely overcome by annealing, but this is a considerable expense and it is seldom done, and as the entire damage is confined to not more than ⅛ inches around the hole it is cheaper and easier to punch the hole a little small and ream the hole out to the required size, thus removing the damaged metal. The American engineer has, however, a better method of allowing for the damaged metal, if there is any such, and that is by considering the hole as

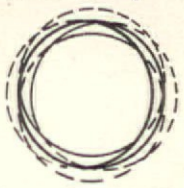


FIG. 16. HOLES BEFORE RIVETING.

FIG. 17. HOLES AFTER RIVETING.

being slightly larger than it really is. Thus, if the hole is for a ¾-inch rivet, it will be made $\frac{13}{16}$ inches, but will be calculated as being ⅞ inches. This extra size will increase the amount of metal in the finished work very slightly, and is all on the side of safety, as when the member is in compression there would be no loss due to defective material, and it is the belief of many engineers that the amount of damage is greatly exaggerated. A comparison between the two methods, that is, between the cost of drilling all the holes and of punching and adding a little extra metal, would show that the drilling costs about five times as much. Drilling of structural pieces is seldom done in this country except for connections in the field, and in such cases the amount of drilling is very small and could not well be avoided. The marking of the flange plates and connection pieces would be very difficult, and even when accurately marked and punched it is likely that resort would have to be had to drift pins to bring the holes in line, which would do more damage than good, and it is likely even then that there would be some holes which it would be necessary to drill to do a good job. As the holes can be accurately located and punched in one piece, it is an easy matter to bring the pieces together, and, clamping them together, drill the corresponding holes in the connection plates. Usually as soon as two or three are drilled they are riveted up so as to hold the pieces more soldly, and the remainder drilled and riveted.

When all the pieces are drilled from the solid it is necessary to mark out the pieces with great accuracy to avoid the necessity for redrilling the job. When the plates or pieces of a built-up member can be assembled in the shop before drilling it is so much the better, as there is then no danger of the holes not centering, but there is then the danger that the drill will work out of line when going through the different pieces. It frequently happens that when the pieces are drilled separately, upon assembling the holes, will coincide about as in Fig. 16, which shows a variation of only $\frac{1}{16}$ inch from the true center. It is then necessary to ream out the holes until the rivet will pass through, or about as shown in Fig. 17. Unless reaming is specified or permitted, the workman will likely bring the holes together with a drift-pin, jamming one piece or the other until a rivet will pass.

The best American practice is now to punch the holes with as great accuracy as possible, and the punching should not vary more than $\frac{1}{16}$ inch from the exact center. This would bring the holes about as shown in Fig. 16, the hole of the top plate being slightly encroached upon by each of the other plates. If now a reamer be passed through the assembled plates it will bring the hole to the shape shown in Fig. 17. As this is the same size as the hole in the top plate, no metal has been taken from it, but as the reamer is slightly larger than the punched hole, there would be a little more taken off, which would bring the hole to the extreme limit of the holes and would leave the hole perfectly round and smooth for the rivet. This is exactly the same result obtained by assembling all the plates and drilling all at once, but the expense is only one-fifth as much. There is still another reason in favor of the punched holes which applies more to shop work than to field work. When the holes are drilled all at once the pieces are held very firmly together, and the drill leaves only a very slight burr on the under side of every plate. This is so little that the plates may be said to be in very close contact. Now when a hot rivet is put in, under a pressure of fifty tons, say, the plates are forced together even closer if possible, and the rivet on cooling tends to contract and draw still more. I say "tends," for there is no chance to do so, and the result is that there is a considerable stress set up in the rivet, for which it was never calculated. It often happens that this stress is so great that one of the heads of the rivet will fly off on cooling, and it is likely that many more are on the point of doing so. It is possible that all will fail in this way that are going to, in the shop, so that they can be replaced, but it is also possible that some will not fail until some frosty morning under a suddenly applied stress, as on a bridge when a heavy train comes on it, and failure at such a time is apt to be serious. A rivet put in by power presses can not have the head cut off and be driven out, but it must be drilled out, which is not easy work when the work is in place. When the plates are punched separately there is a considerable burr left on the plate, and while there is a probability that much of it will be removed in the reaming, there will still be enough left to prevent the plates being forced into such close contact that there is danger of the rivet flying. Of course, with hand riveting there is small chance of ths occurring, but few rivets are put in that way now.

The fact that nearly or quite all of the work in this country is put together in this manner should be proof enough that the system is sufficiently accurate for the work in hand, for no failures have been recorded which can be traceable to the punching.

There are classes of work, however, where punhing is not advisable, such as in boiler work. The majority of engineers will insist that all holes for rivets in boiler shells shall be drilled and not punched. There are boilers made with punched holes, however, and they seem to stand the pressure all right. The question of boilers hardly comes under this discussion.

(To be continued.)

AN AMERICAN INTERIOR ON "MODERN ENGLISH" LINES.

The illustration showing this "interior" is taken from "Cabinet Maker," and exhibits a style of finish and furnishing which is getting quite popular in some parts of the United States While we are not "dead in love" with this style, we can not but admit

AN AMERICAN INTERIOR ON MODERN ENGLISH LINES.

that it possesses some charming features, and has a ruggedness about it that relieves one of the fear of breaking through the furniture while making use of it. There is one thing about it, any good workman can build his own home in this style and then furnish it with the product of his own hands—that is, if he can afford the time and money.

MY SQUARE AND HOW I USE IT IN MY DAILY WORK.

BY DWIGHT L. STODDARD.

My last article I closed by saying, "Don't let little things get you tumble side up; be on the square, keep your head level," etc.

I hoped it would be the means of many, especially young mechanics giving it more serious thought and earnest study, and quietly figure out with ease what might at first appear very difficult.

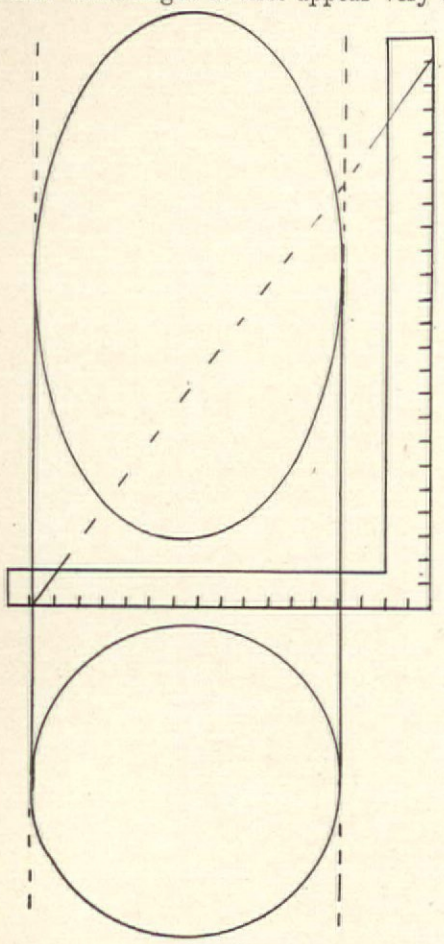


FIG. 1.

I am still in hopes it may yet help many carpenters, but I am free to admit it did not have the desired effect on the engraver, printer or publisher, as all the cuts in the first column were tumbled far from level, for those lines I marked level I drew level and intended them printed level. Those interested can now probably refer back to the article and understand it better.

It very often happens in our daily work that we wish to cut a hole through a roof for a round pipe.

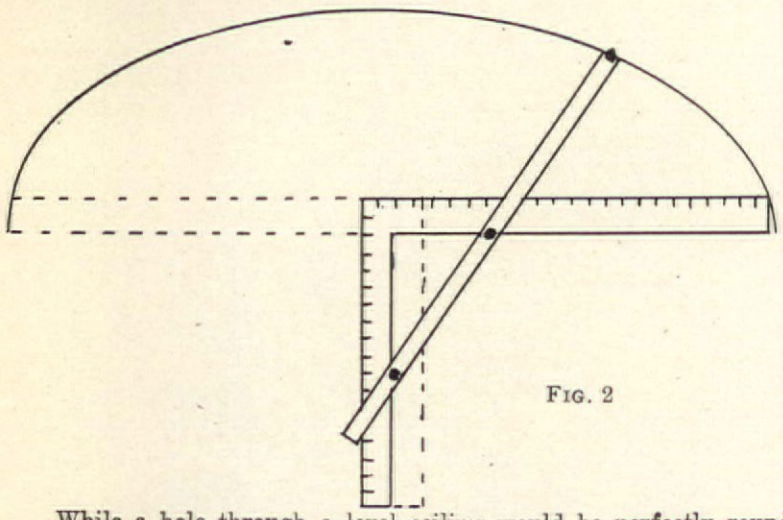


FIG. 2

While a hole through a level ceiling would be perfectly round, a hole through a roof as it has to run up the slant of the roof would be an ellipse.

Figure 1 shows how easy it is to measure across the square, the pitch of the roof, the width of the pipe, which gives the measurements of the ellipse.

Figure 2 illustrates the fact that a stick with brads in it one-half the length, another half the width, and a square to guide the brads, and pencil at end of stick to make the line, it is an easy matter to form an ellipse.

Of course, to form a complete ellipse the square has to be reversed. The laying out of a large arch is exactly the same thing. Simply take height of arch and one-half the width.

Figure 3 shows an oval formed very similarly, but let the one brad stay in the corner of the square and swing the stick and pencil around at one end and form a circle.

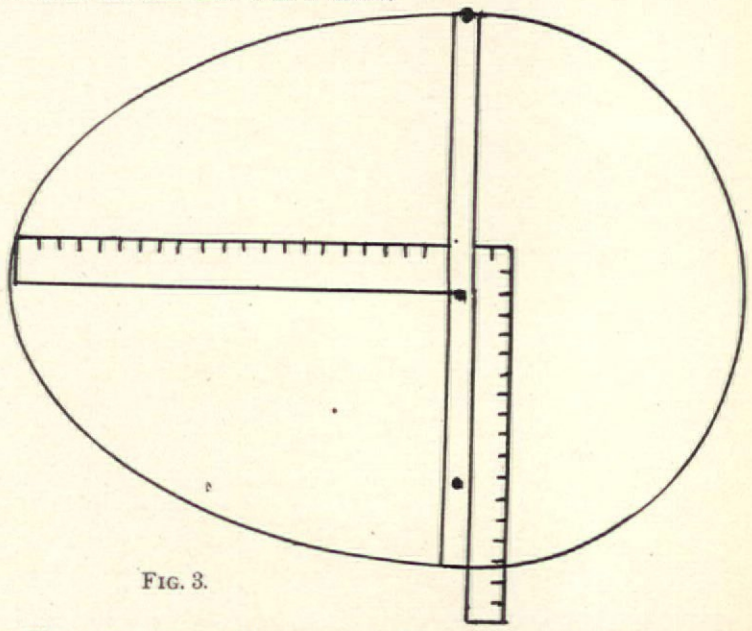


FIG. 3.

There are some quite complicated ways for centering an arch.

Figure 4 shows the simplest and best way I know, after laying your arch out as illustrated, and divide it off into any number of spaces you wish. Then make an ellipse to correspond and divide that into the same number of spaces which will be the centering points.

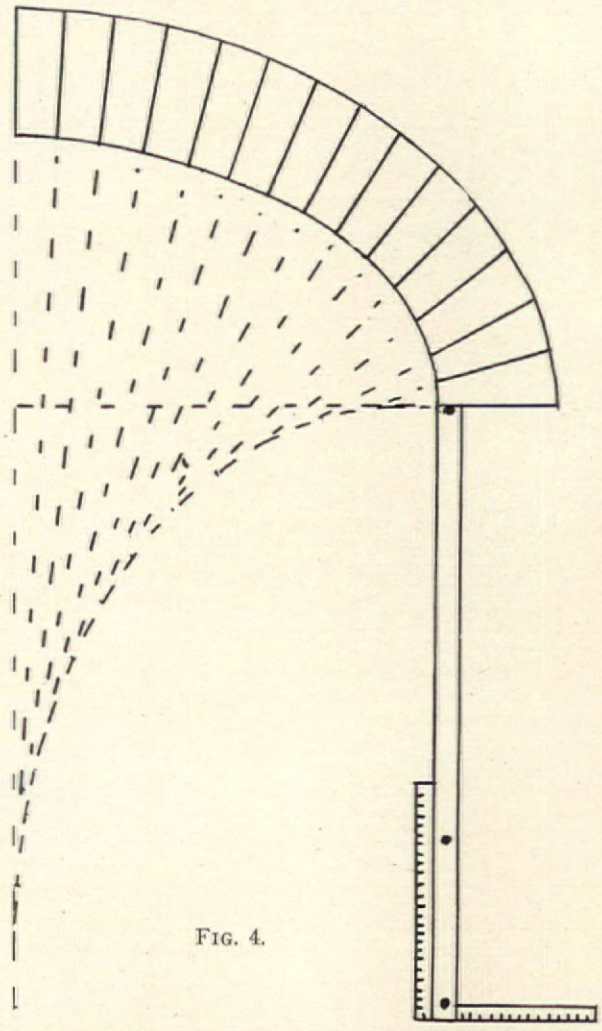


FIG. 4.

Now, some may not understand the proportions of these ellipses. Well, it is a problem in proportion and is just the same as any. Thus, if three men can build a cottage in nine days, how many can twelve men build in the same length of time? Or, if a thousand feet of lumber costs $22, how much would 800 feet cost? or thousands

of other such examples just the same as this one that confronts us now.

Take the height and half the width, or we might call it the rise and run. Thus, as the rise of the ellipse is to the run, so is the (old run which is now the new) rise to the run of the one we wish to find. Remember there is no end to the number of examples that

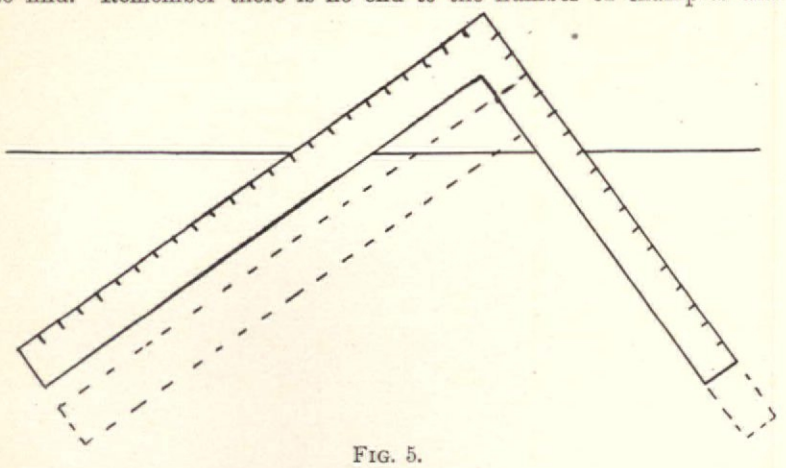


FIG. 5.

can be figured with the square.

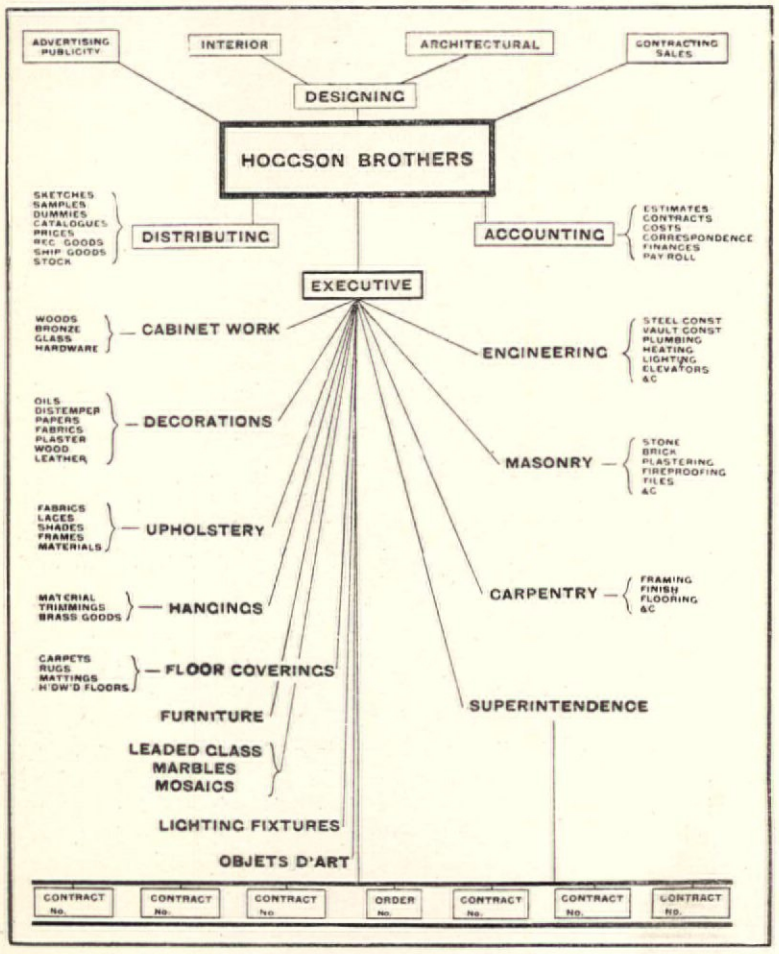
Figure 5 shows the taking of the rise on the tongue, and run on the blade; move the tongue up to the run, which will be the rise that we now want, and the blade will give the run we wish.

I hope the readers will not become disgusted with this poor, short article in this issue, but will study on and on and find that there is practically no end to the practical, every-day applications of the steel square along these lines.

AN ORGANIZATION CHART FOR BUILDERS.

BY KENDALL BANNING.

The tendency of modern commercial systems to find expression in organization charts has heretofore confined itself principally to



An organization chart which is an organization of the details of work rather than of the individuals who do the work; it lays out every department and phase of the work under contract.

manufacturing plants, and secondarily to retail and wholesale houses. Such a chart as applied to an organization whose business it is to do building work is of peculiar interest, not only because it is an innovation, but because of the many phases of work, none of which are necessarily dependent on the other from a business standpoint, which it must cover.

THE DIVERSIFIED WORK CARRIED ON BY THE ORGANIZATION.

Among the prominent building organizations of New York is a concern which undertakes to superintend not only the building but every detail of structural and furnishing work. Its services include not only the superintendence of architects, but of engineers, masons, carpenters, decorators, furnishers and all the details which go toward the making of a complete building. This organization, in other words, selects all those men, methods and material which are best qualified to do the particular work at hand, and for or under a pre-determined sum. For this reason this organization can not properly term itself a concern of architects or even of builders, as such work is only incidental to all the work which it does. For this the concern has originated a form of contract peculiar to itself and the organization is known as "contract designers."

In accordance with the contract peculiar to this firm, whose duty it is to act in the capacity of professional adviser to the owner and whose work includes every detail from the drawing up of the original plans to the buying of the silverware, the owner agrees to devote a certain specified sum to the work on hand. The contract designers, accepting this predetermined sum within which to complete their work, distribute the expenses consistently over the whole, both for the purpose of securing a harmony of design and consistency of quality. The peculiar features of this contract provide that should the work be completed at below the estimated cost, a specified percentage of profit is deducted for the contract designers, and the difference between the sum of these two amounts and the estimated cost is returned to the owner. For the purpose of indicating the many classes of work which this concern—Hoggson Brothers—undertakes, an organization chart has been prepared on which it is shown the main divisions and subdivisions of all the details in the erection and furnishing of a building.

THE CHART MARKS DISTINCTLY THE LINES OF AUTHORITY.

As is indicated on the accompanying chart, Hoggson Brothers act as the executive and sole responsive head. To this executive is responsible all the details of work which are performed under their superintendence by outside parties. The work, which is properly connected with the executive office directly, is indicated by lines representing the routes of authority connecting this work directly with the executive. Thus on this chart is shown not only the various phases of labor conducted under the supervision of this executive, but the lines of authority as well.

Although this chart covers a work considerably more inclusive than that of an architect's office, it is of interest to architects and builders in general, not only because of its completeness and clearness which it indicates the field which the organization covers, but the system of covering it.—System.

A very simple device for very greatly increasing the effectiveness of plain brickwork consists in raking out the mortar from the joints to a depth of one-half or three-quarters of an inch below the surface of the brick, the mortar in the joint being afterward pointed with a special tool which bevels the joint slightly so as to throw the water from each brick course. Work laid in this manner simulates, to a certain extent, the effect of the old brickwork which has stood for generations and from which the mortar has dropped out. The mere imitation of the old work of itself is not necessarily an advantage, but by accentuating the joints, especially if the joints are laid pretty full, the surface of the wall is broken up in such manner that it is impossible for it to have a monotonous appearance, each brick casting a sharp, well defined shadow. Such a method, of course, would be impracticable for a public building or any large structure, but it lends itself very successfully to a picturesque treatment, and especially when the bricks are laid with the Flemish bond is the effect very satisfactory, says the Brickbuilder. The average mason is apt to make his joints too thin and to bring the pointing out beyond the face of the brick, or at least make a broad tuck joint which loses itself with the face of the brick and is apt to be characterless. In the early days of the use of pressed brick in this country it was quite the custom, and is still, for that matter, in some cities, to paint the entire surface of the brick wall with red paint matching the color of the brick and afterward line off the joints in black paint. This was about as reprehensible a practice from an artistic standpoint as could be imagined, but where smoothness and a monotonously even appearance were desired such procedure was quite to be expected. There is no handsomer surface considered as a wall texture than well laid brickwork, and especially if the joints are accentuated in the manner just described the surface can be a delight to any one who appreciates artistic effects.

LESSONS IN PRACTICAL CARPENTRY AND JOINERY.

SECTION IV.

Fig. 1.—Three straight lines being given, to form a triangle. Take one of the given lines a b, and make it the base of the triangle; take the other line b c, and from a describe an arch at c; then take the third line b c, and from b describe another arch, crossing the former at c, and join a c and b c.

Note—That any two lines must be greater than a third.

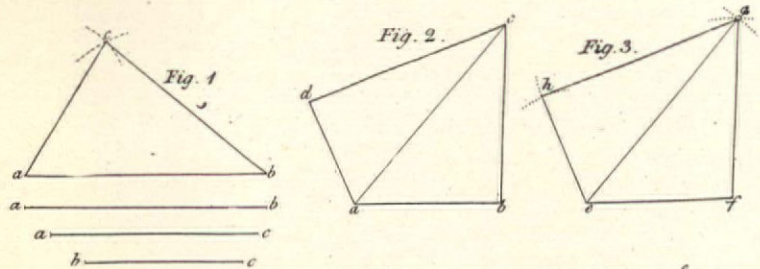
Figs. 2 and 3—To make a quadrangle equal to a given quadrangle. Divide the given quadrangle (Fig. 2) in two triangles; make the triangle e f g equal to a b c and e g h equal a c d and it is done.

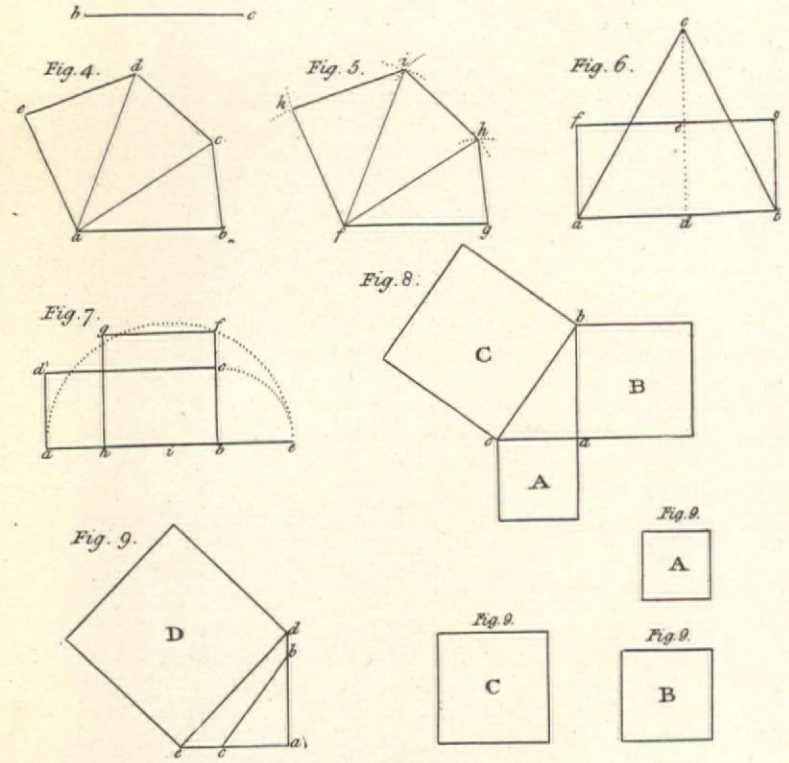
Figs. 4 and 5—Any irregular polygon being given to make another of the same dimensions. Divide the given polygon (Fig. 4) into triangles, and in Fig. 5 make triangles in the same position, respectively equal to those in Fig. 4; then will the irregular polygon f g h i k be equal and similar to a b c d e.

Fig. 6—To make a rectangle equal to a given triangle. Draw a perpendicular, c d, divide it into two equal parts at e, through e draw f g parallel to the base, a b; draw a f, b g perpendicular; then will be rectangle a b g f be equal to the triangle a b c.

Fig. 7—To make a square equal to a given rectangle. Let a b c d be the given rectangle; continue one of its sides as a b out to e, make b e equal to the other side b c, divide a e in two equal parts at i, with the radius e i or i a make a semi-circle a f e, and draw b f perpendicular to a b; make the square b f g h, which is equal to the parallelogram a b c d.

Fig. 8—To make square equal to two given squares. Make the perpendicular sides a c and a b of the right-angled triangle c a b equal to the sides of the given square A and B, draw the hypothenuse c b, which is the side of the square C, equal to the two squares A and B.





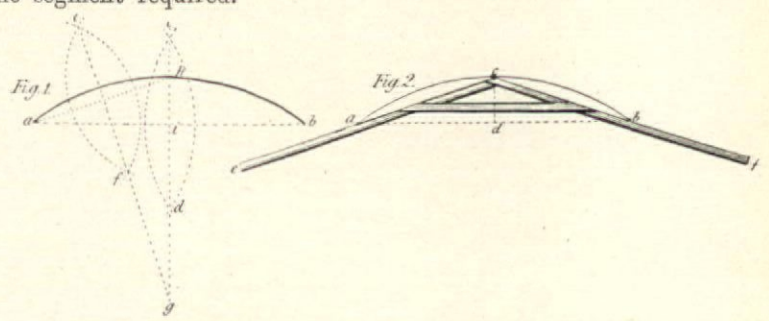
GEOMETRY CONTINUED—NO. 4.

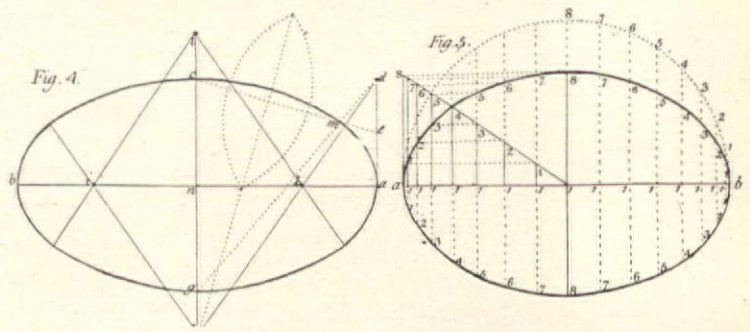
Fig. 9—To make a square equal to three given squares. Let A B C be the three squares; make a b equal to the side of B, a e equal to the side of A, at right angles to a b; join b c, then make a d equal to b c, make a e equal to the side of C, join d e, which will be the side of the square D equal to the squares A B C.

SECTION V.

Fig. 1—To draw a segment of a circle to any length and height. a b is the length, i h the height; divide the length a b into two parts by a perpendicular g c; divide a h by the same method, then their meeting at g will be the center; fix the foot of the compasses in g, extend the other leg to h, make the arch a h b which is the segment.

Fig. 2—To draw a segment by rods to any length and height. Make two rods c e and c f to form an angle e c f so that each may be equal to a b, the opening; place the angle c to the height, and the edges to a and b, put a piece a b across them to keep them tight, then move lath round the points a b, and the point c will describe the segment required.





GEOMETRY CONTINUED—NO. 5.

Fig. 3—To describe a segment of a circle at twice, upon true principles, by a flat triangle. Let the extent of the segment be a b, its height c d, from the extreme b to the top d, draw d b, through the point d draw e d parallel to the base a b, equal in length to d b, stick a nail or pin in a, and another in d, describe one-half, as you see at G; then move the nail, or pin, out of a, stick it in the point b, and describe the other half.

Fig. 4—The transverse axis a b and conjugate g c of an ellipses being given, to draw its representation. Draw a d parallel and equal to n c, bisect it in E; draw e c and d g cutting each other at m, join m c, bisect it by a perpendicular meeting c g, produced at h; draw h d, cutting b a at k, and make n i equal to n k; n l equal to n h; through the points i, l, k, h, draw the lines h, i, k, l, and i, l, h, k, then describe the four sectors by help of the centers, i, l, k, h, and it will be the representation required.

Fig. 5—To describe an ellipsis by ordinates. Make a semi-circle on the length a b, divide it into any number of equal parts, at sixteen, on the end at a make a 8 perpendicular, equal to half the width, and draw the ordinate, through the points in the semi-circle draw the line 8 r t to the center then a i 8 will be the scale to set off the ordinates; take ii from the scale and set it from 1 to 1, on the oval both ways at each end; then take 1 2 on the scale, and set it to 12 in the oval, and find all the other points in the same manner. A curve being traced through these points will be a true ellipse.

(To be continued.)

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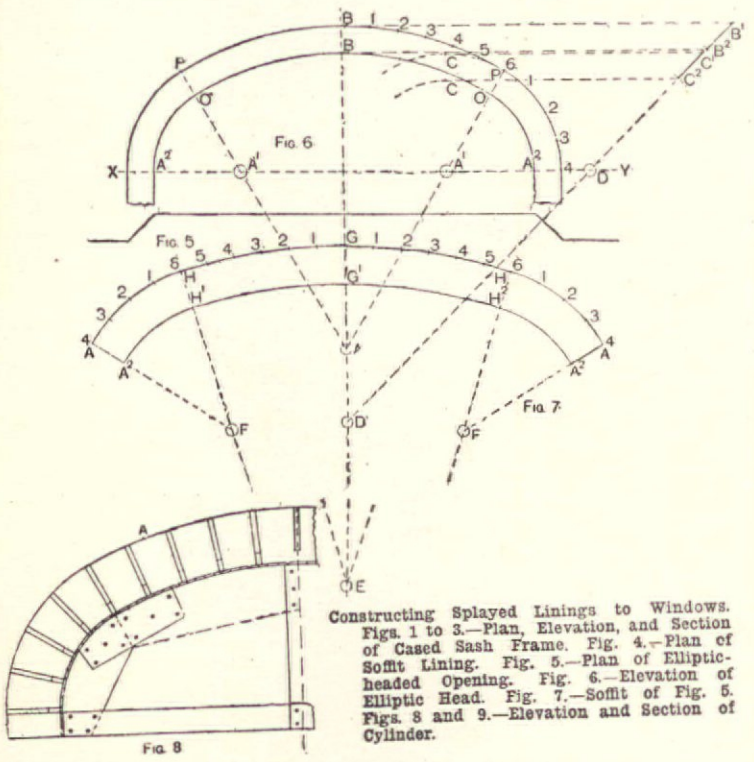
CONSTRUCTING SPLAYED LININGS TO WINDOWS.

BY F. W. TOASBY.

Before describing the method of obtaining the true shape of the veneer for the soffit of an elliptical head to a window, it is advisable to explain how the shape for a semicircular head is obtained. The description of the elliptical lining will then be more easily understood.

Fig. 1 shows the plan of an ordinary cased sash frame in a 14-inch wall, with the linings splayed at an angle of 45 degrees. Fig. 2 represents an elevation of the same frame, showing also the sashes, the upper one having a semicircular marginal bar and radiating bars. Fig. 3 gives a section through the center line of the frame, but shows the splayed lining only. Fig. 4 gives a plan of the soffit lining developed. The plan of the opening is first set out as shown, giving the true position of the splayed lining. It is then set up in elevation as shown by Fig. 2—not necessarily the whole elevation, but at least enough of it to contain the springing line and the part above it. When the linings have been obtained, finishing at springing line A A, and produce lines B B1, B B2, from the center of the head, parallel with the springing line. From the line B B2, set off the angle of the splay, and extend the line of the angle until it cuts the springing line in C. Divide the outer line of the head from A to B into any number of equal parts as shown. Take C as center (Fig. 4) and radius C B1, C B2, and inscribe arcs D D, E E from B (Fig. 4). Mark off the same number of equal spaces as in Fig. 2. Join D C at each side of the figure, and the true shape of the veneer is obtained, D D and A A being of equal length.

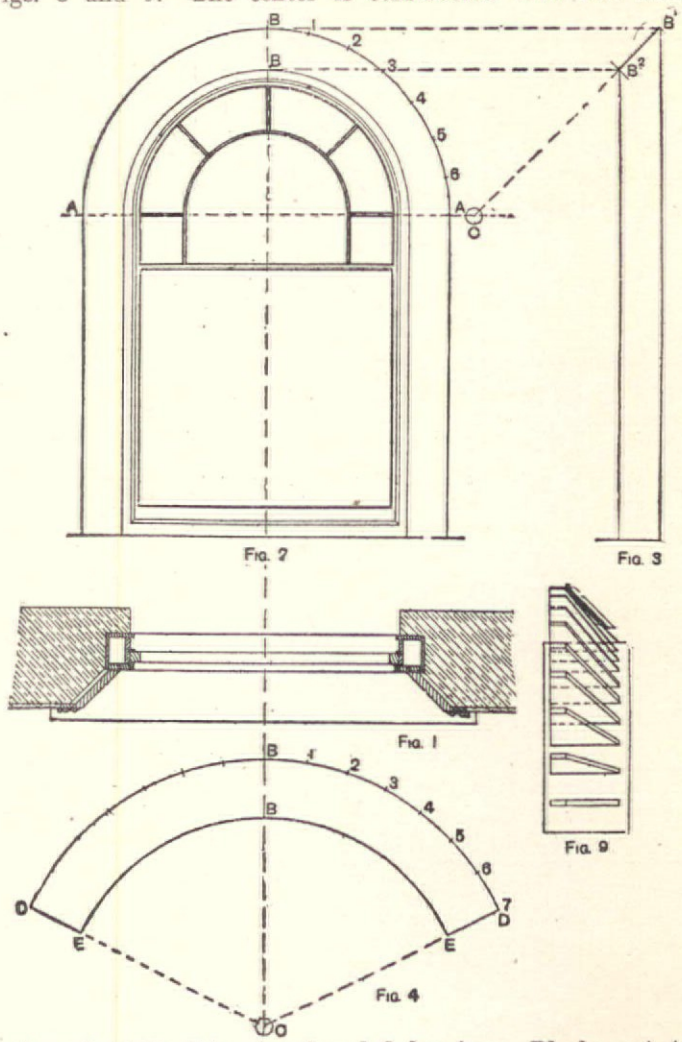
Fig. 5 represents the plan of an opening the head of which is an ellipse, with linings splayed at an angle of 45 degrees; Fig. 6 is an elevation of the head; Fig. 7, the developed soffit; Figs. 8 and 9 showing the elevation and section of the cylinder or center on which the head is constructed. The width and rise of the arch being given, set up the vertical line as the center of the arch, with the springing line X Y at right angles to it. With radius A B (Fig. 6) inscribe arcs O O, P P. From centers A and radius A O and A P inscribe the arcs from the springing line, intersecting P P. Extend these arcs as shown by dotted lines at the right hand side of the figure, until they cut C C in vertical line from A1 in the springing. Produce B B1, B B2, C C1, C C2, at right angles to the vertical



Constructing Splayed Linings to Windows. Figs. 1 to 3.—Plan, Elevation, and Section of Cased Sash Frame. Fig. 4.—Plan of Soffit Lining. Fig. 5.—Plan of Elliptic-headed Opening. Fig. 6.—Elevation of Elliptic Head. Fig. 7.—Soffit of Fig. 5. Figs. 8 and 9.—Elevation and Section of Cylinder.

line, and parallel with the springing. From the line B B1 produce the angle of splay, extending the line of splay until it cuts through XY to D in the vertical center line (Fig. 7). With radius D B1 and B2, and from the center E in the vertical line, inscribe the arcs H H, H1 H2. From the line of intersection P (Fig. 6) mark off six equal parts to B. Produce from G to H (Fig. 7). From H set off the dotted lines to E. With radius D C (Fig. 6), mark off H to F in the line of intersection; and with F as center and radius D C1 and D C2, inscribe arcs H A, H2 A1. Divide the outer radius from the springing to P (Fig. 6) into four equal parts, and from H (Fig. 7) set off the same number of spaces and equal distances. Join A in F, and repeat on the opposite side of the figure. The true shape of the veneer is now obtained; A to A (Fig. 7) being the same length as the outer line in Fig. 6.

The head lining is built up on a cylinder or center as shown in Figs. 8 and 9. The center is constructed with two stiff ribs



and of moderately thin close-boarded lagging. Blocks cut to the proper angle are fixed to the lagging in positions as shown; the distance apart being determined by the thickness of the veneer. The thinner the veneer, the nearer apart the blocks would be required. The veneer is laid on the blocks face downward, and fixed with fine panel pins. When this is properly done, blocks of the desired thickness would be fitted to the back of the veneer, and well glued to each other and to the veneer. When the glue is set, the blocking is levelled off, the veneer carefully eased from the blocking, and the fine pins withdrawn. The remaining portion of the work, such as forming the tongue and the splay on the edge, is easily performed. It is advisable to screw a couple of stretcher pieces across the lining during the time the lining remains unfixed.

HOUSE MOTTOES.

In this my House I live att ease,
And here I doe whate'er I please.

—Willst haben Gemach
—Bleib unter deinem Dach.

Translation.

Wouldst thou put happiness to proof,
Then always live 'neath thine own roof.

Hast du ein Haus
So denke nicht d'raus.

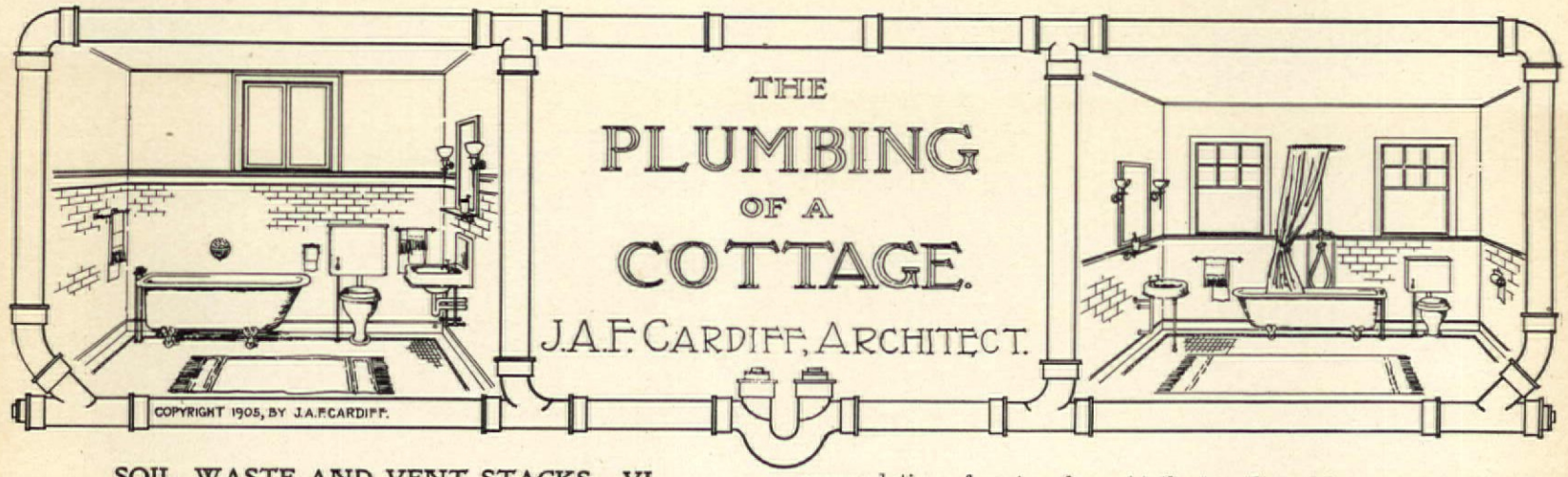
Translation.

Hast thou a home,
Then never roam.

Under a Fox chasing a Goose.

When the fox chased the goose this House was begun,
When the fox gets the goose this House will be done
—1755.

This House ye Fox and Goose doth beare
That foxy men mayn't enter here!



SOIL, WASTE AND VENT STACKS.—VI.

Soil stacks are the vertical lines of pipe that receive the discharge from water closets and urinals in addition to any other fixtures.

Waste stacks are the vertical lines of pipe that receive the discharge from any fixtures other than water closets and urinals.

A vent stack is a vertical line of pipe, running in conjunction with a soil or waste stack, and the purpose of which is to provide a supply of air to the traps of all fixtures discharging into the soil or waste stacks, so as to protect the water seal of the traps from siphonage and back pressure and to ventilate the system.

The soil stack connects to the house drain at the bottom with a Y fitting, and an eighth or sixteenth bend, and extends to a point about one foot above the roof (Fig. 33).

The soil pipe is the horizontal connection between the water closet or urinal and the soil stack (A, Fig. 33).

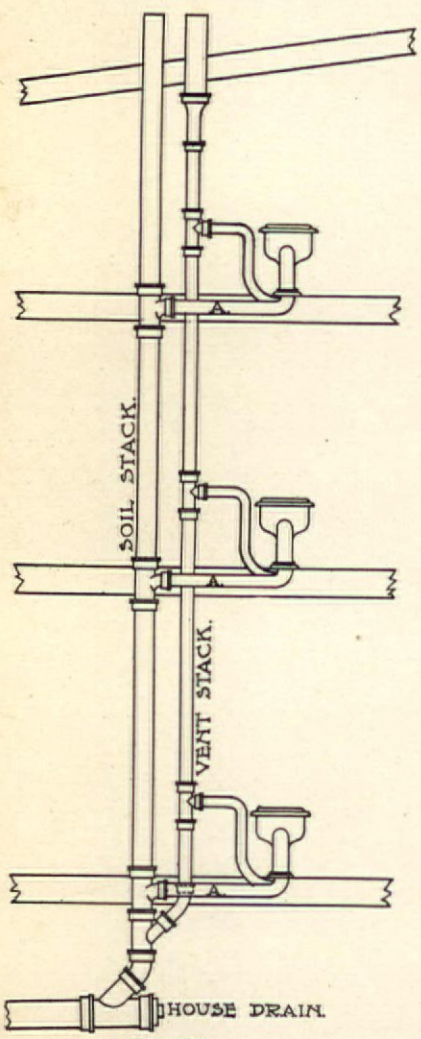


FIG. 33.

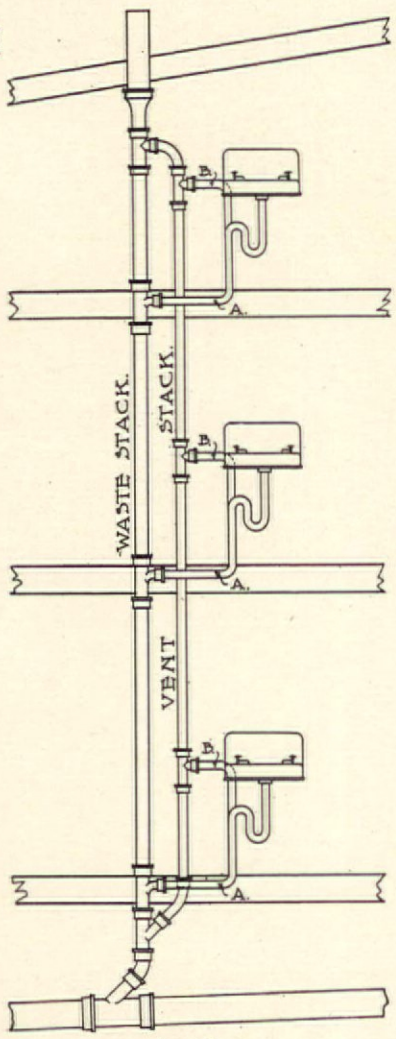


FIG. 34.

Waste stacks are constructed in the same manner as soil stacks, connecting to the house drain at the bottom and extending a foot above the roof (Fig. 34).

The waste pipe is the horizontal connection between the fixture or fixtures and the waste stack (A, Fig. 34).

Vent stacks connect with the soil or waste stacks below the lowest fixture in the manner shown in Fig. 33, so as to prevent the accumulation of rust scales. At the top they either extend above the roof, as shown in Fig. 33, or may be connected to the soil or waste stacks at a point above the highest fixture, as shown in Fig. 34, in

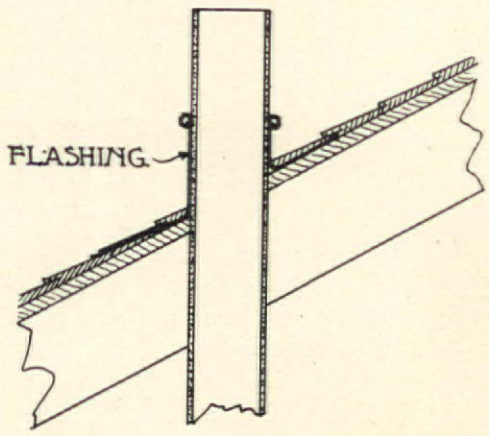


FIG. 35.

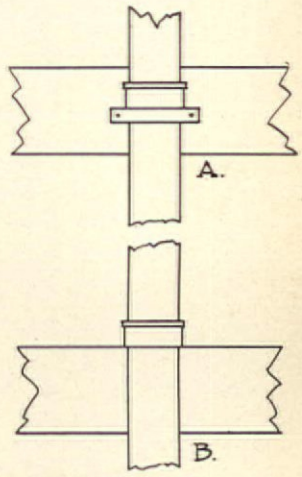


FIG. 36.

which case that part of the soil or waste stack above the connection becomes a vent stack.

The latter method is, of course, less expensive and in no wise objectionable for cottage work, but in a building where there are fixtures on six or more floors the vent stack should extend separately above the roof.

The vent pipe is the horizontal connection between the trap of a fixture and the vent stack (B, Fig. 34). It should be set with a decline to the trap so that the water of condensation will drain through the soil or waste pipe.

Soil, waste and vent stacks should be constructed of extra heavy cast iron pipe, or, where a little extra expense is not an important consideration, wrought iron pipe might better be used. Standard cast iron pipe is used to a great extent, but the plumbing regulations of many cities prohibit its use.

Necessary offsets in soil and waste stacks above the highest fixture should be made at an angle of not less than 45 degrees to the horizontal. All offsets in vent stacks should be made at an angle of not less than 45 degrees to the horizontal.

Soil, waste and vent stacks less than four inches in diameter should be enlarged to four inches at a point not less than one foot below the roof surface, by an increaser such as is shown at "B," Fig. 33, not less than twelve inches long. The increase in the size of the pipe is made in order to reduce to a minimum the possibility of the outlet being choked by frost in winter.

Where stacks pass through the roof the joint at the intersection of pipe and roof should be made thoroughly water tight by flashing with 16-oz. copper or 6-lb. sheet lead in the manner shown in Fig. 35.

Stacks should be supported at each floor, and where possible between floors with iron straps as at "A," Fig. 36, or by cutting the pipe so that a hub will occur at each floor (B, Fig. 36).

The sizes of pipes and stacks and some examples of their installation will be made the subject of the next issue.

THE DETAIL SHEET.

The elevation and details shown on the lower portion of the detail sheet are fine examples of English work. There are many things on this sheet that will prove suggestive to both architect and builder, and the workman, also, will find a number of things on the sheet that will prove of value to him.

SOME LESSONS IN BRICKWORK.—X.

Gauged work, as its name implies, consists in cutting and rubbing the bricks to special sizes and shapes according to requirements. The bricks used for this class of work are specially made for the purpose and are known as "rubbers" or "cutters." While they are hard enough to resist the pressure that comes upon them when they are built in the work, yet they are soft enough to be easily cut and rubbed to the desired shape.

One of the most important uses of these bricks is in the construction of arches. A brickwork arch is practically a curved beam made up of a number of separate pieces so arranged as to support their own weight and that of the wall above.

The complete elevation of a segmental arch is shown in Fig. 1. To set out the arch draw two short vertical lines (Fig. 2) at a distance apart equal to the width of the opening; this width being termed the span. Between these two vertical lines draw the horizontal springing line A B. At the center of A B erect a short vertical line, C D, equal to the given rise of the arch. Bisect the distance between A C by opening the compasses a little more than half this distance and drawing two arcs, one with A as center and one with C as center. Through the intersection of the two arcs

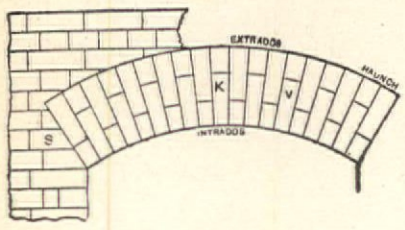


FIG. 1.

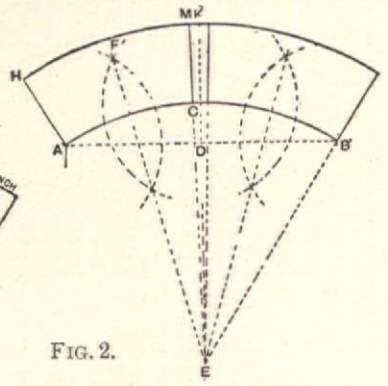


FIG. 2.

draw the line E F to meet the rise continued at E. With E as center and radius E A, the intrados or soffit can be drawn. With a straight-edge against A and E, draw the skewback, A H. Mark off the depth of the arch on the rise continued as C K. With E as center and radius E K, describe the arc H K, representing the extrados of the arch. To fit in the courses of bricks draw a key brick three inches wide, so that half of it falls on each side of the center line. This can be done by marking off one and a half inches on both side of K. With the points of the compasses three inches apart step around the extrados from M to H. If this distance fits in exactly that will do. If it does not, mark out a new key brick and try again till successful, using a distance less than three inches.

To draw the joints keep the straightedge at E, and against

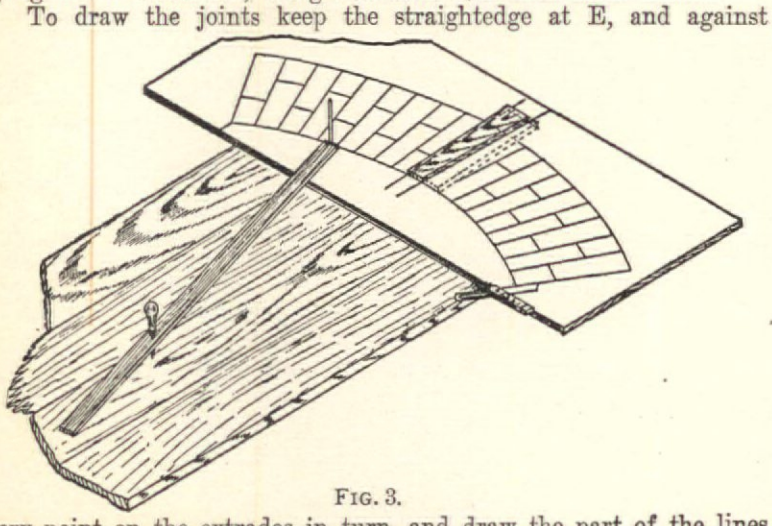


FIG. 3.

every point on the extrados in turn, and draw the part of the lines that falls between the outlines of the arch. The cross joints may be drawn with the compasses, though actually straight in practice. The workshop practice in setting out differs somewhat, as a rod has to be used instead of compasses. The best plan is to keep a setting-out board, as shown in Fig. 3, on which lining paper can be tacked or pasted. Another plan is to whiten the boards afresh each time, but this does not allow the setting out to be so accurately done. Having temporarily tacked the setting-out board to bench of some kind, next ascertain from a scale drawing the length of the rod required to strike the arch. Failing this scale drawing, the length can be calculated by multiplying half the span by itself, and dividing this result by the rise. To this then add the rise and divide by two. Example: Take an arch of three feet span and six inch rise. Half the span equals 3/2 feet. Multiplied by itself equals 3/2/x3/2 equals 9/4. This divided by the rise equals $9/4 \div 1/2 = 9/2$. Add the rise thus, $9/2 + 1/2$ equals 10/2 equals 5. Divide by 2, this equals 2 feet 6 inches, which is the radius of the curve.

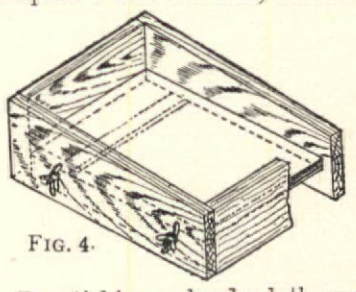


FIG. 4.

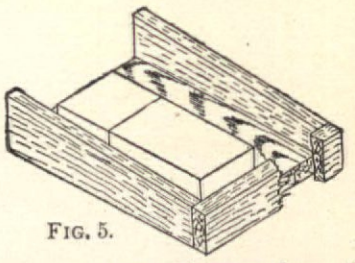


FIG. 5.

By sticking a bradawl through a rod at this distance from the end and holding a pencil at the end, the soffit line can be described. By moving the bradawl back along the rod a distance equal to the face of the arch, and then placing it in the same hole in the board as before, the extrados can be drawn. Care must be taken to put the bradawl on a line square with the edge of the setting-out board and in the center of the span. To fill on the courses proceed exactly as on paper; the joints being obtained by holding a straightedge to the points on the extrados and against a nail driven into the center from which the curves were struck. A template is now made by continuing the joints of one course, Fig. 3, so that when a piece of wood is laid with its straight edge against one of the lines then the other can be squared up over the ends, giving the shape and size of the template. This piece of wood having been shot to the bevel to form a template, its accuracy must be tested by running it over the face of the arch. An easy method of securing accuracy is to make two templates and, laying one over the key brick, place the other in close contact with it, the line that marks the position of the soffit on each template being kept exactly over the soffit of the drawing. By means of two straightedges one template can be run over the arch. The template is laid on the key brick, and one

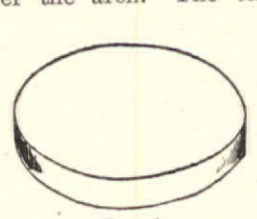


FIG. 6.

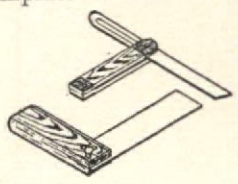


FIG. 7, 8.

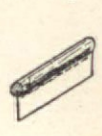


FIG. 9.

FIG. 10.

straightedge butted up against it. Then take away the template and replace it by the second straightedge. Now remove the first straightedge and put the template in its place, this process being repeated until the template ultimately reaches the end position, when it should have one of its sides coincide with the skewback.

The templates having been cut, a number of bricks, according to the number and size of the arches in hand, are prepared by truing one large face to form the bed of the brick. This is done by rubbing the bricks on the circular rubbing stone, Fig. 6. In the case of plain arches the face of the brick that forms the face of the arch is next squared on the stone, and tested with the square (Fig. 8). Next, the end forming the soffit of the arch is cut to the required bevel in a plain cutting box, similar to Fig. 5, but having parallel sides and no end. The sides of this box are made of such a width that by running the wire saw (Fig. 12) over the top of them the brick is cut to the thickness required, to form an even back face in the case of arches only half a brick on soffit, or to form

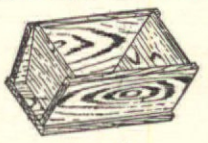


FIG. 11.

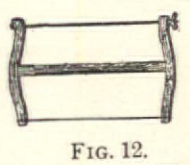


FIG. 12.

FIG. 13.

a soffit joint in thicker work. The length of the box is such that by putting the bricks in it so that they stand at an angle with the sides, they can be cut to the correct length and bevel. It only remains to cut the brick tapering so as to fit the template. This is done in a box similar to that shown in Figs. 4 and 5. Sometimes the bottom end is omitted. The sides of the boxes are made to stand up above the bottom so as to fit the prepared template. Fig. 3 shows a cutting box with a slate bottom which can be set by thumb screws, while Fig. 4 illustrates an easily made box. Care must be taken to allow for the thickness of the joints, 1-16 inch to 1-32 inch being allowed off each course for this purpose.

In cutting arches it is usual first to cut the bricks next to the key brick, and then to work toward the skewback; stacking each half of the arch in this way so that in setting it the right brick is at hand to begin with. The wire saw (Fig. 12) simply consists of a frame in which a blade, made by twisting two pieces of steel wire together after it has been softened, can be stretched. As this saw does not leave a perfectly regular surface, the bricks are finished, either with a file or with a flat piece of wood. A complete course of an arch, nine inches thick, can be cut to the template at once, the bricks forming it being fitted and bonded first.

To cut the skewback make a template to the bevel shown in Fig. 3. If there are many arches of the same size it will be best to make a box to this template; if few are required, they can be marked out after having been reduced to the right thickness by placing the template on the face edge and scribing the bevel with the tin scriber (Fig. 9). The bevel can be cut with the wire saw and finished either with the file or on the stone. The greatest difficulty a novice has is to keep the arises square and sharp, as they are easily rubbed off in the handling. It is upon these arises being sharp that the possibility of showing fine face joints depends.

Though it is not usual for experienced cutters to test their work, their skill being sufficient to ensure success, yet the beginner

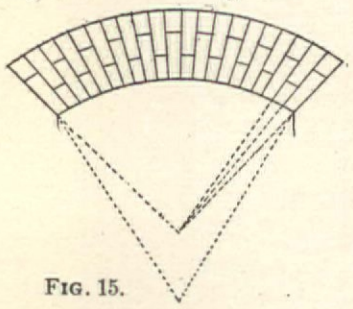


FIG. 15.

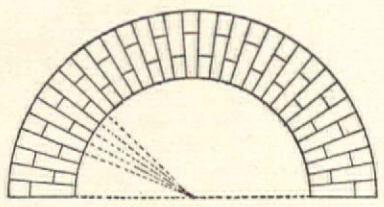


FIG. 14.

may find testing advisable. This can be done by setting up the skewbacks (only one of which is represented) as shown in Fig. 13, and placing the turning piece or center so that the bricks when cut can be laid dry upon it. Working from each end an opening will be left (when all the bricks have been placed in position) equal to the total amount allowed for the joints. The center should be tested by the setting-out board, and in arches where two or three ways of construction are possible, it is imperative that the setting-out board shall be used to make the center from. The center is fixed in a correct position between the reveals, and supported on imposts having folding wedges between them and the center, so that when the center is struck, after the arch has set, the wedges can be gradually loosened. By doing this there is no risk of spoiling the arch. Gauged arches are set in lime putty, made by running lime to a liquid state and passing it through a sieve. This putty stands by the side of the setter in a box, or putty tub, as it is sometimes called (Fig. 11). The putty tub is a box with bevelled sides about nine inches deep and fifteen inches at the top. The putty is stirred frequently to prevent all the solid matter from settling to the bottom of the tub. The brick to be set is brushed to remove all dust, and the setter touches the surface of the putty so that only just sufficient of it adheres to the brick to make a joint. The center part of the joint is scraped almost clean and the setter makes the putty round the edge complete. The brick is put into position and lightly tapped to make a solid joint. After the arch has set any irregularity in the face or soffit is removed by means of files, handstones, pieces of brick, etc.

The semi-circular arch is shown in Fig. 14. It is the strongest form of arch. As it is really a segmental arch with the center on the springing line, there is no need to describe the construction.

A scheme arch is not a very creditable piece of construction, but examples of it are to be found. It is similar in outline to a segmental arch, but the joints are struck from a different center. In some cases the center from which the joints are struck is taken on the springing line, and thus brings the skewbacks level. The bricks vary in bevel, so that each has to be taken separately for half the arch. An arch similar to this may be cut from one template by making a template and running it over the arch, allowing the skewbacks to fit the last course. Even then the soffit bevels must vary. However done, the arch has nothing to recommend it, as far as appearance and economy are concerned.

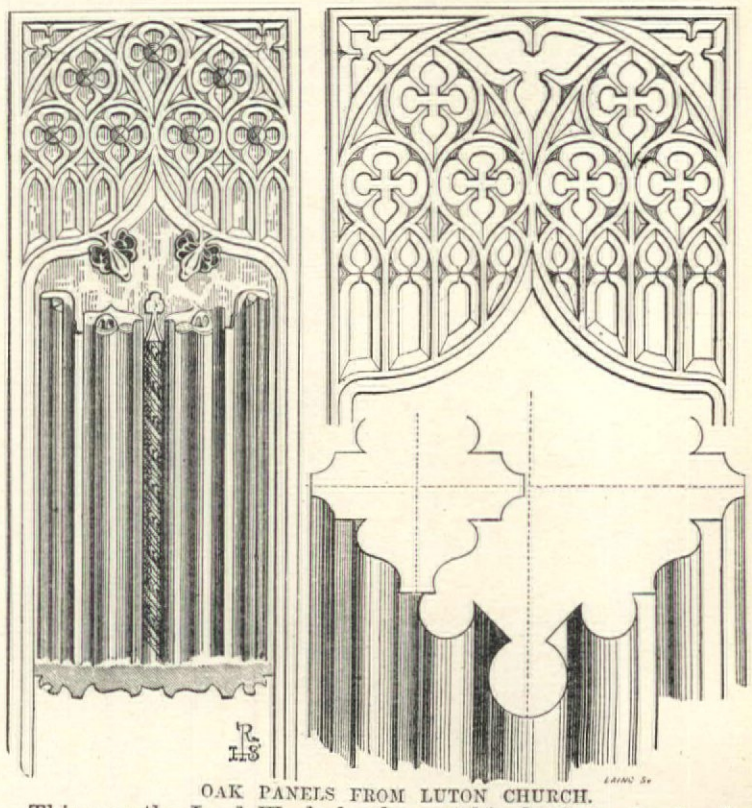
(To be continued.)

FROM THE EDITOR'S SCRAP BOOK.

The accompanying cuts are representations, quarter real size of panels, from the oak screen in the Wenlock chapel, Luton church, England. The moldings are half-size and show the principal and intermediate mullions.

The chapel derives its name from the founder, Sir John de Wenlock, and appears to have been built some time before the year 1461, when he was created Baron Wenlock. The following lines were formerly found in the eastern window of the church:

"Jesus Christ, most of myght,
Have mercy on John de Wenlock, Knyght,
And on his wife Elizabeth,
Who out of this world is post by death.
Which founded this chapel here;
Help them with your hearty prayer,
That they may come of that place,
Where ever is joy and solace."



OAK PANELS FROM LUTON CHURCH.

This was the Lord Wenlock who met his death by the hand of Earl of Somerset, for his supposed pusillanimity at the battle of Shrewsbury in the wars of the Roses. The chapel is placed on the north side of the chancel, and with its oak screen, would form an ornament to the church, were it not filled in with faded green baize and choked up with high unsightly pews. The chapel contains several altar tombs, on one of which is a very fine brass.

Luton church, dedicated to Saint Mary, has been one of the finest in the county of Bedford. It has a bold western tower, in style early perpendicular, composed of flint and stone in diaper work, and although much dilapidated, presents from its bold outline a grand appearance.

The church contains many objects of interest in tombs and brasses, and good specimens of early English and decorated work.

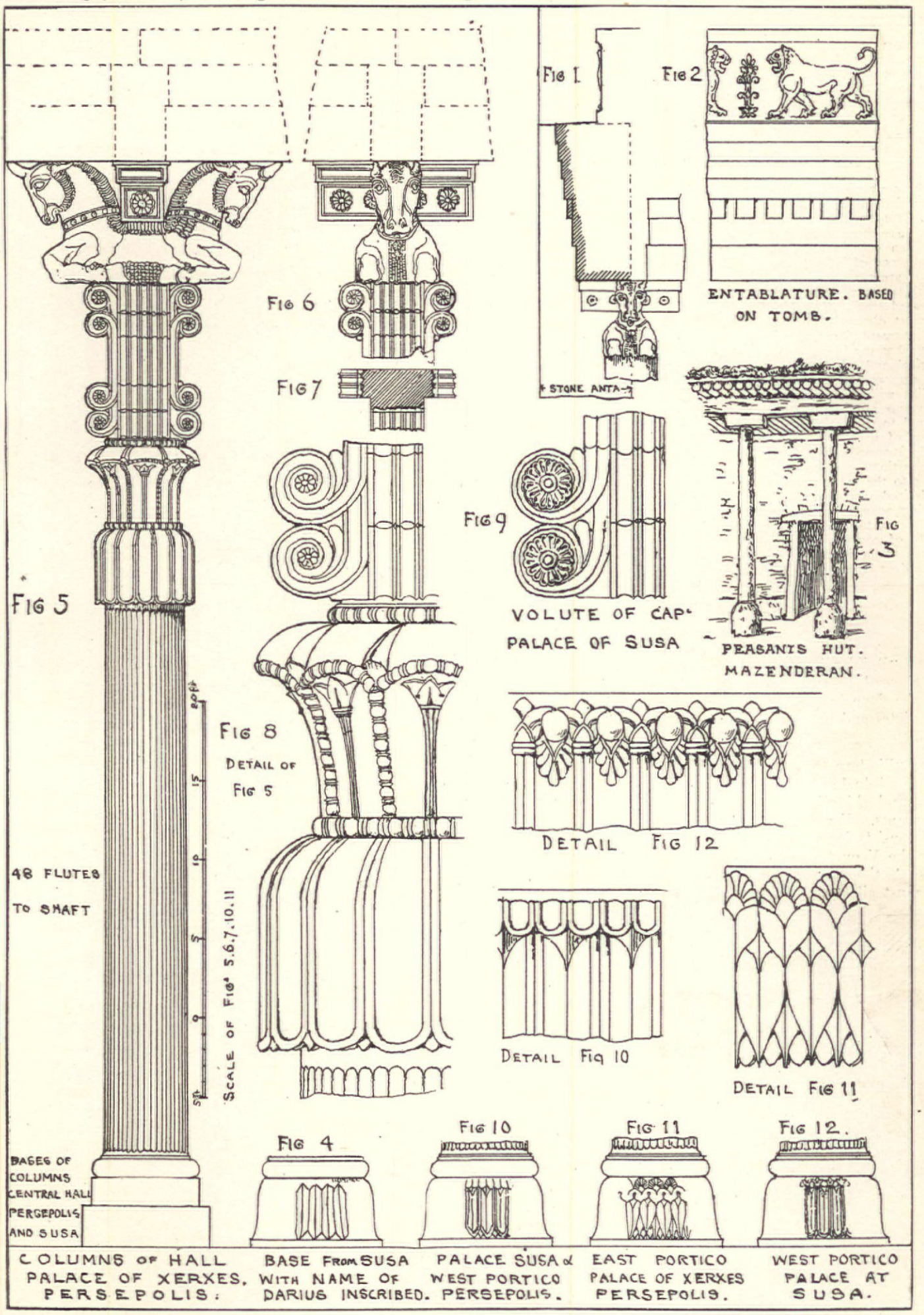
In the latter style may be mentioned a stone Baptistry chapel mounted on steps and covering a font of good design. It is in good preservation, and alone is worth a visit, were there nothing else of interest in this fine but much neglected church.

OUR GRAMMAR OF STYLE.

When in 1851, shortly after Layard's discoveries at Nimroud, Fergusson published his work on the Palaces at Ninevah and Persepolis, and later on reproduced in the Assyrian court at the Crystal Palace his conjectural restoration of an Assyrian palace, he copied therein the Persian order as developed in the Great Hall of Xerxes at Persepolis, his assumption being that Xerxes had copied in stone the columns and capitals which in the Assyrian palaces had been in wood only, and had consequently perished either in course of time or in a conflagration. Layard's subsequent discoveries, followed by those of La Place at Korsabad, have thrown additional light on the subject which render Fergusson's theories extremely doubtful. Into this subject we do not purpose to enter here, but the unfortunate selection of architectural details made by Fergusson from the palaces built by Xerxes in 485 B. C. on his return from his expedition through Greece and Asia Minor has led the student into the belief that the Greek Ionic order owes the origin of some

of its principal features to an Assyrian source, and in his description of Greek architecture Fergusson refers frequently to this subject.

The earliest Persian palace of which remains exist was built by Cyrus the first king (560 B. C.) at Pasargadoe, where he defeated and took prisoner Astyages, the last Median monarch. Of this Persian palace there remains in situ only one column, unfluted, over thirty feet high, built in three drums, with a plain circular base, and three stone antae, twenty-one feet high, on the upper portion of which are the sinkings in which the timber architraves were housed. The foundation bases of other columns have been found and portions of the foundations of walls, which showed that the palace consisted of a central hall of columns and at least one portico. The design was evidently of the simplest kind, showing that in its origin the Persian order had none of the elaboration found in the work of Xerxes. The same may be said of the palace built by Darius at Persepolis in 521 B. C.



Correspondence

[The Editor does not hold himself responsible for the opinion of correspondents. Short, crisp letters will be appreciated. To insure publication, the name and address of the writer must accompany the communication, not necessary for publication. Sketches of work or methods will receive our earnest attention. These columns are open to our readers at all times without charge, and any questions or experiences will be given proper space.—EDITOR.]

TO OUR CORRESPONDENTS.

For the convenience of any reader who requires an answer to his question earlier than it would appear in the usual course in the columns of THE NATIONAL BUILDER, the Editor has decided to send by post, in advance of publication, a written answer furnished by the authority to whom the question has been submitted. Questions must be strictly confined to subjects within the scope of THE NATIONAL BUILDER. Readers who desire these advance or express replies must endorse each question at the top left hand corner with the words "Immediate Mail Reply," and must enclose a stamped and addressed envelope, together with 25 cents in stamps for each question. Readers must distinctly understand that this small fee of 25 cents does not represent payment for the information contained in the reply (for which no charge whatever is made), but is simply a contribution toward the cost of extra clerical and other work, postage, etc. The Editor, while endeavoring to insure prompt replies to urgent questions, can not undertake to forward such replies within stated period, and disclaims all responsibility for any delay that may possibly occur; nor can he guarantee that any question will be answered to the satisfaction of the querist as regards the special use or adaptability of the information tendered. Every answer sent by post may be printed afterwards in THE NATIONAL BUILDER, and must not be reproduced elsewhere without written permission.

Owing to the many questions that have been sent us of late, where the querists desired answers by mail, much time and expense have been incurred in procuring answers and forwarding same to the correspondent, that we find it necessary to make this small charge toward covering expense of same. There will, of course, be no charge made for questions answered through the columns of the journal in the usual manner. Only a charge made where a correspondent wants an immediate answer by mail.

ANSWERS.

FLASHING A CHIMNEY.

From "Builder," Indianapolis—If "Roofer" will examine the diagram I send herewith (Fig. 1) he will see how good flashing ought to be done in his case. The slates or shingles lie upon the slanting plates and upright plates lie closely against the bricks.

ORNAMENTAL SHINGLING.

From "Western Carpenter," Duluth, Minn.—In answer to "Ambitious," Fond du Lac, Wis., I submit the following designs for fancy or ornamental shingling, from among which I think he will find what he wants. For diamond patterns a method is shown at Fig. 2, which consists in cutting the pattern shingles with a V end and dropping the V on to the course below, the shingle A belonging to the course A, the shingle B to the course B, and so on. The pattern shingles must all be of the same width and shape. The upper part

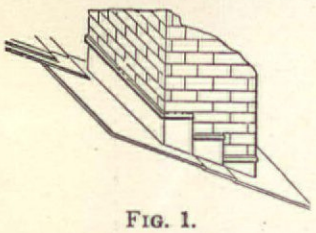


FIG. 1.

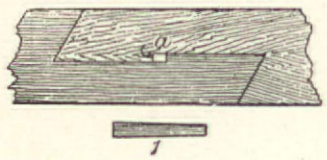


FIG. 9.

of the pattern can not be given the same outline, as the shingles D D, E E, etc., are flush with each other and there is no protection to throw a shadow. This method is more clearly shown by Fig. 3, which is laid exactly as Fig. 2, the only difference being that the butts are cut to a half circle.

Fig. 4 and 5 shows the other method of forming shingle patterns. By this method the common shingles are laid in continuous courses up to and including the course A. The pattern is then laid, the lower shingle of the pattern being laid over the other shingles. After the pattern is wholly laid the common shingling is taken up again and the shingles next the pattern laid over the pattern shingles and their buts cut to the shape desired for the patterns.

By this method a true diamond, circle or oval pattern can be obtained. The pattern is also much more pronounced than with the first method, as the shingles laying over each other there is considerable projection and consequently a greater shadow. Fig. 5 is laid in the same way as Fig. 4, except that the outer shingles are cut to the oval.

To lay a shingle arch there is but one way that we know of, and that is to lay the shingles radiating from the center, as in Fig. 6. The arch shingles are laid over the course A, and the first row of arch shingles B should be double. After the arch is laid the common shingles are laid over the arch shingles and cut to the circle, as at S S S. If a full circle is desired the lower half must be laid as in Fig. 7 the outer row of arch shingles being laid over the common shingles as shown. The last or inner course of arch shingles should be partly covered with galvanized iron or copper flashing. A shingle arch is hardly a legitimate way of using shingles,

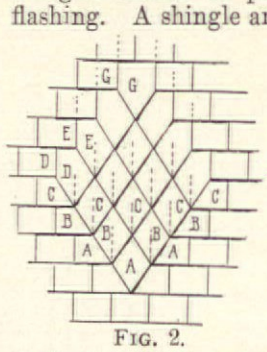


FIG. 2.

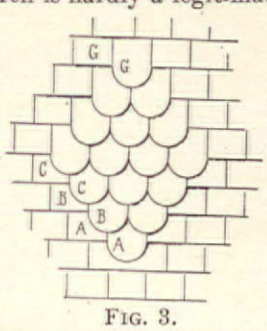


FIG. 3.

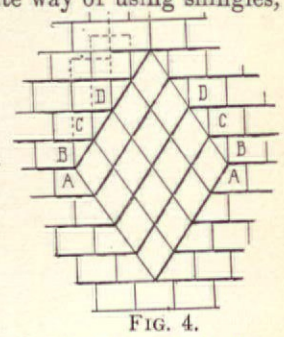


FIG. 4.

as those near the spring must be laid nearly horizontal, which does not give very good protection from the weather. A segment arch may be formed in shingles in a perfectly legitimate and weather-proof manner, as shown in Fig. 8 all of the shingles being vertical, but instead of being laid in horizontal courses the courses are carried up over the arch, or opening, and the butts cut to the circle. The shingles of course D stop at the dotted line d, and those of course E at the dotted line e. This method, however, can not be adapted to a full half circle, as the shingles at the springing would be too much exposed to the weather.

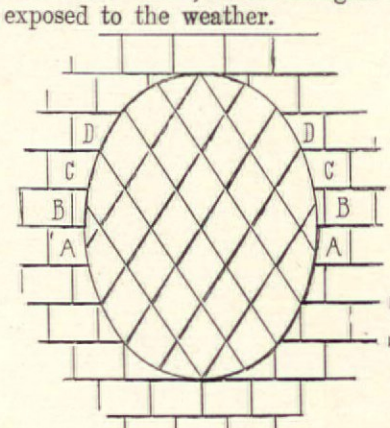


FIG. 5.

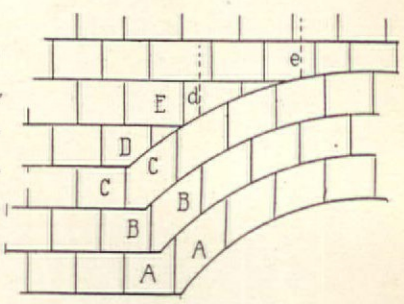


FIG. 6.

SILOS.

From "Woodman," Knoxville, Tenn.—"W. P. H.," of Hepner, Ore., should write to the U. S. Department of Agriculture, Washington, D. C., for copies of "Farmer's Bulletins" Nos. 32 and 36, which will give him all the information required concerning silos. These bulletins are sent free to any resident in the United States who writes to the department for them. They contain a lot of information on silos, and other kindred subjects which can not be obtained elsewhere.

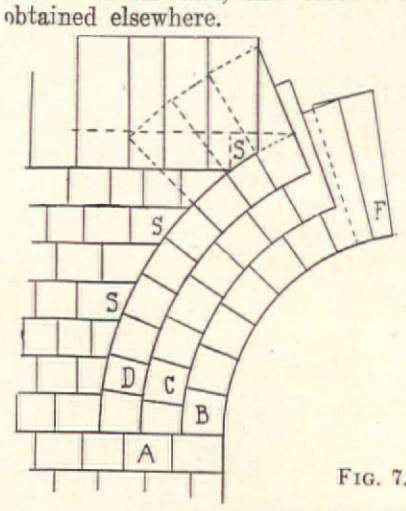


FIG. 7.

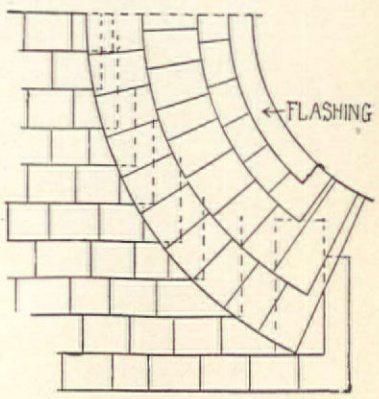


FIG. 8.

LAYING MOSAIC TILE.

From "Cementer," Buffalo, N. Y.—In reply to "J. D. C.," Jacksonville, Ill. The paper should be taken off the tiles as soon as the tiles are laid in the cement. This is done by wetting the paper until it is loose. This is necessary because, if any adjustment of the tiles is required, such adjustment should be done before the cement sets. For setting tile of this kind the cement should be neat, that is, without any admixture of sand.

A SLIP JOINT.

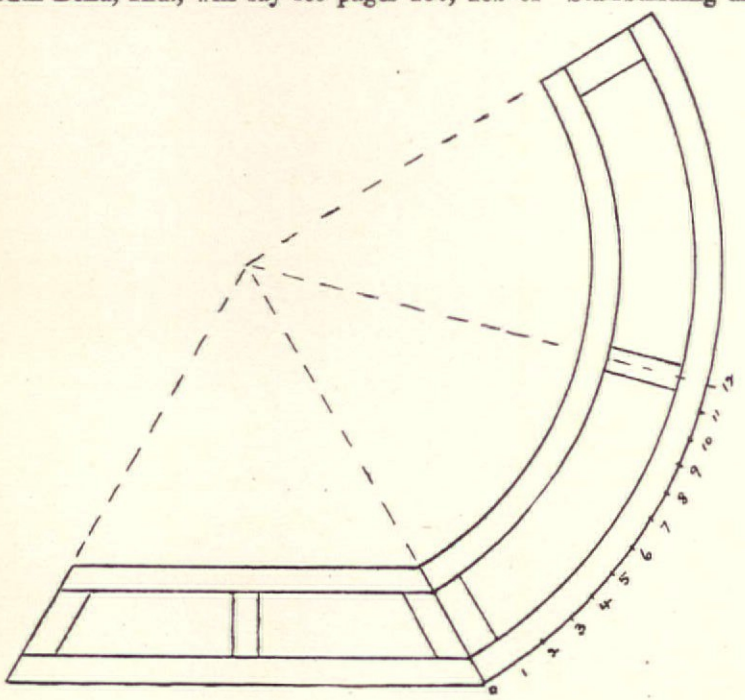
From "Carpenter," Baltimore, Md.—For the benefit of J. S. K., Atlantic City, I submit the following diagram which illustrates what is known as a "slip carpenter's splice." Fig. 9. This makes a good solid splice and is very strong when well made. I show a wedge which is usually of hardwood and a shows the grain cut for the wedge.

SPLAYED CIRCULAR JAMBER AND HEAD.

From "Another Workman," New York, N. Y.—In answer to "Workman," of Boston, Mass., I send you the following diagrams of a good method of "laying out" a splayed circular head. The angles of splay is shown on the upper diagram and the face of the head is shown in the lower diagram, Fig. 10. An examination of the illustrations is all that is necessary to guide the workman in the formation of this work.

RAMP OR KNEE.

From J. S. F., West Frankford, Ill.—In answer to "Carpenter," South Bend, Ind., will say see pages 180, 182 of "Stairbuilding and



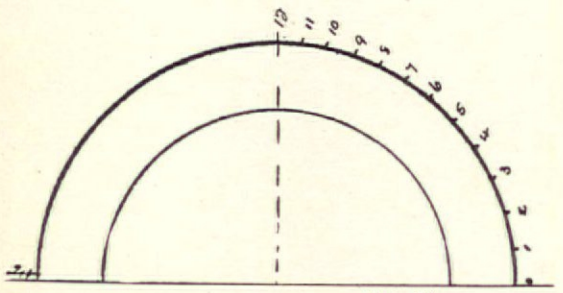


FIG. 10.

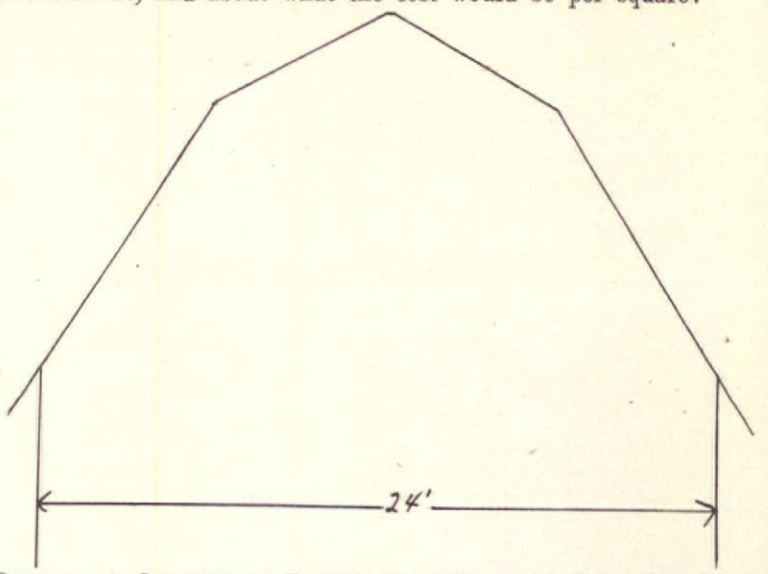
Handrailing" for definition of ramp and knee. One is just the opposite of the other. Ramp, "A concave or convex curve or easement of an angle as sometimes required at the end of a wreath or an adjoining straight line." Knee, "A convex bend in back of handrail. A part of the back of a handrailing of a convex form. The reverse of a ramp, which is a back of a handrail and is concave. Also any piece of timber bent to an angular point." Knowing that one is exactly the reverse of the other will help to get the exact idea of each.

QUESTIONS.

From "Carpenter," Scranton, Pa.—I have a brick elliptical arch to construct over a peak about twenty feet, and I wish to have a center made to turn this arch over. The wall will be eight inches thick, and a few hints as to the best methods of making a center for the purpose will be appreciated.

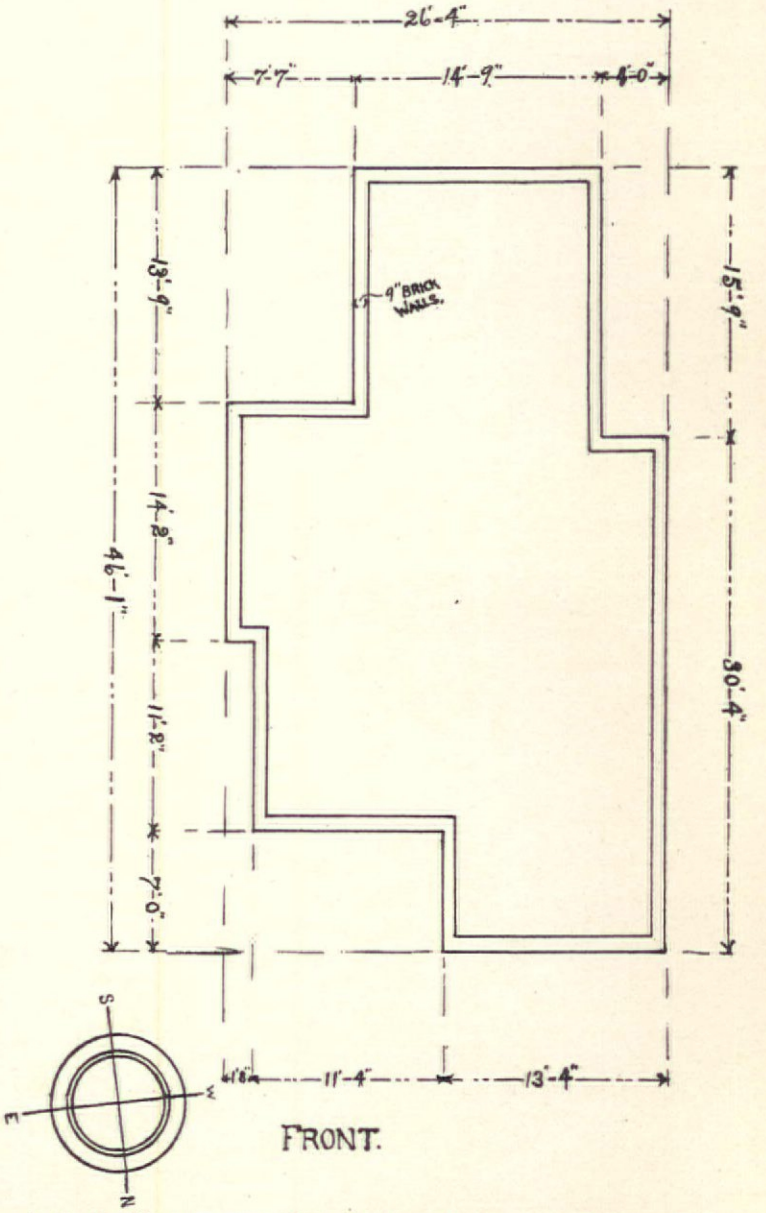
From "S. M. R.," Shellac, Iowa.—I see a number of saw-filing gauges advertised in THE NATIONAL BUILDER and I would like to know if any of THE NATIONAL BUILDER readers have used any of these devices, and if so which of them is best.

From "Joseph H.," Logansport.—I would like to ask the readers of this journal which is the best way to theever a wall between a double house, and about what the cost would be per square?



BEVELS AND LENGTHS OF RAFTER WANTED. BY D. E. A., RED WING.

From "P. J. L.," Pittsburg, Pa.—I would be pleased to find out through your columns how to lay off the top stiles of a semi-circular window frame that sets in a circular wall and has a circular top, sash to be radial?



A ROOF WANTED FOR THIS PLAN. BY JOHN C., HAMMOND, IND.

From "Builder," Hoboken, N. J.—Will you kindly inform me as to the best method of keeping a basement wall dry? I wish to keep the wall perfectly dry from the stone footing up. Outside the walls the earth will be at least four feet above the level of the basement floor, and the brickwork will run down at least one foot six inches below the basement floor. The foundation is of stone.

From "A. K. S.," Fort Wellington, Ontario.—I would be pleased to see in THE NATIONAL BUILDER a sketch of a bake oven that an ordinary bricklayer could work from. Several illustrations of bake

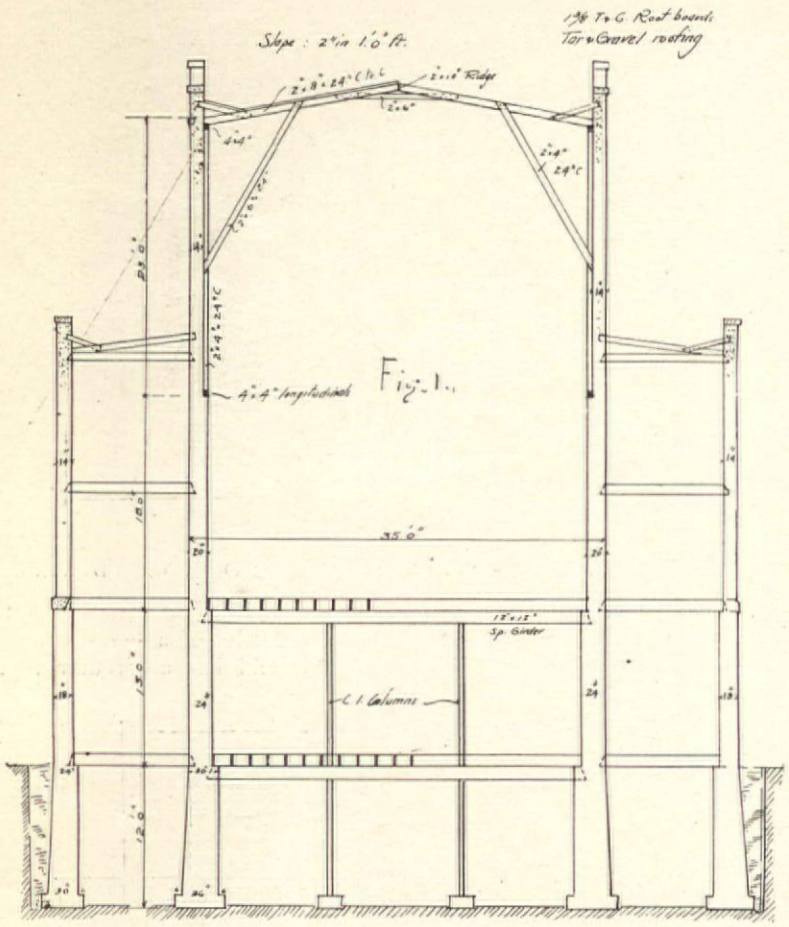
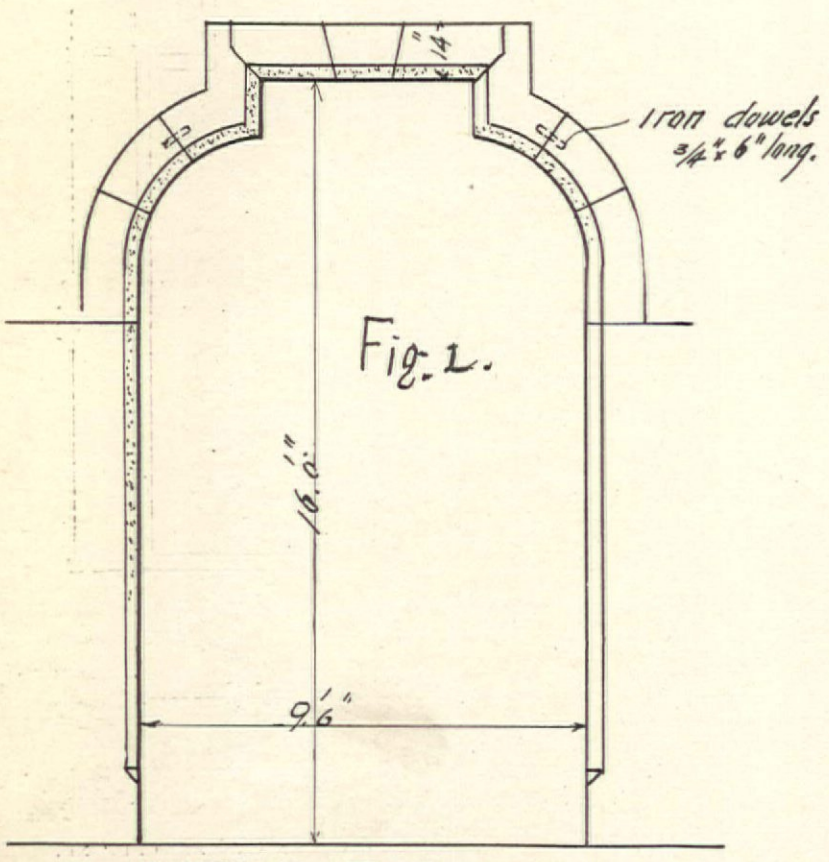


FIG. 1. CROSS SECTION.

ovens have been published, but they do not seem to be the ones wanted, and they are not very plain. Perhaps some reader would give a working plan of an oven. I would be willing to pay for a good set of working drawings and specifications.



From "C.," Milwaukee, Wis.—I notice very few questions from this city, which I think is a mistake, as the more questions asked, the more are likely to be answered, and the greater amount of knowledge obtained. I would like some one to tell me through these columns why it is that clothes closet walls get so damp in winter, yet keep dry in summer? Is it in some fault of the plaster?

From "D. E. A.," Red Wing, Minn.—I send you herewith a rough sketch of a roof I have to build and would be pleased if some reader would explain the method of getting the lengths and bevels of rafters for this kind of roof.

From "W. B.," Zanesville, Ohio.—Will some architect or mason please describe how an elliptical stone arch should be set out and jointed?

From "John C.," Hammond, Ind.—I inclose herewith the outline of a building which I would be pleased to have some one of the readers of THE NATIONAL BUILDER to give me their ideas as to the roof plan or elevation. The roof will be on a level all around the building, and hips preferred in place of gables as much as possible. Roof to have one-half pitch, and cornice to project from fourteen to sixteen inches from wall line. The building is of brick with walls nine inches in thickness. Any assistance granted this request, will be thankfully received by one of the old time readers of THE NATIONAL BUILDER.

From "A. B. C.," Moncton, N. B.—Would some of your obliging correspondents be kind enough to answer the following questions: 1st: Is this roof truss (Fig. 1) strong enough to carry sixty pounds per foot square? 2d: Would you advise me as to a better way of framing, so not to affect the curve of my vault (see line on drawing herewith). 3d: Would the joining of arch "A," Fig. 2, be all right? The arch has to carry a weight of about ten tons. We are using a good, compact sandstone, No. 1 qualty. 4th: Is there any better manner in building this style of arch?

A NEW STEEL SQUARE.

The following letter and specifications explain themselves:

NEW WESTMINSTER, B. C., Jan. 5, 1906.

FRED T. HODGSON, Editor National Builder:

Dear sir—I inclose you tracing and copy of the specification of my "Rafter Gauge," on which I have recently secured Canadian and United States patents.

Being regarded as an authority on this subject this will no doubt interest you. I don't think that I can supplement the specifications only to draw your attention particularly to this one point, and this is where I claim superiority for my invention over any previous device.

They give the lengths of the different styles of rafters for the different roof pitches for one foot run, while with mine you read the required length at once. You will notice that in the specification there is no provision made for cutting the octagon jack. The method will readily suggest itself to you.

In fact, the man well up on the subject owuld not require the graduations on the arc blade (e) but would be able to obtain all the required results with a tool of this construction graduated along the edge of the blade (c).

I give the most common of the roof pitches for the convenience of the novice. The space giving degrees will also be found a convenienve, as we are frequently asked to frame a roof (hipped or otherwise) to thirty degrees pitch.

Just one other point. This hip is the diagonal of common rafter and half the span. Yours truly,

V. A. JOHNDRO.

SPECIFICATION.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Victor A. Johndro, of the city of New Westminster, province of British Columbia, carpenter, having invented certain new and useful improvements in

RAFTER GAUGES

do hereby declare that the following is a full, clear and exact description of the same:

My invention relates to an improved means for determining the length of rafters whether for gable, hip or octagon roofs, and the seat, plumb and side cuts of their ends. It is designed as a bevel square of particular construction, having means for setting the bevel blade to the specific angles required, the stock of which may be applied to an ordinary carpenter's square and the half span and pitch of the roof being determined, the length of the desired rafter may be read off from the blade of the bevel square or gauge which is the subject of this application, and the bevel of end cuts ascertained.

The determination of such particulars, although they can be ascertained from an ordinary steel square such as is used by carpenters, frequently requires a familiarity with the use of the square

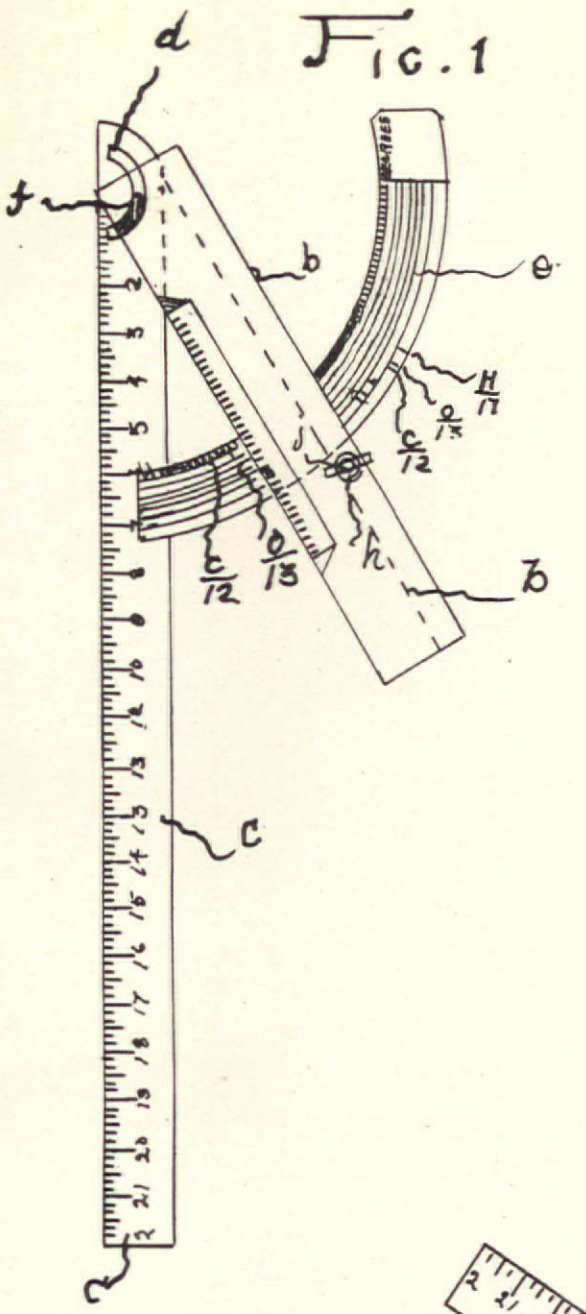


FIG. 1

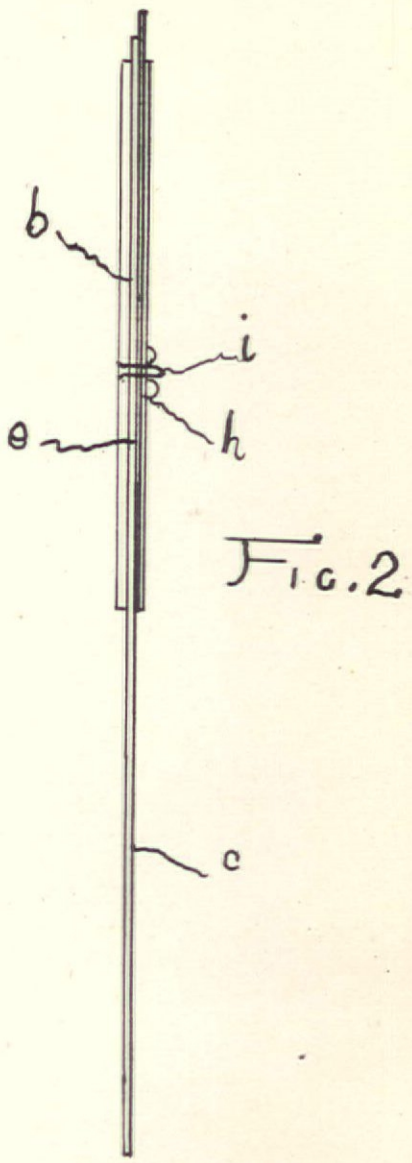


FIG. 2

FIG. 3

A NEW STEEL SQUARE.

which carpenters do not always possess to a sufficient extent to avoid error, and my gauge is intended to facilitate such determination.

The particular construction of the gauge and its application to determine these particulars is fully described in the following specification and illustrated in the drawings which accompany it, in which Fig. 1 is a plan of the square; Fig. 2 an end elevation; Fig. 3, a plan showing the application of the gauge to a carpenter's square in determination of the desired particulars.

In these drawings b represents the stock within a recess of which is mounted a blade, c, in such a manner that the zero end of the graduated portion of the blade is always coincident with the face edge of the stock. As to attain this coincidence it is impracticable to mount the blade upon a pivot pin, it is mounted upon two concentric arcs, d and e, d being of small radius and cut in the body of the blade from a center at the zero end of its graduation and having a short segment, f, secured in the body of the stock so as to slidably fit the arc d. The other arc segment, e, is of larger radius and of sufficient width to afford space for the various graduations required, the use of which will be explained later. It is secured to the face of the blade c and passes through the body of the stock which is provided with an outer plate, g, which although secured to the stock along its length is free to be tightened upon the arc segment, e, by a butterfly nut, h, threaded on a screw or stud, i, secured in the body of the stock. The blade, c, by means of these concentric arc bearings is enabled to be moved to and secured at any desired angle while the zero end of its graduated edge is at all times coincident with the face edge of the stock b.

The description thus far constitutes the mechanical construction of the gauge.

The outer edge of the blade, c, is graduated in any desired unit, which may be found convenient. As illustrated it is designed for builders and the edge of the blade is divided into inches which are subdivided into twelfths so that its graduations may represent feet and inches.

The inner edge of the segmental arc, e, is divided into any desired unit of angular measurement, such as degrees, and outside of this the surface of the segment is divided by a series of concentric lines into spaces which at the end where the arc is secured to the blade are marked with numbers which represent the various pitches of roof in terms of the rise from one foot run, as 6, 8, 9, 10, 12, 18 and 24.

In the spaces indicated by these figures a series of cross lines is inscribed indicating the angle of roof slope required for each pitch for common (C), octagon (O) or hip (H) rafters and if the blade of the bevel gauge is set to any one of these cross lines and the stock of the gauge placed against the tongue of a carpenter's square with the pivot center of the bevel to the dimension representing to scale the half span of the roof the length of rafter required may be read to the same scale from the blade, c, where it intersects the outer edge of the blade of the carpenter's square.

In addition to the letters C, O and H on these several cross lines they are marked respectively with the numbers 12, 13 and 17, and these numbers with those at the end of the spaces, indicating the rise of the roof pitch, will indicate the number on blade and tongue of the carpenter's square required to give the seat and plumb cuts for the ends of the rafter. For example, assuming that a rafter, common, octagon or hip, is required for a roof having a rise of eight inches to a foot, the blade, c, of the bevel gauge will be set to the cross line C, O or H, as the case may be, on the space eight of the arc segment e, and the stock b being set against the tongue of a carpenter's square will give on the blade, c, of the gauge, in the manner previously described, the length of rafter required, and the seat and plumb cuts of the rafter ends will be given by the numbers 12-8, 13-8 or 17-8, which will be used in the customary manner from the tongue and blade of a carpenter's square.

In all cases where a side cut is required it is obtained from the intersection of the blade, c, with the edges of the tongue and blade of the carpenter's square, cutting always on the blade edge, and if in obtaining this bevel the zero point of the blade is moved to 12 on the tongue of the carpenter's square the cut will be expressed in terms of 12 which will be easier to remember.

The bevel gauge may also be used to determine the shortening of the jack rafters at a hip in the following manner.

Set the bevel gauge to the hip mark for the pitch of roof required and apply the zero point of the blade, c, to the half span of the roof in feet and inches on the tongue of the carpenter's square, space off the number of inches the centers of the rafters are apart and move the zero point of the bevel that amount to the left, when the point of intersection of the edge of the bevel blade, c, with the blade of the carpenter's square will give, on the blade of the carpenter's square, the length of the first jack rafter. The others can be obtained either by successive movement of the zero point, the amount of pitch to the left, or, having ascertained the amount of shortening, by deducting it as required. The side cut bevel will be determined on tongue and blade of the carpenter's square in the manner previously described.

To enable the shortening of the jack rafters to be ascertained when the tongue of the carpenter's square does not happen to be divided into inches and twelfths I provide toward the mid-length of the contract edge of the stock, b, a short scale so divided that the rafter pitch movement to the left may be made.

There are several other determinations frequently required by carpenters which the use of this bevel gauge simplifies, but as the description of them is not material to this application they need not be here explained.

Having now particularly described my invention and the manner of its application, I hereby declare that what I claim as new and desire to be protected in by letters patent is:

1—In a bevel gauge, the combination with a stock, of a lineally graduated blade axially mounted toward one end in a manner that the zero point of the graduation of the blade is coincident at all angular positions with the edge of the stock, secured to the blade an arc segment, the face of which is provided with a series of concentric lines on which are indicated various distinctive angles, and means for securing the blade at any desired angle on the segment.

2—In a bevel gauge the combination with a stock of a lineally divided blade member axially mounted toward one end so that the axis of movement coincides with the graduated edge of the blade, an arc segment secured to the blade the face of which segment is provided with a series of concentric lines between which are marked various distinctive angles, the graduation of a section of the edge of the stock adjacent to the graduated edge of the blade into linear divisions corresponding with those of the edge of the blade, and means for setting the blade at any desired angular position in relation to the stock.

3—In a bevel gauge for the purpose specified, the combination with a stock, of a blade member mounted on concentric arcs the center of which is coincident with the edge of the stock, one of which arcs toward the axis of movement is cut in the blade member and has an arc bearing in the body of the stock, the other being an arc segment secured to the blade and passing through the body of the stock, desired graduations on the face of the last named arc segment, and means for clamping the stock to the arc segment at any desired position of angular movement.

4—In a bevel gauge for the purpose specified, the combination with a stock having a recess in one edge face, of a graduated blade member fitting the recess and mounted on concentric arc bearings the center of which is coincident with the recessed edge of the stock, the arc bearing adjacent to the axis of movement of the blade being cut in the body of the blade and provided with a bearing segment in the body of the stock, the other arc segment secured to the blade member and passing through the body of the stock having means on the stock for clamping it in any desired position of angular movement, and a series of graduations on the face of the last named arc segment indicating the angles of bevel required for various slopes of roof pitches, and numbered to give the cut of bevel for the rafter ends.

Vancouver, B. C., the 21st day of June, 1905.

(sgd.) Victor A. Johndro.

Witnesses:

(sgd.) Thomas Alexander Martin.

(sgd.) Rowland Brittain.

In connection with the foregoing we may say the drawings and specifications have been thoroughly overhauled and examined and so far as our investigation went we have become convinced that the new square, apart from the difficulties and cost—will prove quite a useful addition to the builder's "kit" as regards roof framing, bridge work, and timber framing generally. The square in this case may be considered more as an instrument than as a working tool, as its object is to solve the various problems in roof and irregular bridge framing, rather than to perform the ordinary service for which the simple steel square is intended; not that the new invention destroys the general usefulness of its existence, but that the progressive workman will have both the new and the old square in his "kit"—the first to guide him in obtaining lengths and bevels, and the second to do all-round every day work. Perhaps some of our readers will give us their opinion on the new tool.

Fred T. Hodgson, Editor.

DECORATIVE PLASTER WORK.

BY LAURENCE A. TURNER.

Decorative plaster work is a much abused craft, inasmuch as it is so often made to pretend to be something that it is not, and the material is comparatively seldom allowed to give the quality of beauty which ought to be so readily obtained from it. What is the particular charm of this material, and what is it that so often usurps the place of that charm? I think it may be said that softness of effect is the base of its beauty, hardness its bane.

When we compare, for example, the work done during the Elizabethan and Jacobean periods with that done, let us say, in the average modern London drawing-room, what is the great difference (quite apart from design) which is so strikingly apparent between them? The modern work is generally lacking in that individual interest with which it should be imbued; the ornament, for the most part, appears to have been, and probably was, selected from some ready-made stock pattern to fit a given space—which it probably fails to do. There is no real modelling in it, but it looks rather as if the wood carver had been employed to make the originals, and that his aim had been to make it as sharp, hard and mechanical as possible. Even if it were not so, and the ornament had been made expressly for that ceiling, however well the workman may have carried out the direction to give a frisk of light and shade to cover an awkward break, or perhaps the instruction to "put something there," it is all of a most uninteresting nature and expresses nothing but line, and that more often than not, merely accurately geometrical line and quite lifeless. How different is the earlier work of the period referred to! Be it only a piece of plain ground, no one can look at it without feeling that the surface had the hand of the modeler upon it instead of the dead level straight edge. The moldings are full of interest, variety, life and spirit and the very errors have interest and charm. The flowers, birds, beasts, though they may have been ruudely done and conventionalized to an unrecognizable degree, are full of vigor, and always convey the impression of a craftsman in love with his work and with nature around him, trying to impart his own enthusiasm for his creations to those who should have the good luck to live with them. How are these beautiful Elizabethan and Jacobean plaster ceilings made? Can any tell us? It is doubtful. That the work was nearly all molded, and not modeled in position, is evident, if the old work is carefully examined; but it is not evident how much was cast and allowed to set hard before being applied to the ceiling, nor how much was by some method pressed up when in a moist state. If we could find out how they were made, it would be very instructive and interesting, but I doubt whether the methods used would now-a-days be often employed.

What concerns us now is, how can we make a modern ceiling interesting with the common materials in ordinary use, what methods can we employ to attain this end, and what are we to avoid? Subtle light and shade, of a degree of delicacy almost unobtainable in any other building material, homogenity, and a feeling of stability, are the qualities to be sought. Sharpness of outline, dark, strong shadow and fragility the qualities to shun.

Plaster can no doubt be made to represent many materials, but it has a quality all its own. The dead level plaster face generally seen on the covering of the interior walls of our houses nowadays is not plaster work in the sense in which it is treated here. Architects generally despair of getting that delightful surface to be met with on the old plastered walls of two hundred odd years ago, and in many cases it would be out of keeping with its surroundings if it could be obtained, for the angles in the room would be too irregular to agree with the mathematical accuracy of the surrounding work in a modern house. If only the setting plaster were applied with a wooden hand-float and the last coat put on very wet with the same tool and the straight-edge discarded, some feeling of modelling would be obtained, giving even a flat wall-face some sense of interest. The ordinary materials in use today differ a good deal from those employed at this early date. Modern inventions have supplied us with new methods and new materials with which to work, and there is no reason why they should be shunned, for though we may lose something by their use, there are many points of advantage to be gained by them. The chief difference is the use of plaster of Paris as against lime plaster, and the ease with which large sheets can be cast without using one-tenth of the material, by employing what is known as fibrous plaster, i. e., plaster of Paris strengthened with coarse canvas and stiffened with wood laths. These can readily be made eight feet square, and are screwed up to the joists, etc. The joints, however, should always be covered by a molding or masked by enrichments; if this is not possible, then the work had better be done some other way.

What therefore is the simplest and most ready way of getting something of the character of the early ceilings into the work that is made of fibrous plaster? Suppose the type of design be one of the Elizabethan ribbed ceilings with its intricate geometrical pattern relieved by sprigs of foliage. The size of the repeat of the design once obtained, it will be necessary to get a modelling-board large enough to take the repeat, and to cover it with clay, and carefully model a ground all over it. Observation of the height, lighting, and size of the room in which it is to be fixed, together with experience, must teach the modeller how uneven his ground should be made. Then take a cast of this model; that is to say, make a mold from the modeled ground, and cast from that mold. If the mold were placed on the ceiling instead of the cast, it would in all probability look very wrong, for it would be found that it would have a lumpy appearance, very unlike the model. Set out the design on this cast and run a short length of the rib molding in clay, and make a mold of this in plaster; into this squeeze the modelling clay, having well dusted the mold with French chalk to prevent the clay adhering; turn the squeeze out, and lay it in its place on the pattern, pressing it well down until it takes the same undulations which the plaster-surface has beneath it, bending it to the required curves of the design, and softening down any of the lines which look too hard or the reverse. In doing this an effect will be produced very similar to that of the old plaster ribs, and, at least, that appearance of cast-iron hardness so characteristic of most modern plaster-work will have disappeared. If the curves are found to be too sharp to allow the clay to be bent to them, a separate piece of curved rib would have to be run and molded to give the molding the necessary curve.

It has been said that this method is quite unsuitable to the severely classic forms of architecture; if so, then so much the worse for a style which does not in any part of it, even in the carving or modelling, portray the hand of the craftsman, but is made up of dead-level surfaces, perfectly smooth curves, and arrises as sharp and hard as it is possible to make them. The method is not in fault, but the manner in which it has been carried out, if the work looks too coarse even for such a classic house.

The method thus roughly described can only be applied, when, as has been previously said, the jointing of the casks can be masked. It will be found that if a joint comes in the modelled ground and can not be covered, no amount of stopping will hide the position of the joint, as the undulations of the modelled face will be broken. In such a case the best method to use would be the old plan of modelling a lime plaster ground and setting the cast enrichments into it. If the ornament be of a character large and simple in detail, a good way of producing it would be to model the ornament on the lime plaster ground in situ, with a mixture of Keene's cement and a large proportion of sand. The advantage of this over lime plaster is that it can be modelled wih the fingers, which is not possible if lime is used, however long it may have been slaked.

The use of steel tools to apply lime plaster generally produces a hard effect, for, however much the craftsman may profess to model the work, it will be found to more resemble carving. The fact is that the difficulty of getting the material to adhere to the ceiling, generally results in putting on more than is required, and the workman has to carve it off again with his steel tools, and, as he works almost exclusively with these, the final result is more that of a ceiling executed by as having been entirely cast from clay models; a good and cheap carvers than by modellers.

To return to the fibrous plaster ceiling which has been described method of finishing, instead of painting with oil paint and then whitewashing, is to give it a coat of wax. A very small proportion of wax dissolved in turpentine, and a trifling addition of ochre, to help to get rid of the somewhat disagreeable whiteness of the plaster, may be applied with a brush, like paint; and, while it is still wet, rubbed with a piece of canvas used for casting. Care must be taken, however, that the color is right before it is applied, as no further coats added afterward have any effect. The first coat, which is put on when the plaster is quite dry, is sucked right into the plaster and the wax stops all the minute pores, but it has no prejudicial effect on any painting or whitewashing that may be put on at a later date.

In designing moldings for plaster work which shall look like plaster, the one thing to avoid is undercutting; and all fillets at right angles to the ground look very much better if they are slightly splayed. In making a design for a ribbed ceiling, it is advisable not to have too many curved lines, which will be found to produce a restless feeling; straight lines in the design should generally predominate over the curved.

The material of which the molds are made to cast from have an important bearing on the final result. They may be roughly described as three, viz., plaster, wax, and gelatine; the latter, I think, being the best, but this question would be too technical to deal with here, and difficult to treat in an article, as each model requires its own particular method of molding.

CONCRETE RESIDENCE AT JACKSON, MICH.

BY THE DESIGNER.

The concrete residence of Sid L. Wiltse, of Jackson, Mich., illustrated in detail in this issue, is excellently arranged in every detail. This residence was designed by Sid. L. Wiltse, and the architect was Claire Allen, both of Jackson, Mich. Excavation started and first block made August 15, 1905; residence cmopleted December 15, 1905; concrete work cost $620; carpenter work, tinning and painting, $2,000; plumbing and heating, $600; fixtures, $100; excavating and grading, $60; miscellaneous, $40; total, $3,400.

Foundation is made of 9x10x32 rock-faced block, with the special outside and inside rock-faced blocks for the corners as well as for the bay window octagon blocks. Water table has 2-inch wash and ¼-inch drip, is 9 inches high and 11⅛ inches wide. First floor walls are plain blocks, 4½ inches high, in lengths of 8, 12, 16, 20 and 24 inches, and 8 inches wide laid up in random style with quarter-inch joints. The corner blocks above the water table as well as the inside corners, including bay window, are what is called "quoins" in stone work—they all extend a quarter of an inch and then bevel for three-quarters of an inch, making the total extension of the quoins 1 inch. This sets off the 4½ block work in good shape. The windows and doors on the first floor all have these quoins running alternately 4x8x9 and 8x8x9 on each side. Sills are plain and the caps are 9 inches high, 9 inches wide and in various lengths up to 5 feet 8 inches, all reinforced with angle iron. They are made on the quoin order also and have the same bevel extensions as the corners. Each of these caps, including those over all doors and windows, have molded thereon an extended ornamental scroll and shell design which is about 8 inches high and 32 inches long, and makes a very handsome cap. Each of the 9-inch high and 4½-inch blocks have vertical air chambers which are about as wide as one-third of the width of the block. Some of these air chambers have wires and pipes encased therein. In addition to the vertical air chambers in the blocks Mr. Wiltse had his men when they were making the blocks take their trowel and notch each bridge of concrete on the top of the block in an oval manner to a depth of about 2 inches. This left an opening on each end of the blocks, as well as in the center, in such a manner that when a block was laid on top of it it left a horizontal air chamber on each course, as well as a vertical one, the result being that it is impossible to have the walls filled with stagnant or damp air, as the first course in the cellar has openings in different places for draft, and the air passes upward and circulates until it reaches the base board of the roof, which is fastened to the top course of blocks. It then passes through this base board (1½-inch holes have been bored in every 16 inches) into the attic, the result being an absolutely dry wall in the cellar and first floor, notwithstanding the fact that the first floor is furred and lathed, the inside of the cellar is washed with hydrated lime and is very clean and sanitary. Piers in cellars are of 16x16-inch blocks 9 inches high. Ash bin, and coal bin in cellar are made of blocks. The fruit and potato room in the cellar is made of sand cement brick. Foundations for this residence, including those for boiler and grate, lay on foot and a half of grouting mixed 1:2:4. Porch consists of fluted concrete columns with bases and capitols, concrete balusters, two styles; concrete rails and piers, concrete balls and bases. The work between the floor and water table is of sand cement brick, rocked face. The chimney is of the same brick, only rock and plain alternating. Square balusters, 11 inches and 4 inches square are used with the brick in the porch. Concrete steps front and back. Retaining wall on right side of house not shown in picture 8 inches wide, 9 inches high, with 10-inch coping 5 feet high and 100 feet long of blocks.

The second floor is of cedar shingles, firsts, stained or dipped with two coats of Cabot's stain, including roof. Residence is heated by steam. First floor finished in oak, second floor Georgia pine; bathroom, maple with modern equipment throughout. This residence has nine large rooms, open vestibule and storeroom and full cellar. The photo does not flatter this residence in the least; in fact, it does not do it justice, and to appreciate this house one should see it, as it only goes to show how rapidly the concrete industry in house building is breaking away from the "old square rocked-faced" house. This residence we have described has architecture and is attractive.

For Elevations, Floors, Details, see Supplement Sheet, this issue.

Wiltsie, No 278. **S. L. Wiltsie, Designer.** **Claire Allen, Architect.**

ESTIMATE OF WILTSIE.
BY I. P. HICKS.

EXCAVATING AND MASONRY.

140 yds. excavating, 25c.	$ 35.00
165 cu. ft. concrete footing, 25c.	41.25
1,520 cu. ft. cement block wall, 20c.	304.00
17 lineal ft. chimney breast	42.50
20 lineal ft. chimney above breast, $1.75	35.00
6 stone sills for cellar windows, $1.25	7.50
1 cellar door sill	1.75
2 door sills	4.00
1 large window sill	2.50
10 window sills, $1.50	15.00
Total excavating and masonry	$488.50

LUMBER BILL.	Feet.
3 posts, 6 in. by 8 ft.	72
2 6x8x18 ft. girders	144
15 2x8x16 ft. first floor joists	315
43 2x8x14 ft. first floor joists	817
4 2x8x12 ft. first floor joists	64
16 2x8x18 ft. second floor joists	384
43 2x8x14 ft. second floor joists	817
4 2x8x12 ft. second floor joists	64
23 2x4x14 ft. collar beams	207
20 2x4x16 ft. collar beams	220
12 2x4x12 ft. collar beams	96
12 2x8x16 ft. porch joists	132
2 2x8x18 ft. porch joists	48
4 2x6x12 ft. porch joists	48
14 2x4x16 ft. porch ceiling joists	154
18 2x4x12 ft. porch rafters	144
20 2x4x12 ft. gable studding	160
20 2x4x16 ft. gable studding	220
100 2x4x10 ft. rafters	650
40 2x4x16 ft. plates	440
10 2x8x16 ft. plates	210

45 2x6x18 ft. first story partitions	810
70 2x4x18 ft. second story partitions	840
20 1x6x12 ft. braces	120
40 2x2x16 ft. furring	220
40 1x2x16 ft. furring	110
12 1x4x12 ft. bridging	48
	7,554
7,554 ft. framing lumber, $24	$181.30
1,150 ft. No. 2 Y. P. sheathing, 1x10x16 to 20 ft., rough floor, $22	25.30
2,400 ft. No. 2 Y. P. sheathing, 1x8x16 to 20 ft., outside walls and roofs, $22	52.80
18 M. extra Star A Star cedar shingles, $3.25	58.50
1,150 ft. 1x4x12 and 16 ft. Star Y. P. flooring, $31	35.65
360 ft. 1x3x12 ft. Y. P. V. G. A. flooring, $40	14.40
850 ft. 1x3 end matched, red oak flooring, $95	80.75
325 ft. 1x4x10 ft. clear fir flooring, $40	13.00
50 ft. 1x4x12 or 16 ft. clear fir finish, $40	2.00
50 ft. 1x6x12 or 16 ft. clear fir finish, $40	2.00
150 ft. 1x8x12 or 16 ft. clear fir finish, $40	6.00
100 ft. 1x10x12 or 16 ft. clear fir finish, $40	4.00
600 ft. 1x12x12 or 16 ft. clear fir finish, $45	27.00
24 ft. 1¼x12x12 ft. clear fir finish, $45	1.08
100 ft. 1x6x14 ft. clear Y. P. finish, $45	4.50
100 ft. 1x8x14 ft. clear Y. P. finish, $45	4.50
80 ft. 1⅛x12x16 ft. clear Y. P. finish, $45	3.60
260 ft. ⅝x4 in. by 10 ft. No. 1 Y. P. ceiling, $30	7.80
4 rolls red rosin paper, 60c	2.40
Total lumber bill	$526.58

MILL WORK.

6 cellar window frames, 14x16, 2 lt., $1.40	$ 8.40
1 cellar dr. frame, 3x6 ft. 6 in	2.00
6 cellar sash, 2 lt., 14x16, 1⅜	6.00
1 cellar door, 3x6 ft. 6 in., 1¾	3.70
1 outside door frame, 3x7 ft.	3.00
1 outside door frame, rear, 3x7 ft.	3.00
1 window frame, 56x32x28	3.00
1 sash frame, 52x36	2.00
1 sash frame, 52x32	2.00
6 window frames, 28x30x26, $2.25	13.50
1 window frame, 28x24x20	2.25
1 window frame, 34x30x26	2.25
2 window frames, 36x28x26, $2.25	4.50
5 window frames, 32x28x26, $2.25	11.25
1 window frame, 26x28x20	2.25
1 window frame, 26x22x20	2.25
1 window, 56x32x28, 1⅜, divided	15.00
1 sash, 52x36, divided	7.00
1 sash, 52x32, divided	6.00
6 windows, 28x30x26, 1⅜, divided, $3.50	21.00
1 window, 28x24x20, 1⅜, divided	3.00
1 window, 34x30x26, 1⅜, divided	4.00
2 windows, 36x28x26, 1⅜, divided, $4	8.00
5 windows, 32x28x26, 1⅜, divided, $3.75	18.75
1 window, 26x28x20, 1⅜, divided	2.75
1 window, 26x22x20, 1⅜, divided	2.50
1 door, 3x7 ft., 1¾, oak veneered	11.00
1 door, 2 ft. 4 in. by 7 ft., 1¾, oak veneered	9.00
1 door, 2 ft. 8 in. by 7 ft., 1¾, oak veneered	10.00
1 door, 2 ft. 8 in. by 7 ft., 1¾, one side oak, one sile yellow pine	10.00
1 door, 2 ft. 8 in. by 6 ft. 8 in., 1¾, one side oak, one side yellow pine	10.00
1 door, 2 ft. 8 in. by 7 ft., 1¾, W. P.	5.00
2 doors, 2 ft. 6 in. by 7 ft., 1⅜, W. P., $5	10.00
2 china closet doors, 2x3 ft., oak	8.00
3 china closet doors, 2x3 feet, pine	6.00
5 doors, 2 ft. 8 in. by 6 ft. 8 in., 1⅜, pine, $2.60	13.00
3 doors, 2 ft. 6 in. by 6 ft. 8 in., 1⅜, pine, $2.50	7.50
130 ft. 4½-in. crown mold, 2c	2.60
160 ft. 3½-in. crown mold, 1¾c	2.80
200 ft. 2-in. bed mold, 1c	2.00
150 ft. 1½-in. band mold, 1c	1.50
200 ft. ⅞ quarter round	1.00
100 ft. ⅞ cove mold	.50
200 ft. oak picture mold	3.00
270 ft. white wood picture mold	2.70
47 ft. chair rail	.88
200 ft. oak base	12.00
100 ft. yellow pine base	3.50
270 ft. white wood base	8.10
144 ft. 4-in. by 7 ft. oak casings	5.76
96 ft. 4-in. by 6 ft. oak casings	3.84
54 ft. 2-in. oak door stops	.80
128 ft. 1½-in. oak window stops	1.28
80 ft. oak head casing, 4½-in.	3.20
80 ft. oak cap mold, 1⅜x2¼	1.60
40 ft. oak apron, ⅞x4 in.	1.20
40 ft. oak stool, 1⅛x4 in.	1.20
18 oak plinth blocks	1.80
2 oak corner beads	.80
98 ft. Y. P. casings, 4 in. by 7 ft.	2.94
48 ft. Y. P. casings, 4 in. by 6 ft.	1.44
48 ft. Y. P. head casing, 4 in. by 12 ft.	1.44
48 ft. Y. P. cap mold, 1⅜x2¼x12 ft.	.96
48 ft. Y. P. apron, 4 in by 12 ft.	.96
48 ft. Y. P. stool, 1⅛x4x12 ft.	.96
48 ft. Y. P. door stop, 2 in. by 16 ft.	.48
42 ft. Y. P. window stop, 1½ in. by 14 ft.	.36
10 plinth blocks, Y. P.	.80
200 ft. oak floor mold	2.00
100 ft. Y. P. floor mold	.75
270 ft. w. wood floor mold	2.00
26 w. wood plinth blocks	2.08
204 ft. w. wood casing, 4 in. by 6 ft.	4.08
108 ft. w. wood casing, 4 in. by 12 ft.	2.16
100 ft. head casing, 4 in. by 12 ft.	2.00
100 ft. cap mold, 1⅜x2¼x12 ft.	1.75
40 ft. apron, 4 in by 12 ft.	.80
48 ft. stool, 1⅛x14 ft.	.96
140 ft. 2-in. door stop	1.40
128 ft. 1½-in. window stop	1.00
Front stairs, oak	80.00
Rear stairs, yellow pine	40.00
Arched ceiling	15.00
5 thresholds	.60
5 large porch columns	17.50
1 small column	1.50
1 Porch newel	.75
20 balusters	1.60
Hall seat	20.00
Total mill work	$529.18

RECAPITULATION.

Excavating and masonry	$ 488.50
Lumber	526.58
Mill work	529.18
Carpenter labor	520.00
Hardware and nails	40.00
Tin work	42.00
Plastering, 825 yds., 27c	222.75
Plumbing and gas fitting	250.00
Electric wiring	30.00
Heating	150.00
Mantel	60.00
Painting	100.00
Cistern	40.00
Incidentals, 5 per cent	149.95
Total estimate	$3,148.96

Heating by Andrews' system for this home, $231.00
(See Ad on page 51)

Legal Decisions.

Where a builder was required to plaster a building he was not entitled to charge as extras for a scaffold necessary for that purpose. Gates v. O'Gara, 39 So. (Ala.), 729.

Mechanic's lien judgments are not subject to collateral attack in an action on a building contractor's bond in which they were proved as a part of the damages. Gritman v. United States Fidelity & Guaranty Co., 83 P. (Wash.), 6.

A substantial compliance with the provisions of the statute is all that is required in the account and affidavit filed for record to enforce a lien, under code 1899, c. 75, sec. 7. Rainey v. Freeport Smokeless Coal & Coking Co., 52 S. E. (W. Va.), 473.

A contractor who installed an extra radiator, which was not called for in the contract, at the owner's instance and request, was entitled to enforce a lien for the value thereof. Otis Elevator Co. v. Dusenbury, 95 N. Y. S., 959.

The mechanic's lien law is not unconstitutional, as depriving the owner of his property without due process of law, nor as interfering with his right to acquire, possess and protect property. Gardner & Meeks Co. v. New York Central & Hudson River Railroad Co., 62 A. (N. J.), 416.

Where an alleged defect in a heating plant installed in a building by a contractor was not in the plant itself, but in the manner of its maintenance by the owner, the contractor was entitled to enforce a lien for the contract price. Otis Elevator Co. v. Dusenbury, 95 N. Y. S., 959.

Where plaintiffs by letter offered to install certain grates and blowers under defendant's boilers, and defendant wired acceptance, there was an express contract, excluding any contract by implication. Beggs v. James Hanley Brewing Co., 62 A. (R. I.), 373.

Where, in a suit to foreclose a mechanic's lien, nothing was allowed on account of extra materials, an alleged variance between the complaint and lien and the contract, relating solely to extra materials, was immaterial. Newell v. Brill, 83 P. (Cal.), 76.

BUILDING MATERIAL PRICE LIST

REVISED TO DATE.

	Omaha Prices furnished by I. P. Hicks. Yellow Pine Dim'n'ns.	Chicago Prices J. H. Touchstone, Chicago No. 1 Pine Dim'n'ns.
2x 4—12—14 & 16 ft.	$21.00	$21.00
2x 6—12—14 & 16 ft.	21.00	21.00
2x 8—12—14 & 16 ft.	21.00	21.00
2x10—12—14 & 16 ft.	23.00	23.00
2x12—12—14 & 16 ft.	24.00	25.00
4x4 to 8x8—12—14 & 16 ft.	24.00	24.00
For 18 & 20 ft. lengths add	1.00	1.00
Hemlock $3.00 less.		
BOARDS.		
No. 1, Y. P. Sheathing	$22.00	$23.00
No. 2, Y. P. Sheathing	20.00	20.00
No. 1, W. P. Sheathing	24.00	24.00
No. 2, W. P. Sheathing	22.00	20.00
No. 1, Hemlock Sheathing	—	19.00
No. 2, Hemlock Sheathing	—	17.00
FENCING.		
No. 1, Y. P. Fencing	$23.00	$23.00
No. 2, Y. P. Fencing	21.00	20.00
No. 1, W. P. Fencing	28.00	28.00
No. 2, W. P. Fencing	25.00	24.00
No. 1, Hemlock Fencing	—	19.00
SHIPLAP.		
No. 1, Yellow Pine Shiplap	$24.00	$23.00
No. 2, Yellow Pine Shiplap	22.00	21.00
No. 1, White Pine Shiplap	28.00	27.00
No. 2, White Pine Shiplap	25.00	24.00
No. 1, Hemlock Shiplap	—	19.00
No. 2, Hemlock Shiplap	—	17.00
FLOORING.		
No. 1, or Clear, Y. P. Flooring	$30.00	$32.00
No. 2, or Star, Y. P. Flooring	28.00	30.00
No. 3, or Common Y. P. Flooring	25.00	26.00
No. 1, White Pine Flooring	50.00	50.00
No. 2, White Pine Flooring	42.00	45.00
No. 3, White Pine Flooring	37.00	40.00
CEILING AND PARTITION.		
No. 1, or Clear, Y. P. ⅜ Ceiling	$28.00	$28.00
No. 2, or Star, Y. P. ⅜ Ceiling	26.00	26.00
No. 1, or Clear, Y. P. Partition	31.00	33.00
No. 2, or Star, Y. P. Partition	28.00	31.00
DROP SIDING.		
No. 1, or Clear, Y. P. Drop Siding	$30.00	$32.00
No. 2, or Star, Y. P. Drop Siding	28.00	30.00
BEVELED SIDING—6-inch.		
No. 1, White Pine Siding, B	$32.00	$31.00
No. 2, White Pine Siding, C	30.00	25.00
No. 3, White Pine Siding, D	24.00	20.00
Clear Red Cedar Siding	28.00	27.00
FINISH.		
Clear Yellow Pine Finish, ⅞	$40.00	$35.00
No. 1, White Pine Finish, ⅞	55.00	50.00
No. 2, White Pine Finish, ⅞	50.00	42.00
No. 3, White Pine Finish, ⅞	45.00	32.00
SHINGLES.		
Clear Red Cedar Shingles	$ 3.25	$ 3.25
W. P. Shingles, Best Star A Star	3.50	3.00
W. P. Shingles, Second Quality	2.75	2.50
LATH.		
No. 1, White Pine	$ 5.50	$ 5.50
PICKETS.		
Clear Pickets, 4 ft., per 100	$ 3.80	$ 3.80
BUILDING PAPER.		Per 100
Straw Paper, per lb	$ .01½	$ 1.75
Tar Paper, per lb	.01¾	2.00
Tarred Felt, per lb	.02½	2 50
Red Rosin, Atlas Brand, 500 ft., per roll	.75	.75
Red Rosin, Durable Brand, 500 ft., per roll	.60	.65
SUNDRIES.		
Lime, per barrel	$ .90	$ .90
Cement, per barrel	1.70	1.70
Cement, Imp. Portland, per barrel.	3.00	2.95
Hair, per bushel	.25	.30

ARCHES—XII.

Another arch theory, based on the hypothesis of least thrust at the crown, is that of Dr. Scheffler, in which, however, no account is taken of the horizontal components of the external forces.

This theory does not, as is sometimes stated, assume that the stones forming the voussoirs of the arch are incompressible. It is true that, as developed by Scheffler, the theory gives the position of the line of pressures for incompressible voussoirs, but its author recognizes the fact that compression of the material affects the line of resistance so that it will be diverted towards the center line at points where it would otherwise be in close proximity to the outer boundary of the arch ring.

For the purpose of illustrating the application of this theory, we will take, as an example, a segmental arch, of which the left-hand half is shown in Fig. 54. The span of the entire arch is 50 feet, with a rise of 10 feet. The voussoirs have the uniform depth of 2 feet 6 inches, and the arch is surmounted by a masonry spandrel wall, the top of which is 2 feet 10 inches above the

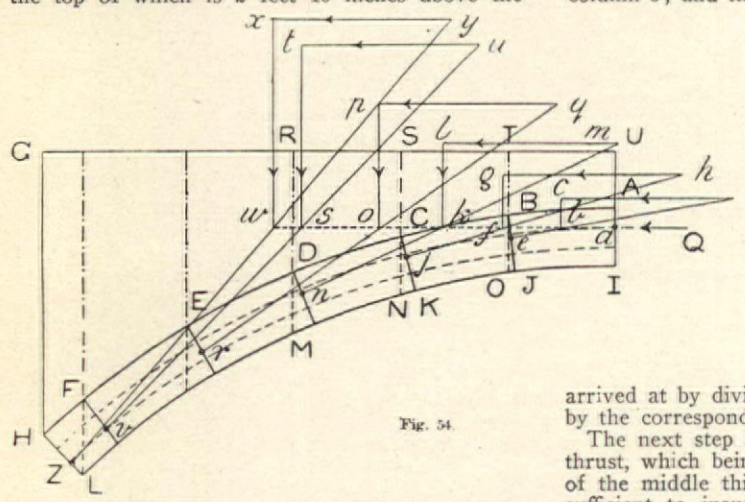


Fig. 54.

crown. In the determination of the line of resistance for this arch we will follow the exposition of Sheffler's theory, as given in Cain's "Practical Theory of Voussoir Arches."

Dealing with the semi-arch, represented in Fig. 54, it is necessary to ascertain the value and point of application of the resultant of the external forces acting upon portions of the arch above the joints, considered successively from the crown to the springing. It is assumed that the lengths of the voussoirs have not been settled. Therefore, for the purpose of the present demonstration, we divide the half span of 25 feet into five equal portions, as shown in the diagram, and draw tentative radical joints through the points A, B, C, D, E, and F.

The load on any part of the arch is then assumed to be proportional to the area immediately above it. For instance, the load on K C B J is assumed to be proportional to the area N S T O.

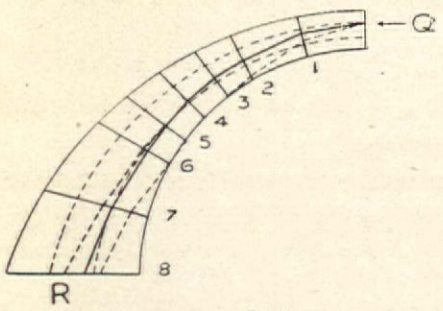


Fig. 56.

It should be observed, however, that the load on the joint C K is actually K C S T B J, and not N S T O. The amount of the error varies with the form of the arch, being at a minimum near the crown of a flat segmental arch, and at a maximum near the springing of a semi-circular arch.

Sheffler gives the following approximately accurate method for altering the positions of the joints to correct errors of the kind here mentioned:

Let A B C, Fig. 55, be the side of the trapezoid, and B D the uncorrected joint. From *c* midway between C and D draw the line *c* A; also draw C *b* parallel to *c* A, and *b d* parallel to B D. Then *b d* will represent the corrected joint. The error would also be eliminated by determining the separate weights of C S T B and K C B J, in Fig. 54, and combining them into a single resultant for the weight on the joint C K. Or, by drawing the arch to a large scale on cardboard, then cutting out the various polygons which represent the loads, the amount of the latter could be determined from the weights of the corresponding sections of the cardboard, and the center of gravity of each section could be found experimentally.

When the areas representing the loads have been determined, it is necessary to find the values of the several loads and the distances of their centers of gravity from a vertical line drawn through the crown of the arch, and also to ascertain the values and positions of the centers of gravity of the loads above the several joints.

Table II gives the data necessary for these operations. The lengths of the medial lines of the several trapezoids are given in the column 1 of Table II. In column 5 are the products of the values in columns 3 and 4. Column 6 gives the continued sums of the quantities in column 3; column 7 the continued sums of the quantities in column 5; and the figures in column 8 have been

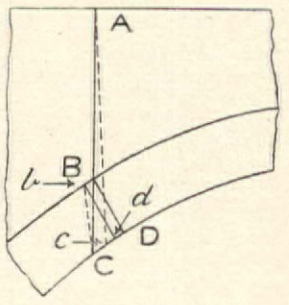


Fig. 55.

arrived at by dividing the quantities in column 7 by the corresponding quantities in column 6.

The next step is to determine the least crown thrust, which being applied at *a*—the upper limit of the middle third of the crown joint—will be sufficient to insure the safety of the semi-arch from failure by rotation. The center of moments for each joint is taken to be situated on the lower boundary line of the middle third of the arch ring.

Then to insure equilibrium about any joint

$$Q = W\,x \div y$$

Where Q = horizontal thrust at the crown; *y* = the arms of the horizontal thrust; W = the load above any joint; and *x* = the arm of the load W.

The value of W for each joint is given in column 6 of Table II, in terms of the weight of one cubic foot of the masonry. The value of *x* for any joint is the horizontal distance between the resultant of the load above the joint and the center of the moments for the joint; and to find the value of *x* for any joint, shown in Fig. 54, we must first take the horizontal distance between *a* and the center of moments, and then deduct the horizontal distance between *a* and the center of gravity of the load above the joint under consideration, the latter distance being stated in column 8 of Table II.

The required quantities for the value of *x* are stated in Table III, the first in column 2, the second in column 3, and the difference in column 4.

The values of *y* for the several joints are given in column 5, of Table III, and the values of the horizontal thrust required to insure safety against rotation about the several joints, can be obtained by the formula given above after substitution of the foregoing data. These values are stated in column 6 of Table III, where it will be seen that the maximum horizontal thrust is at joint 6, which consequently is the joint of rupture. This position of the joint of rupture is only what might have been expected (see Article X), as the angular distance of joint No. 6 from the crown of the arch is little more than 43 degrees.

The final step is to construct the line of resistance for the semi-arch. For this purpose it is first necessary to find the center of pressure on joint No. 1, the joint next to the crown, in the following manner: Draw a horizontal line through *a* and lay off a listance *a b*, representing, to any convenient scale, the horizontal distance from the point *a* to the center of gravity of the load above joint No. 1, taking the value of this distance from column 3, Table III. The point *b* is that through which acts the weight of the section O T U I, approximately equal to that of J B T U I. Next, lay off from *b*, also to a convenient scale, the vertical line *b c*, representing the superincumbent load, or, in other words, the area of the load above joint No. 1, taking for this the value stated in column 1, Table III. Then lay off from the point *c*, the line *c d* representing the value of Q, the horizontal crown thrust required to insure safety against rotation, taking the necessary quantity from the bottom line of column 6, Table III. Connect the points *d* and *b*, and in accordance with mechanical principles, the line *d b* will represent the resultant pressure on the first joint B J. By producing the line *d b* to intersect the joint B J, we find the point *e* to be the center of pressure for that joint.

The center of pressure for the second joint is found by laying off from *a*, the horizontal distance *a f* representing, to the same scale as before, the distance from the point *a* to the center of gravity of the load above joint No. 2, taking the value from column 3, Table III. Lay off from *f*, to the scale previously used, the vertical line *f g*, representing the weight of the superincumbent loads above joints Nos. 1 and 2, taking the value from column 1, Table III. From the point *g*, lay off the line *g h*, representing the value of Q, the horizontal crown thrust, taking the necescolumn 6, Table III. Connect the points *h* and *f*, completing the triangle of forces, and the line *h f* will represent the resultant pressure on the second joint C K. Producing the line *h f* to intersect the joint C K, we find the point *j* to be the center of pressure for that joint.

Following a similar course, we obtain the trisary quantity, as before, from the bottom line of angles of forces: *k l m*, *o p q*, *s t u*, and *w x y*, giving the centers of pressure for the succeeding joints. A line joining the centers of pressure *a e j n r v* and *z* would be the line of resistance of the arch, but this is omitted from the diagram for the sake of avoiding confusion.

Having thus determined the line of resistance, the stability of the proposed arch can be considered in the manner discussed in Article IX.

The above described method of constructing the line of resistance is simple and convenient, but its adoption involves the assumption that the external forces are vertical, which we know is not a correct hypothesis.

The student will find it instructive to compare the lines of resistance for the semi-arch represented in Fig. 47, (1), as afforded by Scheffler's theory, and (2) by the theory described in Article IX.

We previously gave an equilibrium polygon for the arch in question, and from this it is easy to draw the line of resistance, which we have indicated in Fig. 56 by continuous lines.

A line of resistance should then be constructed in accordance with Scheffler's theory, disregarding the horizontal components of the external forces, and taking the necessary data from Table I. After laying off the crown thrust and the loads as given in the table, the remainder of the construction is similar to that explained in Article

TABLE II.—FOR THE APPLICATION OF SCHEFFLER'S THEORY.

No. of Division of Arch.	Values and Positions of the Centres of Gravity of the Loads.				Data for Values and Centres of Gravity of the Loads over the Several Joints.			
	Dimensions of the Sections.			Hor zontal Distance of Centre of Gravity of each Section from	Moments of each Section, about *a*.	Area of the Load above the Joints.	Moments of the Loads over the Joints, about *a*.	Horizontal Distance from *a* to the Centre of Gravity of the Loads over the Joints.
	Height.	Width.	Area.					
1	5·4	5	27·0	2·5	67·50	27·0	67·50	2·5
2	6·1	5	30·5	7·5	228·75	57·5	296·25	5·1
3	7·6	5	38·0	12·5	475·00	95·5	771·25	8·1
4	9·8	5	49·0	17·5	857·50	144·5	1,628·75	11·3
5	13·2	5	66·0	22·5	1,485·00	210·5	3,113·75	14·7
6	14·5	1·75	25·4	25·9	657·86	235·9	3,771·61	16·0
Col.	1	2	3	4	5	6	7	8

IX. The line of resistance so obtained is indicated in Fig. 56 by broken lines

Comparison of the two lines of resistance shows that they are fairly in agreement above the joint of rupture for this particular arch, whereas the divergence is considerable below that joint, and increases as the springing is approached. It follows, therefore, that if reliance be placed upon Scheffler's theory, the thickness of the arch at the springing must be greater than that which is required by the other theory. As a matter of fact, the thickness will be greater than is actually necessary.

TABLE III.—FOR THE APPLICATION OF SCHEFFLER'S THEORY.

No. of Joint.	Area of the Load above each Joint. (= W)	Horizontal Distance from a to the Centre of Moments for the Joints.	Horizontal Distance from a to the Centre of Gravity of the Loads over the Joints.	Area of the Load about the Centre of Resistance of the Joints. (= z)	Area of the Thrust about the Centre of Resistance of each Joint. (= y)	Horizontal Thrust required to Prevent Rotation about the Joints. = Q
1	27·0	4·8	2·5	2·3	1·15	54·0
2	57·5	9·6	5·1	4·5	2·09	123·6
3	95·5	14·4	8·1	6.3	3·72	116·9
4	144·5	19·2	11·3	7·9	6·16	185·3
5	210·5	24·0	14·7	9·3	9·60	204·0
6	235·9	25·6	16·0	9·6	11·00	205·9
Col.	1	2	3	4	5	6

It should be observed that in taking the value of the crown thrust from Table I., the correct quantity for employment is the maximum value on the fourth line of the column headed $w\,x \div y$. This is the thrust that would establish a condition of equilibrium about the joint of rupture, which we already know to be joint No. 4. If the quantity on the last line of the same column were employed, the erroneous result would be obtained that is indicated by the dotted line of resistance, in Fig. 56, tangent to the intrados, a condition absolutely incompatible with stability. But such a line of resistance would be entirely wrong, for we have already proved the arch to be perfectly safe. The point is worthy of careful attention, as the erroneous method here indicated necessarily tends to heavy and wasteful construction.

ANOTHER CONVENTION OF CEMENT USERS.

On March 21, 22 and 23 the cement users of Iowa and Minnesota will hold a meeting at Mason City, Iowa.

LEGAL DECISIONS.

Where plaintiff sued to enforce a contractor's lien for the construction of a building, and did not allege that he was entitled to a lien as a material man, he was not entitled to enforce a lien for the furnishing of material for the plasterer's scaffold. Gates v. O'Gara, 39 So. (Ala.), 720.

Where two buildings are built on the same or contiguous lots under different contracts, it is permissible to include in one lien account the account for the work and labor done under both contracts, describing separately the several amounts due on both contracts. Kittrell v. Hopkins, 90 S. W. (Mo.), 109.

Where, in a suit to foreclose a mechanic's lien, the complaint referred to the claim of lien for a description of the property, and the claim contained a sufficient description thereof, the complaint was not objectionable for failure to contain a sufficient description. Newell v. Brill, 83 P. (Cal.) 76.

A contractor, who left ladders and other appliances on the job, which he claimed as his own property and which he had not furnished to defendant, was not entitled to enforce a contractor's lien therefor because defendant had refused to permit him to remove them. Gates v. O'Gara, 39 So. (Ala.), 729.

Where, in a suit to foreclose a mechanic's lien, the house subject to the lien was described, and the decree directed a sale only of the building and land on which it was situated, it was not material that the land necessary for the occupation of the building was not described. Newell v. Brill, 83 P. (Cal.) 76.

A mechanic's lien will not be defeated by including in the lien account non-lienable items, if they are separately stated and easily segregated from the lienable ones, unless the lienor understood at the time he filed the account that he had included in it the non-lienable items. Kittrell v. Hopkins, 90 S. W. (Mo.), 109.

Where, in an action on a building contract, the architect testified that a floor in the building was defective, the contractor was properly permitted to testify in rebuttal that he did not pay his sub-contractor for the floor until the architect "passed on it, said it was all right and accepted it." Wyman v. Hooker, 83 P. (Cal.), 79.

On an issue whether an employee employed to improve a building was to receive a commission on the amount of the pay roll for the work in addition to daily wages, evidence that the employe had previously worked for defendant, and had been paid commissions in addition to the wages, was inadmissible. Shall v. Old Forge Co., 96 N. Y. S., 75.

Where a contractor's surety delivered the bond to him for the purpose of closing a building contract with plaintiff, the surety thereby constituted the contractor its agent, and in the absence of anything on the face of the bond tending to put plaintiff on inquiry the surety was bound. Gritman v. United States Fidelity & Guaranty Co., 83 P. (Wash.), 6.

Under mechanic's lien law (P. L. 1898, p. 538), section 1, where the building contract is not filed, a lien may be claimed for materials furnished to a subcontractor to enable him to carry out his part in the construction of a building pursuant to the owner's contract with the principal contractor. Gardner & Meeks Co. v. New York Central & Hudson River Railroad Co., 62 A. (N. J.), 416.

A replication, alleging that plaintiff's failure to complete a house he had contracted to build for defendant by the time specified was due to the defendant's failure to furnish the materials until after such date, was insufficient, where it did not also aver that it was defendant's duty to furnish such materials. Gates v. O'Gara, 39 So. (Ala.), 729.

BOOK NOTICES.

"The Slate Roofer." This is a thoroughly practical work on roof slating, and contains some ninety-six pages which measure 4x8 inches. The contents consist of all sorts of real good practical information on the use of slate for roofing and other similar purposes and rules for measuring and estimating slate work of all kinds; tables, memoranda, hints, suggestions and other information regarding laying of slate, choosing same and arranging colors, etc. The little work is well illustrated with diagrams showing how to handle slates, to lay ornamental roofs, to slate a round tower roof, to flash a slate roof, to select slates, to cut, punch and work slate of all kinds, to select slates for various purposes to arrange for letters on a slate roof, to scaffold, to slate a church spire and a thousand and one other things.

To the contractor, this little book will prove of inestimable value, as it shows how many slates will be required to cover a given surface, and the price of the slates chosen, their weight, and their peculiar qualities. To the slater, the book is indispensible, as it teaches the latest and best methods of working and laying slates.

The book is finely printed on excellent paper, is well bound in cloth limp and is handy in shape for pocket use. It is published by The Auld & Conger Company, 262 Prospect street, Cleveland, Ohio, and will be sent to any address in the United States or Canada, postpaid, for fifty cents.

From the Department of Agriculture we have received the following farmers' bulletins, which have been prepared with great care by specialists engaged in the service of the United States Government. The first bulletin, No. 126, is devoted altogether to buildings for farmers and is entitled "Practical Suggestions for Farm Buildings," by George C. Hill. This deals with all sorts of farm buildings, such as farm houses, barns, stables, outhouses, yards, cow sheds, cellars, root-houses, granaries, bank barns and other similar works. The bulletin is well illustrated with a number of designs for farm houses, barns, stables and details for these buildings.

Bulletin No. 185, "Beautifying the Home Grounds," is an excellent number and was prepared by L. C. Corbett, horticulturist, Bureau of Plant Industry. The object of the work is to enable farmers to beautify their grounds around their homes at a small expenditure of labor and money, a list of suitable plants, shrubs and trees is given, also a number of excellent designs of grounds laid out, showing location of house, walks, position of trees, plants, etc. This bulletin should be within reach of every man who owns a plot of land.

Bulletin No. 235 deals altogether with the use of mortars and cements as constructive materials for the farmers' purposes. The work was prepared by Philip L. Wormelay Jr., testing engineer, office of public roads, and is entitled "Cement Mortar and Concrete Preparation and Use for Farm Purposes." It describes methods for making and mixing concrete for the construction of farm buildings, fences, fence posts, walls, troughs, roads, and sidewalks. This is really a good practical work for the farmer.

"Concrete Building Blocks," by S. S. Newberry, published by the "Association of American Portland Cement Manufacturers, Philadelphia, Pa." This is a pamphlet of some thirty-two pages, and goes very thoroughly into the methods of making cement blocks and the appliances used for the purpose. The author describes the better methods, also the most approved proportions for sand, cements and broken aggragate or pebbles. The little work will be found very useful to all workers in cements and concretes.

"Standard Methods of Testing and Specifications for Cement." Prepared under the direction of Committee C on standard specifications for cement of the American Society for Testing Materials. Published by the committee, 1006-1008 Arch street, Philadelphia, Pa.

FIFTY-FIVE YEARS AT THE TRADE.

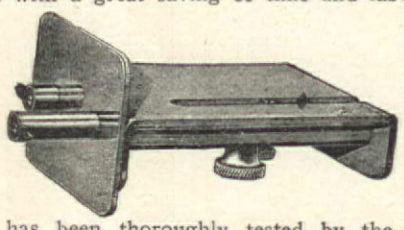
Fifty-five years at the trade is a long period. Mr. Christopher Southern, of Oswego, Kas., in a letter to THE NATIONAL BUILDER, under date of February 15th, writes that he is seventy-one years of age and that it is just fifty-five years since he started in the building business. THE NATIONAL BUILDER has been Mr. Southern's constant companion for a long period of years and he writes that he still reads it with the same degree of interest that he always has, and derives from it much helpful information.

COMBINED GAUGE AND SQUARE.

The advertisement of H. H. Mayhew Company, of Shelburne Falls, Mass., on page 20 of this number should interest every reader of THE NATIONAL BUILDER.. This advertisement calls attention to Goodell's combined gauge and square.

In this tool are valuable features which has led to this notice. It combines simplicity, durability and convenience. The tool can be used as an ordinary marking gauge. It can also be used as a double gauge where it is necessary to have two gauge marks. This will be found particularly useful in door hanging and mortise work.

In this class of work, this combined gauge takes the place of three ordinary gauges and a try square, insuring absolutely uniform and perfect work with a great saving of time and labor.



It has been thoroughly tested by the most competent carpenters and builders in the country, and has been found perfect in every way.

The uses of the tool as a marking or double gauge will readily adjust themselves from the description received.

The H. H. Mayhew Company have issued a four-page descriptive folder, which is well written by one whose experience places him in a position to speak knowingly of the advantages of this tool. This circular will be forwarded on request.

THE UNIVERSAL SQUARE.

The Duby & Shinn Manufacturing Company, of 34 East Twenty-ninth street, New York, manufacturers of the New Universal square, are receiving such a large number of orders that they find some difficulty in filling them promptly.

Mr. Wanzer, president of the company, states they contracted for a large number of these squares to be delivered to them. The manufacturing concern who took this order has been unable to produce the goods in sufficient quantities, and Mr. Wanzer states the company some time ago decided to build a plant for themselves, and it is now ready for occupancy. He also states that in a very short time they will be up with their orders and looking after each one promptly on receipt. Mr. Wanzer realizes the fact that some orders have been delayed and that purchasers have not received their goods as promptly as could be desired.

The popularity of this New Universal square has brought about unlooked-for contingencies in the way of manufacturing them in large quanties. The company at the present time, however, are in a position to look carefully after the wants of their customers. The yhave had so many cases of misunderstanding among the dealers who have filled orders with the common squares in place of the "New Universal" because of the fact of the "New Universal" being numbered 1, 2 and 3, and on account of these being similar numbers to those on the common squares, that they are compelled to adopt new numbering, and herewith announce to the trade that henceforth their squares will be numbered as follows, viz.: The 6-inch size, No. 6; the 10-inch size, No. 10; the 13-inch size, No. 13.

THE GORTON VAPOR VACUUM SYSTEM.

In a hot water system it is possible in mild weather to circulate the water through the system at a low temperature, and to regulate the heat in any radiator. It is impossible to do this in the steam system, for it is necessary to carry a pressure of steam in the boiler to overcome the friction in the pipes and to force the air from the radiators, through the air valves. Therefore the steam must be circulated at a temperature of at least 212° Fahrenheit, and each radiator filled with steam, for it is impossible to regulate the heat in the radiator.

While the hot water system has advantages over the steam system, it also has many disadvantages, such as the size of the radiators, which are 50 per cent larger than for steam, danger of freezing if the fire goes out, and danger of leakage from defective pipe or fittings.

Heating engineers have, for many years, been trying to develop a system of heating that would have all the advantages of the steam and hot water systems with none of their disadvantages or defects, a system that would have a wide range of temperatures at which steam could be circulated, to meet the requirements of the sudden changes in winter, and the mild weather in the spring and fall, when only a little heat is needed.

The Gorton & Lidgerwood Company, of 96 Liberty street, New York City, claim to have perfected a heating system which combines the advantages of both steam and hot water and at the same time lacks the disadvantages of both these systems.

The Gorton Vapor Vacuum System can be put in by any steam fitter. It is claimed that it costs less to install than the ordinary hot water system, and can be used with any boiler which will not lift the water up into the steam mains.

A postal card to the Gorton & Lidgerwood Company at 96 Liberty street will bring full particulars on this system.

CONSTANTLY GROWING CITIES; OPPORTUNITIES FOR BUILDERS.

At a number of points on the North-Western Line there is a demand for buildings to take care of the incoming residents. The North-Western Line has had its attention called to this condition at a splendid manufacturing point, where there is a population of about 12,000, supplied with all modern conveniences, churches, schools and a college. The demand for houses in this city is one that should command the attention of enterprising builders. The enlarged plants in manufacturing lines at this place makes this an especially attractive point. Persons interested will be put in communication with representative parties upon request to the industrial department of the Chicago & North-Western Railway, Chicago.

CONCRETE BLOCK LEGISLATION.

The publishers of THE NATIONAL BUILDER are in receipt of a letter from the Battjes Fuel & Building Material Company, of Grand Rapids, Mich., as follows:

The Grand Rapids cement block makers have formed an association for the purpose of having the city of Grand Rapids adopt proper building code for cement construction. The first meeting of said association was held February 7th and Nicholas H. Battjes was elected as president and Carl M. Adams secretary.

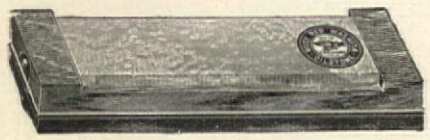
The second meeting was held February 14th. A committee was appointed for the purpose of laboring together with the building inspector, and committee on ordinances, the report being very favorable toward the association. By motion, it was decided that the organization be a permanent one, and be known as the "Grand Rapids Cement Block Makers' Association," the object of the association being to better the quality of cement blocks and encourage cement buildings and look after better ordinances for cement block construction for the city of Grand Rapids.

The object of this new association is certainly well worth careful consideration. The concrete block is comparatively new as a building material. While its good qualities have been thoroughly demonstrated times without number it will be necessary to follow up this demonstration by careful work, as has been laid out by the Grand Rapids block makers. Before the full benefit of concrete blocks as a building material can be realized it will be necessary to do missionary work particularly with municipal officials in a great many cities. Block manufacturers in other cities might well join in the action of the Grand Rapids association.

Trade Review.

COVERFAST OILSTONE BOXES.

The Pike Manufacturing Company, Pike, N. H., is just putting upon the market oilstone boxes as illustrated herewith. The mounting enables the entire length of the stone to be used and keeps the stone in perfect condition. To get the best results, it is remarked, an oilstone must be kept clean and always oil moistened, and this is impossible with an unmounted stone or an ordinary loose cover box. The Coverfast consists of a solid hardwood box, which can not warp, and a strong enameled metal cover, fastened by a pivot hinge, which can be turned under the box instantly. The inside of the cover contains a thick felt pad, which absorbs surplus oil and



BOX OPEN. COVER SWUNG UNDERNEATH.

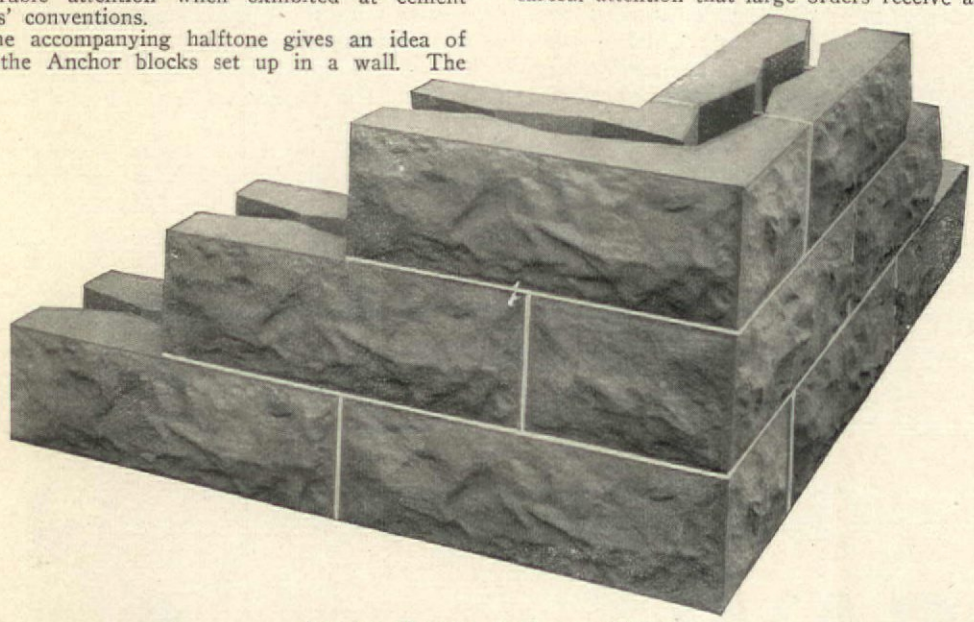
keeps the stone moist and clean and makes the cover practically air tight when closed. The ends of the box are flush with top of stone, thus enabling the tool to be pushed the entire length of stone without danger of nicking or blunting. It is pointed out that the cover is never lost nor in the way, and that the stone is ever clean and moist. These oilstone boxes are offered with either Rosy Red, Lily White, or India oilstones, as preferred.

THE ANCHOR MACHINE.

Every one visiting Rock Rapids, Iowa, is at once favorably impressed with several concrete block buildings of exceptionally fine appearance. These buildings are attractive because there is none of that sameness and imitation stone effect about them. The blocks are not made in sizes out of all proportions to the size of the structure; the color work, and there is color work in both, is of the same shade in every block. The interior walls are always dry and the general satisfaction felt by the owners of these block buildings is a strong argument for buying the Anchor Concrete Block Machine, manufactured by the Anchor Concrete Stone Company of Rock Rapids, Iowa.

This machine, which is illustrated in their advertisement in this issue, is very radically different from any others. Its features are so distinct that the machine has attracted unusual and favorable attention when exhibited at cement users' conventions.

The accompanying halftone gives an idea of how the Anchor blocks set up in a wall. The



ANCHOR BLOCKS AS SET IN WALL.

reading matter issued by the Anchor Concrete Stone Company will explain the strong points about this wall and machine more fully.

DIAMOND EXPANSION SHIELDS.

The use of reinforced concrete in building construction has increased very rapidly and with it a growing demand for an expansion bolt that can be used for attaching fixtures, etc., to floors which oftentimes are not more than two inches in thickness.

To meet this demand the Diamond Expansion Bolt Company, of 9 and 15 Murray street, New York, are making three new sizes of their Diamond expansion bolt as follows: For ⅜, ½ and ⅝ diameter bolt, the shields of which are only 1½ inches in length. The Diamond expansion shield is now made in sizes ranging from ⅛ to 2 inches diameter of screws. The smaller sizes are used with regular wood screws and the larger sizes with the common lag screws. The Diamond Expansion Bolt Company will be pleased to furnish further information to any one interested.

COMBINED LEVEL AND GRADE FILLER.

On another page of this number will be found the advertisement of Edward Helb, of Railroad, York County, Pa. Mr. Helb is placing on the market a combined level and grade finder which, upon careful investigation, will be found to have many merits. It will be found particularly useful to mechanics, carpenters, brick layers, etc., because of the fact that it eliminates the necessity of figuring grades.

Combination dial indicates the grade and degrees of elevation by means of a single pointer. By sighting through the longitudinal recess it is possible to find the true level or grade to any point within sighting distance. A dial in connection with the spirit level makes the instrument a double proof of accuracy both for horizontal and vertical positions.

In all forms of grading this instrument will enable the ordinary laborer to do work which otherwise requires the expense of a civil engineer or surveyor. It is possible to determine with this instrument the height of buildings, trees or any object. The instrument is so simple in construction that it can be used readily by any one. It is adjustable and can not easily get out of order, and in case of breakage any part can be readily replaced at small expense. Every instrument is properly adjusted and tested before leaving the factory. The cost of this level is so low that it is within the reach of all.

Full particulars and catalogue may be obtained by writing Edward Helb, Railroad, Pa.

NEW GRILLE WORK CATALOGUE.

The Northwestern Grille Works, 1456 Milwaukee avenue, Chicago, have issued a new catalogue for 1906. Attention is called to their many new and attractive designs of modern styles of grilles and to the facilities for furnishing all kinds of grille work in the shortest time possible.

The wood used in the construction of all this company's work is of carefully selected, thoroughly seasoned and perfectly kiln-dried stock; workmanship is guaranteed to be of the highest order and at prices that must command the patronage solicited. Small orders receive the same careful attention that large orders receive and it is the aim of the company to make everyone that deals with them a satisfied customer.

Christianson Bros., who are proprietors of the Northwestern Grille Works, show in this new catalogue page after page of grille work, giving the prospective buyers a great number and variety of designs to select from. They are also prepared to furnish special designs or make estimates on architects' plans and specifications.

The catalogue will be promptly mailed to those who write for it.

THE KLINE MACHINE.

The H. Z. Kline Company, 628 West Washington street, Indianapolis, Ind., illustrates with this article a number of cement blocks manufactured on their machines. These blocks were taken from their stock without any effort to select the best and were piled up hastily. A photograph was taken of them and this half-tone made, which shows exactly what kind of work their machine will do.

Attention is called in the reading matter being sent out by the H. Z. Kline Company, to the following features claimed for their machine:

It is the "only machine" which makes all the different sizes and styles on one size pallet board. Wood or iron pallets of any thickness desired can be used.

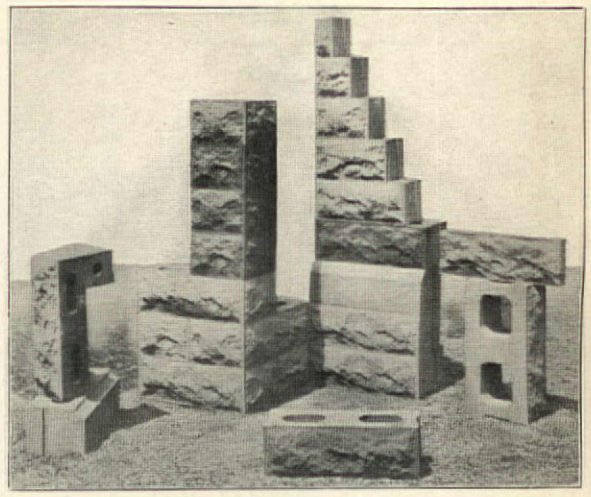
Machine is adjustable, making stone from 2 to 12 inches in width, varying by ¼ inch. Adjustments are simple.

Cores are removable, to make solid and extra strong blocks when necessary; other cores may be substituted to make smaller or special openings.

Its capacity is the greatest of any machine on the market.

It is quickly adjusted to mold stone of any size or style.

Makes corner blocks and angle blocks of any radius.



BLOCKS MADE ON A KLINE MACHINE.

All rock-face molds are taken from natural stone of various designs.

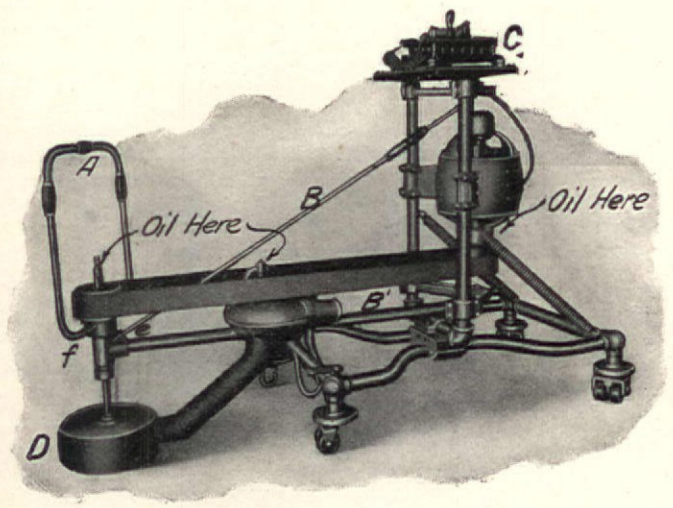
The hinges are so constructed as to pull molds straight away from the block, leaving every block perfect.

Special attention is called to the sharp effect of the corners on all blocks, which makes an especially handsome stone.

Reading matter about this popular priced outfit will be sent on request.

Let a 1½ Horse-Power Motor

Replace Six to Eight Men at Floor Surfacing



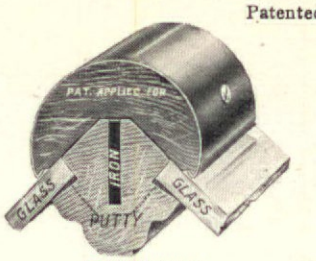
THIS is what is being done by every owner of a Ransome Floor Surfacer—the machine is replacing eight skilled men. The owner of a Ransome Floor Surfacer gets the old prices for the new way of surfacing floors, and a small investment of money in the machine brings a large and steady income. The machine will surface and polish any kind of a floor—wood, marble, mosaic, tile, concrete, etc.—and do the work in a fraction of the time it can be done by hand. Moreover the machine does a better class of surfacing and polishing than **is possible** by hand work.

YOU can use either the electric light current for running the 1½ Horse-Power Motor, or we can supply a small gasoline driven generator which furnishes the power. We may add that the machine leaves a clean floor, for a small suction fan sucks up all the dust from the hood that surrounds the revolving disc that surfaces the floor. The adjustment of the disc is such that no marks or "rings" are made. Send for catalog 3 N. B. giving further details. State kind of current available.

The Ransome Concrete Machinery Company
11 BROADWAY, NEW YORK, U.S.A.

"Petz" Corner Post AND Transom Bars

Patented Nov. 28th, 1905.



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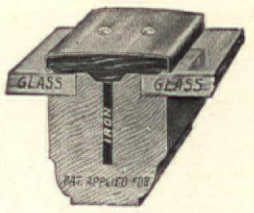
Write For Circular Fully Illustrated.



TRANSOM BAR

Take up small space—do not obstruct light; hold largest and heaviest lights of glass securely; do away with pillars and posts; make glazing easy (glass set from the outside), and are the strongest, neatest and most attractive Corner Posts and Transom Bars on the market. Any finish.

Send for circular with full-size illustrations and complete information.

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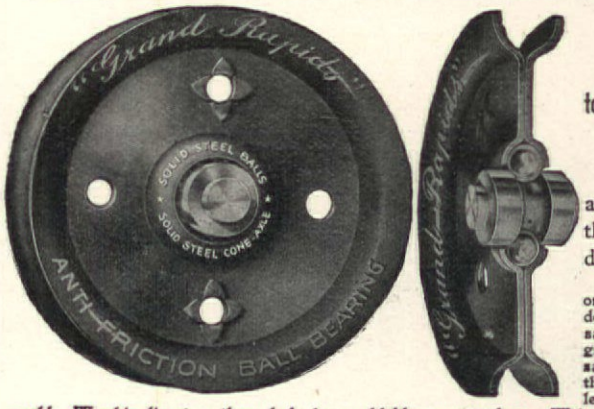

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Artistic booklet free

THE STANLEY WORKS,

NEW YORK NEW BRITAIN, CONN. CHICAGO

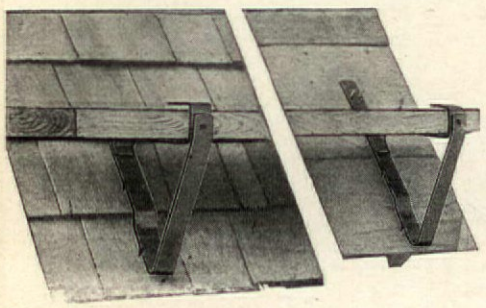
THE WAGNER NO. 40 ROOF BRACKET.

Is a device gotten up to provide a bracket which can be quickly and easily put to use and taken away after use. All that is necessary is to place the bracket in position, which can be done in a moment's time. They are as quickly detached after use.

By the use of the No. 40 roof bracket the timber can not possibly slip off, no matter what

angle the roof. They claim it is the only roof bracket that can be used on a very steep roof. The safety hook holds the timber from slipping off.

It can also be used for sheathing a roof. The cut shows the No. 40 bracket when used on a



5/8 pitch roof, one part shingled and one part sheathed. On a roof more flat the front is higher than the side next to the roof.

When climbing from place to place on a roof a carpenter need not fear to take hold of the timber, as owing to the safety hook the timber can neither slip off or tip up edgewise. Either 2x4 or 2x6 lumber can be used.

It is made of steel and weighs 1¾ pounds each and retails at 25 cents. It is packed one dozen in box; weight per dozen, 22 pounds. For further information write the Wagner Manufacturing Company, Cedar Falls, Iowa.

PROPER TREATMENT FOR FLOORS.

The proper treatment for floors, woodwork and furniture is a book issued by S. C. Johnson & Son, Racine, Wis., which can be had by our readers who will write for Edition N. B. 3. This is the most complete and practical book on beautifying the home ever written. The directions are complete and simple and will be a great aid to every architect, contractor or builder in getting the best results possible out of the flooring work. The subjects covered are: Selection of woods, wood treatment, new floors, old floors, treatment of floors requiring frequent scrubbing, removing old finish, keeping wood in condition, etc. The illustrations not only add greatly to the attractiveness of this book, but make it practically impossible to treat a floor in any other than the right way.

S. C. Johnson & Son have been manufacturing ornamental hardwood floors for over eighteen years and besides issuing "The Proper Treatment for Floors, Woodwork and Furniture," also publish an ornamental hardwood floor catalogue, fully descriptive of their line of parquetry, borders, strips, floor finishes, and weighted brushes.

The designs shown are in color work, giving an exact idea of the style and beauty of this company's flooring, which has gained for them satisfied customers in almost every part of the United States.

The Ornamental Hardwood Flooring catalogue contains instructions for laying flooring that any good carpenter can readily understand and follow. The hints on flooring will be useful to any building man who is interested in good flooring. The company's page advertisement in this issue should be read carefully. It will give the reader of this journal a chance to buy from a large stock and from a great variety and number of designs.

FARRINGTON EXPANSION BOLT.

H. Farrington, of 45 Broadway, New York City, calls attention in this number to the Farrington expansion bolt. This bolt is simple, effective and inexpensive, three points which will recommend it to the average purchaser.

It depends for its expansive qualities upon the flexibility of a coil of wire engaging the thread of a common wood screw or for larger and heavier work on the taper of the mandrel of a screw bolt especially threaded. It can be used most extensively wherever an expansion bolt is required and can be removed or replaced as easily as a common bolt with a nut without its expansive qualities being lessened. It is made up of two parts; the screw and coil of wire. The metal contained in the jacket offers little resistance to the great power of the expansion of the coil, consequently when in place takes the spiral impression of the wire coil.

This bolt requires no sleeve to compress the expansive parts of the device. In its practical operation it requires to be driven into a hole in hard material with slight force until the head of the screw comes in contact with the object to be held. Then a few turns only of the screw will permanently and efficiently hold the fixture in place.

A descriptive circular has been prepared and will be forwarded on request to H. Farrington, 45 Broadway, New York City.

CONTRACTORS' ESTIMATE BOOK.

Messenger & Parks, 51 and 53 South Water street, Aurora, Ill., will send an estimate book for contracts to subscribers of THE NATIONAL BUILDER who get their request in before the issue is exhausted. This book is ruled up and arranged so as to include everything from excavating to drayage. Besides this, there are a few illustrations of cornices and hip shingles shown with prices, also a lot of general information pertaining to erecting buildings which is always well to have on hand.

Messenger & Parks are manufacturers of architectural sheet metal work and their advertisement in this issue contains some very attractive prices on ornamental hip shingles.

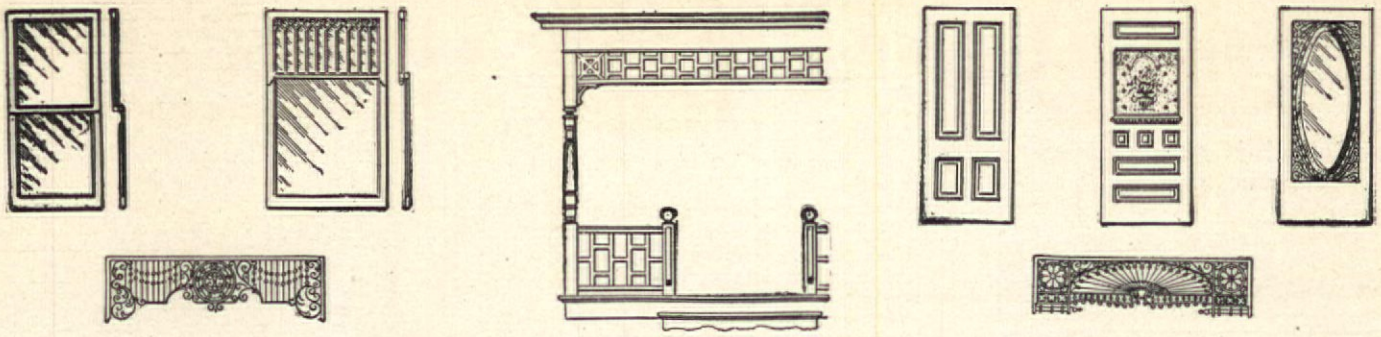
Their estimate book is well worth writing for.

A NEW ARCHITECT.

C. J. Bowell, Shenandoah, Iowa, has opened an office as an architect in that city. He wishes catalogues and samples from manufacturers of goods that are likely to interest the architect.

Where a known, described and defined article is ordered for a manufacturer, although it is stated to be required by the purchaser for a particular purpose, still if the known, defined, and described thing be actually supplied, there is no implied warranty that it shall answer the particular purpose intended by the purchaser. Beggs v. James Hanley Brewing Co., 62 A. (R. I.), 373.

Wanted—For large factory, energetic, capable superintendent, thoroughly experienced in the manufacture of veneered and solid pine doors; good salary to right man. Address "G," care National Builder.



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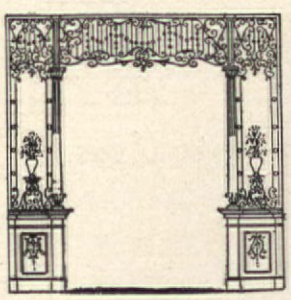

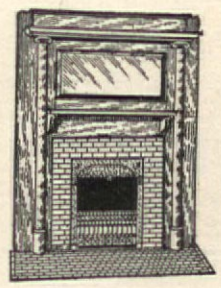

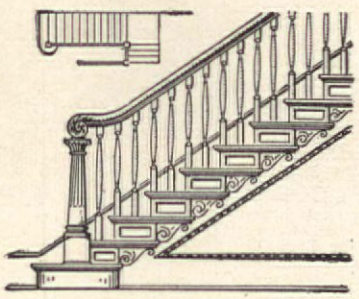

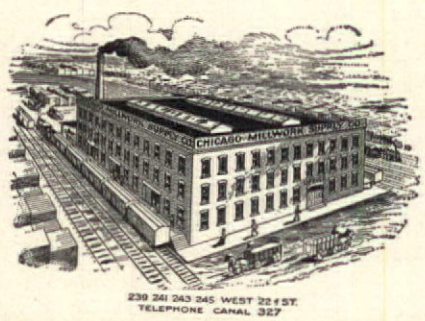

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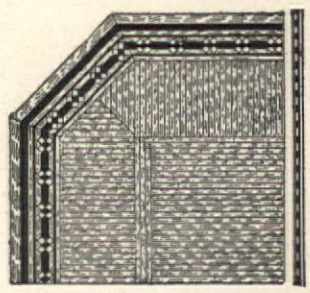

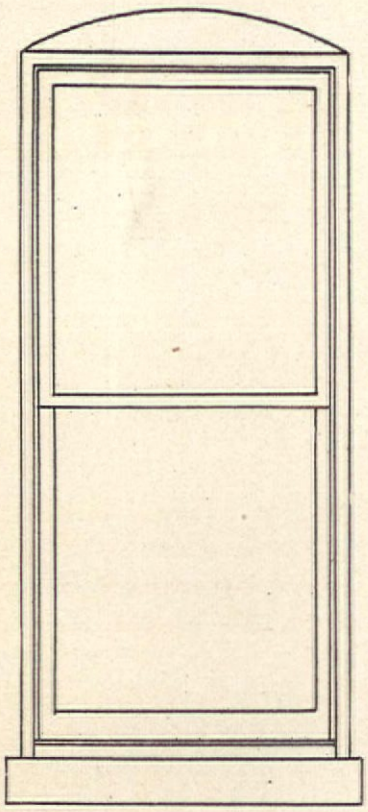

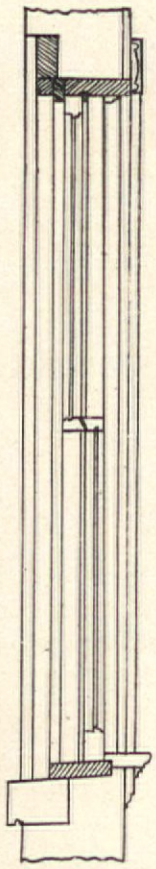

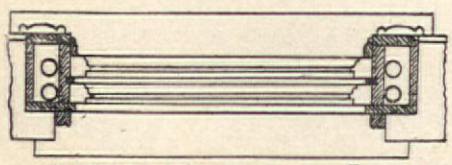

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Grand Rapids Hardware Co. ..... Grand Rapids, Mich.
Orr & Lockett Hardware Co. ..... Chicago
Johnston & Sharp Mfg. Co. ..... Ottumwa, Iowa

SAWS.
E. C. Atkins & Co. ..... Indianapolis, Ind.
Disston & Sons ..... Philadelphia, Pa.
Simonds Saw Co. ..... Fitchburg, Mass.

SAW BENCHES.
Seneca Falls Mfg. Co. ..... Seneca Falls, N. Y.

SAW SET.
Chas. Morrill ..... New York

SCAFFOLD HOOKS.
Bracket Hook Co. ..... Rockford, Ill.

SCREENS.
Phillips Co., A. J. ..... Fenton, Mich.

SHEET METAL WORK.
The Berger Mfg. Co. ..... Canton, Ohio
The Edwards Mfg. Co. ..... Cincinnati, Ohio

SHINGLES—Metal.
The Edwards Mfg. Co. ..... Cincinnati, Ohio
Wheeling Corrugating Co. ..... Wheeling, W. Va.

SHINGLING GAUGE.
James Dinwiddie ..... Fayetteville, Ark.

SHUTTER WORKER.
Mallory Mfg. Co. ..... Flemington, N. J.

SKYLIGHTS.
The Edwards Mfg. Co. ..... Cincinnati, Ohio
Willis Mfg. Co. ..... Galesburg, Ill.

SPRING HINGES.
Bommer Bros. ..... Brooklyn, N. Y.

SQUARE AND MITER.
P. L. Fox ..... Br

STAIR BASE SHEAVES.
Johnston & Sharp Mfg. Co. ..... Ottumwa, Iowa

STEEL CEILINGS.
Berger Mfg. Co. ..... Canton, Ohio
The Edwards Mfg. Co. ..... Cincinnati, Ohio

STEEL JOIST HANGERS.
Van Dorn Iron Works ..... Cleveland, Ohio

STEEL WORK—Structural.
Van Dorn Iron Works ..... Cleveland, Ohio

TERRA COTTA.
N. W. Terra Cotta Co. ..... Chicago

TILE.
Star Encaustic Tile Co. ..... Pittsburg, Pa.

TOOLS.
Britt & Page ..... West Lynn, Mass.
Duby & Shinn Mfg. Co. ..... New York, N. Y.
Ducharmes & Co. ..... Shelburne Falls, Mass.
H. H. Mayhew Co. ..... Shelburne Falls, Mass.
Mack & Co. ..... Rochester, N. Y.
L. S. Starrett Co. ..... Athol, Mass.
Wm. P. Walter's Sons ..... Philadelphia, Pa.

VARNISHES.
Berry Bros. Co. ..... Detroit, Mich.

WATER HEATERS.
Gorton & Lidgerwood ..... New York

WEATHER VANES.
T. W. Jones ..... New York

WOOD CARPET.
Foster-Munger Co. ..... Chicago
Interior Hardwood Co. ..... Indianapolis, Ind.

WOOD TURNING.
C. E. Zimmerman ..... Syracuse, N. Y.

WOOD WORKING MACHINERY.
Cordesman, Meyer & Co. ..... Cincinnati, Ohio
Crescent Machine Co. ..... Leetonia, Ohio
Seneca Falls Mfg. Co. ..... Seneca Falls, N. Y.
W. F. & J. Barnes Co. ..... Rockford, Ill.
J. M. Marston & Co. ..... Boston, Mass.
Smith Machine Co. ..... Smithville, N. J.

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