Why ask for the moon
When we have the stars?

AS

CARPENTRY AND BUILDING.

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INDEX.

CARPENTRY AND BUILDING

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A Country Chapel.

Various correspondents have sent in requests from time to time for designs of chapels and churches suitable for erection in rural communities. In response to one of the last of these which we have published, Mr. J. Dimmock, architect, of Richmond, Va., sends us some drawings of a chapel designed by him, and recently erected in the suburbs of that city, from which we have prepared the accompanying engravings. The perspective view upon this page has been photo-engraved from a drawing by Mr. Walter H. Hicham, and affords a fair conception of the edifice. The building represented was constructed at a cost somewhat under $2500. The material is yellow pine, with the exception of the foundation walls, which are of brick. The dimensions of the audience-room are 28 x 50 feet, inside measurement; the vestry-room, 14 x 14 feet, and the tower vestibule, 8 x 8 feet. The hight of the walls inside is 13 feet: the hight from the floor to the apex inside is 21 feet, while the hight of the tower outside is 50 feet. The dimensions of the roof timbers are as follows: Rafters, 3 x 9 inches; purlins, 3 x 4 inches; plates, 4 x 8 inches, and joists, 2½ x 10 inches. The latter are lattice-bridged. The wall timbers are 4 x 6 inches. The roof is covered with hard pine shingles, cut so as to show hexagonal shape. The frame is covered with 12-inch boards, put on perpendicularly, with battens over joints. In the finish of the rooms inside they are wainscoted to a hight of 4 feet with narrow-tongued, grooved and beaded boards, with a cap. Above the wainscoting the walls are plastered rough-cast, and blocked off and tinted a neutral tint. The ceilings are formed of the same material as the wainscoting. They are divided into panels by moldings planted on the boards. The glass of the large front window is colored, while that of the other windows is simply obscured. The finish of the inside woodwork is oil and varnish. The outside has been painted, including the roof shingles. The settees used in furnishing this chapel were made of yellow pine, and are the only thing about the building not included in the cost above mentioned. Mr. Dimmock informs us that in the selection of material for the inside work, including ceiling and wainscoting, care was taken to obtain lumber of the most irregular grain. This, being oiled and varnished, presents a most atttractive appearance. The chapel in question has recently been occupied, and, we understand, greatly pleases the congregation generally.

ST. ANDREW'S CHAPEL, SUBURBS OF RICHMOND, VA., J. DIMMOCK, ARCHITECT.—ENGRAVED FROM A DRAWING BY WALTER H. HICHAM.

Imitating Various Woods.

To imitate rosewood great care should be taken in correctly glazing, blending and blazing. This caution holds good in imitating mahogany and oak. Glazing colors are transparent, thinly mixed. In mahogany glazing add a little asphaltum to the grain color, which is burnt *terra de sienna;* also add ale to this mixture until it is quite thin; rub it over the wood. Asphaltum for glazing must be dissolved in turpentine, and it is well to add a little boiled oil to check it from drying too soon. To produce a fine rosewood out of ordinary pine make the ground color rose pink This is mixed with asphaltum; the grains are put in with pencils such as are used by professional grainers; the knots and shadows are wiped out with a bit of rag or sponge in patches to suit the fancy. Blend crosswise in imitating mahogany. Maple wood is very handsome and not difficult to imitate; the grain color is raw sienna and raw umber mixed well together; wipe out the lights with a bit of buckskin, the edge of which gives the curl natural to this kind of wood; varnish, and, when dry, dampen with the grain color, which is made thin by the addition of a little asphaltum; wipe out the large light patches with a sponge, and then blend the light by

crossings; when dry use the glaze color for a grain finish. If the bird's-eye effect is desired, take a wet sponge and wipe out specks of light after the grain color is laid on; blend the whole, and dot it with the ends of the fingers, and then lightly blend, which is the finishing process. Oak for a dining-room is handsomely imitated. Paint with a mixture of chrome yellow and Venetian red; the grain color is raw umber and raw sienna made light and brilliant with whiting mixed with boiled oil. Paint over the wood and comb while damp, first lengthwise, and then run the comb with a trembling motion over the same crosswise. Carefully wipe out the grains of light; hold the cloth over the thumb-nail, changing its position at every touch. After glazing with asphaltum, wipe out large patches of light, and with a sash tool darken other spots. The grain color for imitating walnut is burnt umber; the ground color is made of Venetian red, black and yellow ocher, equal proportions, well mixed. Take a flat brush and a piece of buckskin for wiping out the lights.

Water Supply for Country Dwellings.

BY A COUNTRY PLUMBER.

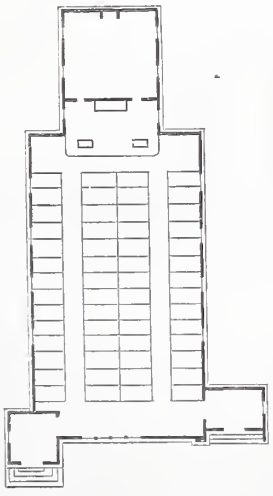
VIII.

Having located the site for the windmill and decided where and what character of storage cistern or resorvoir to use, and found the distance and elevation from the water in the well or spring, an estimate of the quantity of water needed should be made before determining the size of the pump and of the windmill to erect. The following instructions, although a repetition of some already given, are in order:

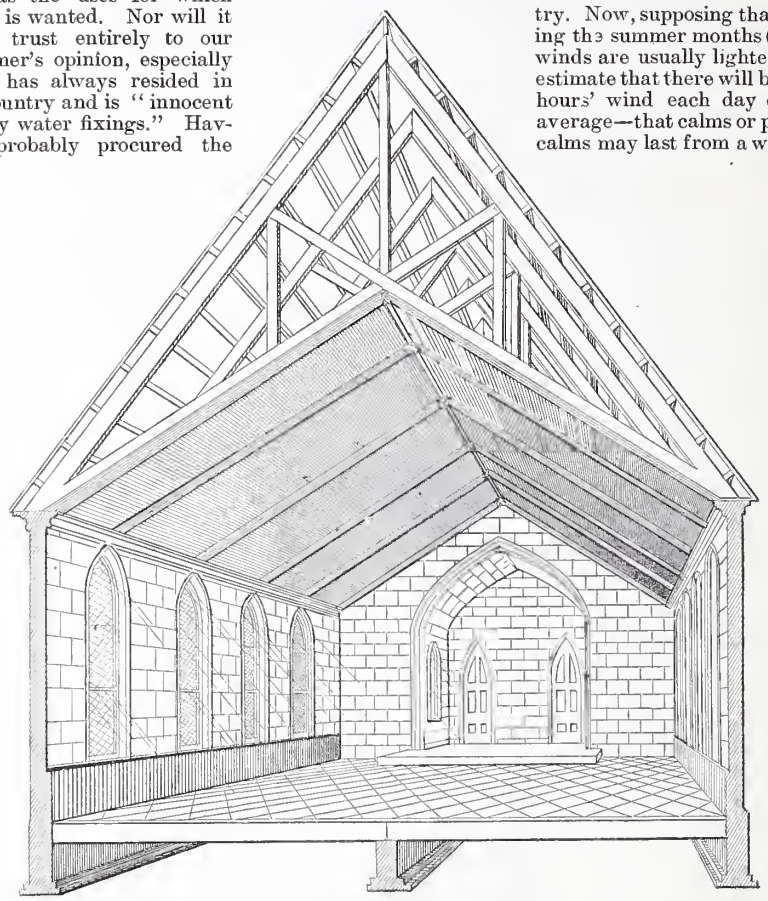
1. Ascertain the depth of well or spring below the surface of the ground or platform of well.
2. The least depth of water in it.
3. The hight above the platform of the well to where the water is to be discharged, adding the depth of cistern or tank to same.
4. The lateral or side distance (if any) from the source of supply to where the water is to be discharged.
5. The quantity of water wanted, or, at least, the purposes for which it is to be used; also, the quantity afforded by the source of supply.
6. The hight at which the mill must be erected to secure a free current of air.
7. In case of a bored or drilled well, find the diameter.

It is important and should be observed that a windmill, deriving its force or power from the wind, should have as great an elevation as possible within reasonsble limits, so as to obtain steady motion and full benefit of light winds. A liberal estimate of consumption should be made. Supposing it will be required for all the purposes of the household, kitchen, laundry, baths, closets and also for lawn or fountain, and the family and dwelling are large, the quantity needed to supply all these would be very much greater than inexperienced persons would estimate—possibly more than afforded by the source of supply. The city plumber, who usually has only to tap the street main to obtain a supply, does not have to deal with this question of quantity, as we now must. So we must study the style of our customer's house and premises, the tastes and number of its inmates, as well as the uses for which water is wanted. Nor will it do to trust entirely to our customer's opinion, especially if he has always resided in the country and is "innocent of city water fixings." Having probably procured the daily supply from a spring, possibly at the foot of a steep hill, or pumped it from a deep well by hand, or pulled it up with a windlass or "sweep," or, worse still, have hauled it in a water-cart or barrel from some distant well or spring, the estimate he would be able to make would not be very reliable. If a Southerner, the washing has probably been done at the spring or creek bank beneath a shade tree, and only so much water brought to the house as was absolutely indispensable. In some sections the remark is common, "Was the house to take fire, the first thing to burn would be the water bucket," and this is not largely overdrawn for many sections of the country. Without any intention of underestimating the intelligence of our rural population (and they certainly will compare favorably with any other class), through habits or total lack of experience they are incapable generally of forming an intelligent estimate of the quantity of water required to serve an average family where plumbing fixtures are employed. The writer recently met a "practical" man from a New England State who estimated 20 gallons per day as a full supply for a family of five persons. The "practical" experience of that Yankee was not of much practical value to himself. Fifty gallons per capita per day, or 250 gallons for a family of five persons where there is neither bath-room, closets or fountains, is not too large an estimate, and double that quantity where closets and baths are used may be needed. Possibly, however, the spring or well would prove inadequate to supply all these fixtures were they introduced. Bear in mind that it will be after our work is completed that our customer will judge of its merit, and if we have underestimated the consumption, or overestimated the capacity of the mill and pump, or constructed too small a reservoir, it will be too late perhaps to remedy the error, and consequently prove only a partial success.

In our first article we said that windmills could be made available whenever the wind blows; but as we cannot control the winds, which are emblematical of fickleness and uncertainty, to insure success much larger cisterns or tanks are required than when using a motor that derives its power from a controllable source or cause. A storage cistern or tank capable of holding ten days' supply or consumption will not be too much in most sections of the country. Now, supposing that during the summer months (when winds are usually lightest) we estimate that there will be four hours' wind each day on an average—that calms or partial calms may last from a week to ten days—how shall we provide for a daily estimated consumption of 1000 gallons? Only by the use of a pump capable of elevating 250 gallons per hour when working at one-half the maximum speed of the windmill. There will be days when it will work constantly and store a great deal more water than is consumed, and other days when it will do little or nothing, or will fail to run at full speed. In some sections of the country the daily average of wind is far more than in others, and six to eight or even ten hours' wind may be depended on. Nor is the seasons of calm in such sections so long. Hence, not only may smaller mills and pumps be employed successfully, but also smaller tanks or cisterns. Very liberal estimates for storage room and pumping capacity and short estimate on duration of wind should be made, so that the supply shall meet the demand at all times.



Ground Plan of St. Andrew's Chapel.—Scale, $\frac{1}{32}$ Inch to the Foot.



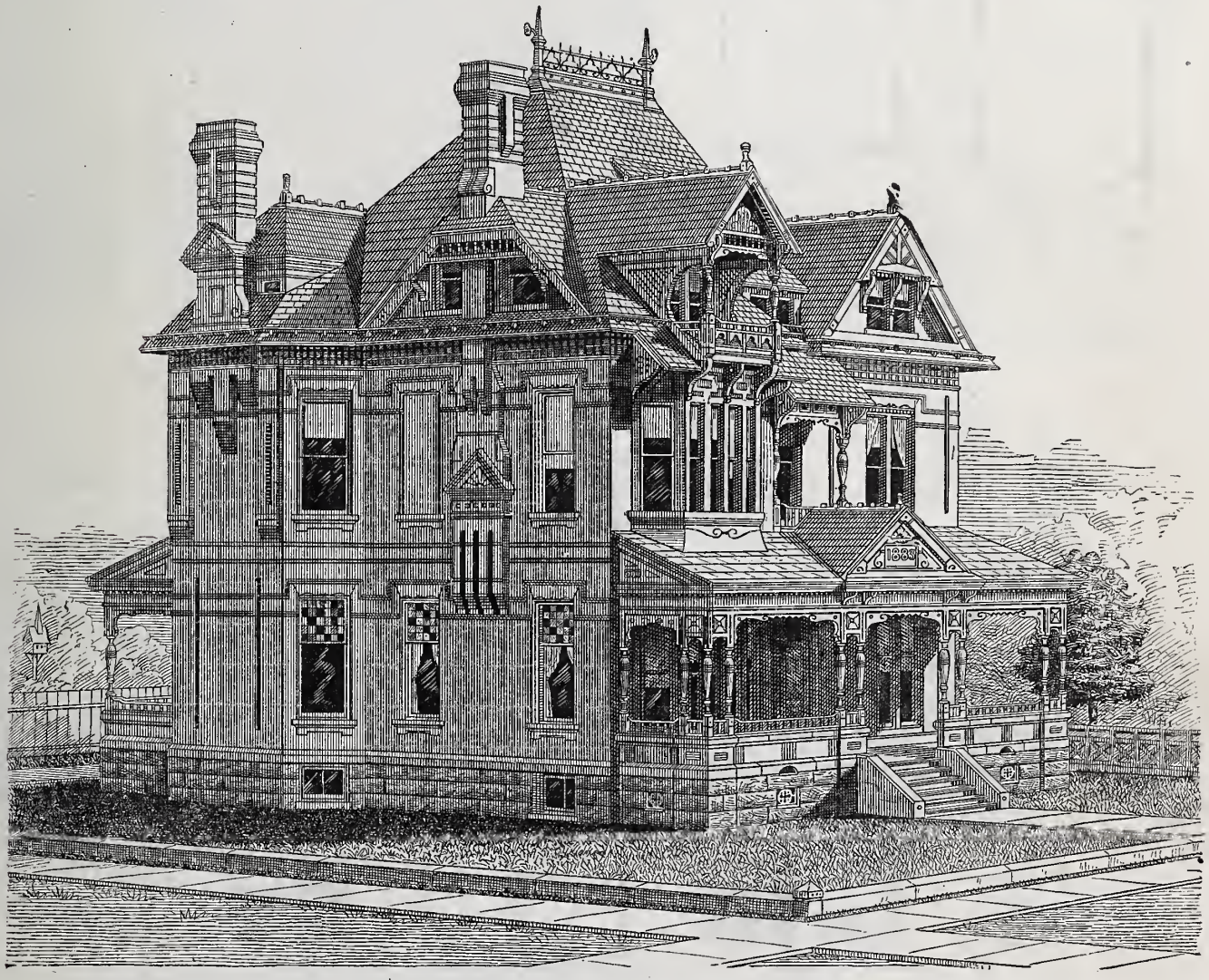
Interior Perspective and Sectional View of St. Andrew's Chapel.

Demerara Greenheart.—Greenheart is one of the ten woods classed A1 at Lloyd's, and, although a product of the forests of South America, only rates at about half the price of teak-wood, the one being purchasable at about 87 cents per cubic foot, and the other at about $1.75. Its specific gravity is 1149, against teak 800, and oak 828. Greenheart has the qualities of being hard, tough, strong and elastic, is very durable and practically indestructible. It is imported in logs from 24 to 50 feet long, and in squares ranging from 12 to 24 inches, and logs are recorded as long as 70 feet, and 24 inches square, so that no objections can be taken to it on the score of size. In color it is not unlike oak, except that it has a greenish tinge. The figure, which is somewhat rare, partakes of that found in American birch, caused by the fibers in the outer wood, under certain conditions of growth, taking a waved or tortuous course. It has the specialty of being remarkably free from knots, and of being more free from ring and heart shakes than

any other wood. The sap-wood is most difficult to tell, and although there are experts who assert that it forms one-fifth to one-third of its bulk, there are others who assert that it is a wood free from sap, or, if not free, that the alburnum, like that of the lignumvitæ, is as durable as the duramen. As a weight-carrying wood, it is questionable whether, when its size and practicability are taken into account, it has a rival. The breaking weight of a specimen 7 feet long and 2 inches square is 1332 pounds, against teak 877 pounds, and oak 900 pounds. Its crushing weight on a 4-inch cube is $98\frac{37}{1000}$ tons, against teak $37\frac{5}{100}$ tons, and oak (green) $33\frac{41}{1000}$ tons.

Second Prize Design—Ninth Competition.

The subject of our Ninth Competition, as our readers will doubtless recall, was the elevations and details of a house in brick, built according to the plans receiving the first prize in our Fifth Competition. These floor plans have been commonly designated in our columns as the floor plans for an eight-room house. They have been the basis of various studies of elevations in woods which we have published. Eight-room, however, is in part a misnomer, from the fact that our contests have permitted additional rooms in basement and attic; accordingly, the complete house to the floor plans in question gives a complement of from 12 to 14 rooms, according to the judgment of the designer. In the June issue for last year we presented the elevations receiving the first prize in the Ninth Competition. We now lay before our readers the set of designs to which was awarded the second prize. Our present illustrations are confined to the perspective view and elevations. In a subsequent issue we shall give the details, a very excellent selection of which were included in this study. The author of this design is Mr. F. J. Grodavent, of Syracuse, an architect with whose designs our readers are not altogether unfamiliar. How well he has succeeded in the problem at present undertaken we leave our readers to judge, remarking only in passing that the elevations have been photo-engraved directly from Mr. Grodavent's original drawings, and that, therefore, they show his exact intentions without possible modifications incident to the ordinary process of engraving. The use of brick in domestic architecture is increasing year by year, a fact which gives great importance to designs making use of this important building material. The extensive introduction of pressed and molded brick makes it possible at present to obtain features of design and ornamentation which formerly were beyond reach. All these points were, no doubt, carefully considered by the various contestants in the competition referred to. In the description accompanying this design the author directs attention to the fact that the gables, dormers and other parts of the roof are so arranged that the water is divided at the front and flows toward the rear. With reference to the exterior walls, the author suggests that the bricks employed be of one color, using such molded forms as he has shown in his detail drawings.



SECOND PRIZE DESIGN, NINTH COMPETITION.—F. J. GRODAVENT, ARCHITECT, SYRACUSE, N. Y.

On the Use of Building Stones.

BY JAMES GOWANS.

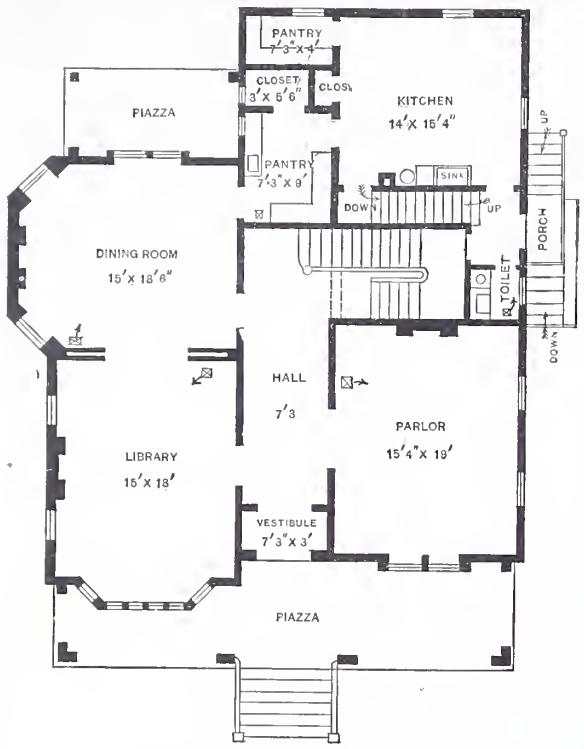
(Concluded.)

5.—*How to Use Stone in the Building of Rubble.*

Of walls built of rubble there is a great variety. With common rubble masonry, or walls built with stones of irregular shape as they come from the quarries, if well put together, well dressed, well knocked to their bed, and built from front to back, so as to bond and get them to work together, enduring walls may be built; but if, on the other hand, as is too often the practice, such work is done by running up one side of the wall before the other, without bond or ties, such as are required to unite the whole, then nothing but failure can be the result. There is another kind of rubble of which we have some admirable examples in the city—that is, coursed rubble. This work was done entirely with the paned hammer, without chisel mark of any kind, and when well bonded and backed, walls of the most enduring kind were got. Where what is called squared rubble is adopted, with ordinary rubble for backing, the practice of running up the outer face should not be allowed. No worse masonry could be built than this, and it is to be regretted that so much of this kind of work is being done in our city. It is not only bad in itself, but leads to our younger masons being trained to a most objectionable style.

Speculation in building, where cost appears to be the first consideration, has led to much of this kind of work, although I am by no means sure but what there is something else to be blamed, and that is that many of our masons have not been properly trained, owing greatly to their being allowed to break their indentures, and not serving their full time of apprenticeship. Masons were better trained when it was more the custom than it is now of indenturing apprentices for a term of years—usually five. Three were devoted to the art of hewing, and two to the art of building. When the term expired it was usual for the master to attach a certificate to the indenture, stating how good an apprentice he had been and his qualification to take his place as a journeyman; and he was proud of the document, as showing what he was and what he could do. This was a good custom, and one which I would like to see revived by the masters or workmen's unions, whose interest it should be to have well-trained men in their ranks.

In specifying rubble work, architects should be careful in making clear the kind of work they require, as many questions have had to be settled in court which might have been avoided if more clearly described, or if, what is better still than any specification, the kind of work was shown to contractors before estimating. There are so many different kinds of rubble, such as common, squared, random, hammer-dressed, nidged and pick-dressed rubble, and rubble where the stones are limited in length, hight and breadth of bed, which comes to be a puzzle to the mason if specified for walls such as I have seen built in this city. These should be made perfectly clear by the architect by sample, so as to prevent after disputes and show exactly how the stone is to be treated. Another kind of rubble which was much in vogue when the houses in Moray Place, &c., were built, as shown in the back walls of the same, and also in the front of the older houses in George Square and Gilmore Place, was that of coursed rubble. As the term indicates, the stone was taken from the rubble, squared and faced entirely with the cairn hammer I have before alluded to, and it is well to notice from these examples how shapely and well done the work is—some of it brought to a surface by squaring the stone so as to show the natural face, and others by using the paned hammer for dressing off any inequalities and bringing it more within the term of what we call "nidged" work, only with much less labor than that which is required for this more costly style of masonry.



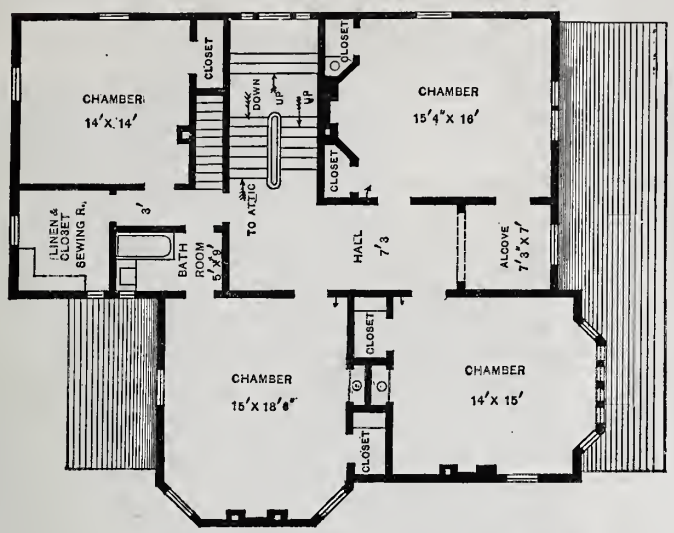
First Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

6.—*How to Use Stones in the Superstructure.*

There are many ways of building, but whatever kind of work is adopted, whether ordinary rubble stone, cubic stone or ashlar, the great secret is to make every stone do its fair share. The true way of doing this is to build the walls from front to back of stone as nearly equal in thickness as possible—that is, of stones of cubic dimensions, or stones of a large area, examples of which we have in the remains of Egyptian and Cyclopean masonry. This is particularly desirable in the space between the foundation courses, and where the face of the wall comes to be seen; good masonry is required for this, although it is often otherwise, owing perhaps to its being buried and out of sight. For the abutments of bridges or piers of viaducts, cubic stone only can be used with safety. Where a great load has to be carried, to build with cubic stone facing and rubble stone backing is a mistake, unless the rubble stone is of large size and carefully bedded. With cubic stone and ordinary rubble you have in the outer face of the wall fewer beds and less mortar than in the backing, so that when the strain comes there is fracture, or a tendency for the wall to yield to the weaker side. Walls, as a rule, are much too thin to allow of the interior of a building being kept at a desirable temperature; thick walls are necessary. I would have all outer walls not less than 2 feet 6 inches, and, as applied to chimney-heads, you will never have a good draft in chimneys that are thin after passing through the roof. Unless they are thick, the current gets chilled and choked, owing to the cold, damp air it meets with from the thinness of the masonry, and, further, it leads to disfigurement, by the use of cans, cowls

Second Prize Design, Ninth Competition.—Front Elevation.—Scale, ⅛ Inch to the Foot.

and such like contrivances, of what the architect should make one of the most telling features.



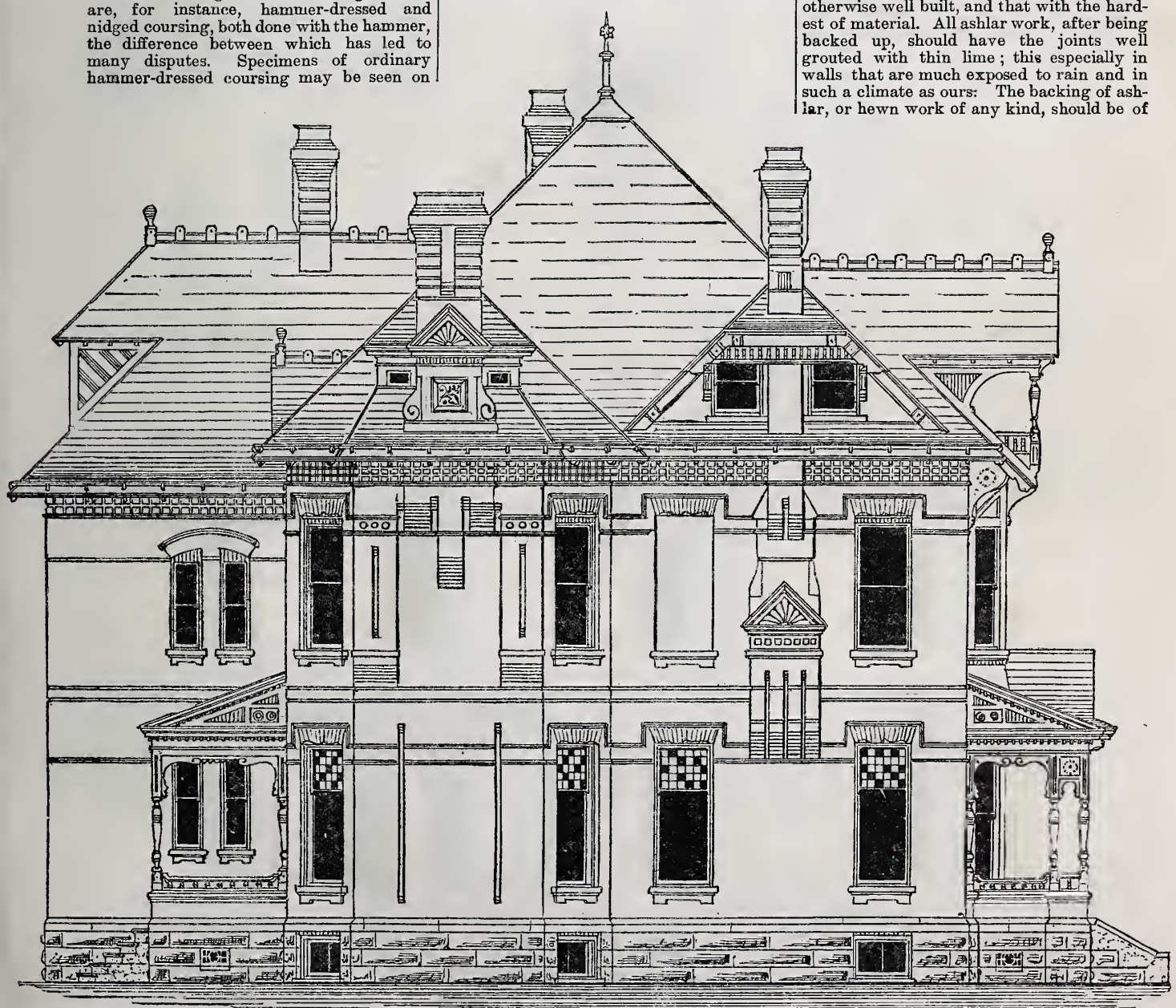
Second Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

7.—*How to Use Stone for Coursed Work.*

The variety of this work lies more in the mode of dressing than of building. There are, for instance, hammer-dressed and nidged coursing, both done with the hammer, the difference between which has led to many disputes. Specimens of ordinary hammer-dressed coursing may be seen on the back walls of the older buildings of the New Town, while in many of the same, where modern additions have been made, nidged coursers have been used, both as different as to cost as that of ashlar and ordinary rubble work. There is also pick-dabbed coursing, which requires to be clearly defined, as without a specimen it may be interpreted to mean work done with the ordinary pick, which belongs to the builder; or it may mean work which can only be done by the point or pick dabber of the hewer. But, before leaving this part of my subject, I do not know that anything more valuable could be done through your association than to have a clear and well-considered specification prepared, treating of all kinds of work. This would be certain to lessen, at least, the difference so often arising between architects and builders as to what is meant.

8. *How to Build with Ashlar Facing and Rubble Backing.*

For ordinary purposes, where there is no great load to carry, to build a substantial wall the ashlar should be well squared on the beds and joints, and laid in a good swimming bed of lime—not stones with slack beds, which the builder has to pin up to bring to the plumb, but square, well-hewn beds, which will bear equally on the mortar and stones below. The builder has no excuse for not bedding them well, as with the machinery now in use, such as steam cranes and like appliances, he never needs to put his hand to the stone, but can at once have it lifted and rebedded without the slightest effort or trouble on his part. A great mistake is often made in laying ashlar with too thin a bed of lime, and also jointing too closely. This may look well, but hard to hard is bad masonry, as when the pressure does come a fracture from the face is sure to follow; and I have observed building where the architect or clerk of works was anxious to show thin beds and close joints sadly defaced, although otherwise well built, and that with the hardest of material. All ashlar work, after being backed up, should have the joints well grouted with thin lime; this especially in walls that are much exposed to rain and in such a climate as ours. The backing of ashlar, or hewn work of any kind, should be of large-sized rubble—every stone being well knocked to its bed—not simply tapped with the light hammer now in use or the edge of



Second Prize Design, Ninth Competition.—Left Side Elevation.—Scale, ⅛ Inch to the Foot.

the trowel, but with the old-fashioned cairn hammer, which every good builder had beside him on the scaffold 50 years ago.

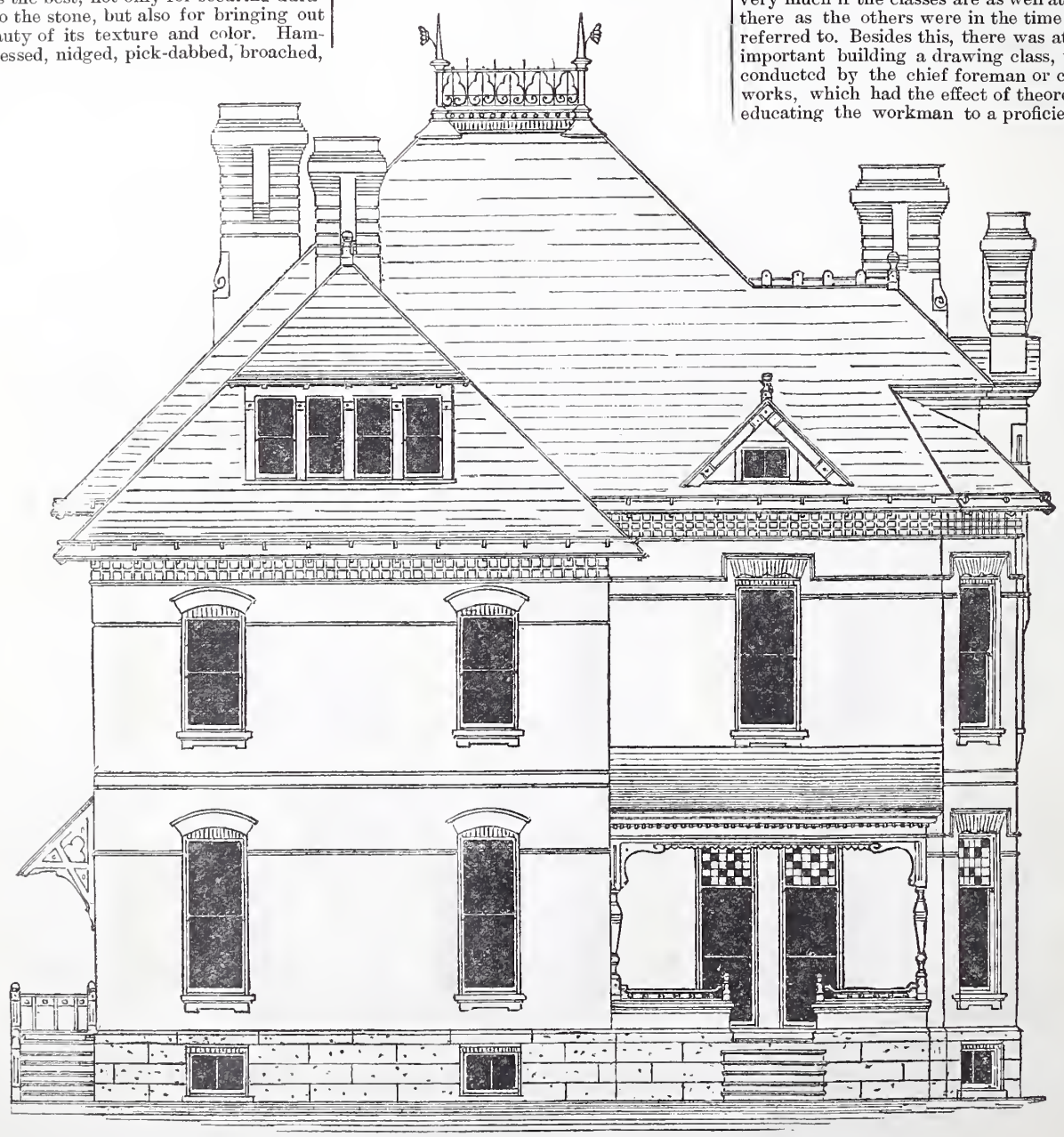
I cannot help noticing here how different the tools which builders now use are from what they were in the time I have referred to. Then they had a large-sized trowel with which they did not spare the mortar, and the large hammer which was freely used and never failed to bring the stone to its bed. Another tool was the hawk hammer, with one end of which the stone was squared and other inequalities were dressed off. The mash and pincher, first used by the hewer 40 years ago, were handy tools for bending the checks of rybats and removing the rough along the edges of the stone. Now these, with the clourer, are part of the builder's kit, and are used by him for doing that which the older hands accomplish with the hammer—work that was not only cheaply done, but far more tradesmanlike in appearance. Now it is a small trowel and the slightest of hammers, which, if used, scarcely affect the stone at all. In short, the ordinary rubble building of the present day is not such as will maintain the character our Scotch masons had when I first remember.

9.—*How to Dress Stone so as to Get the Most Durable Surface.*

Of the various kinds of work adopted, and of which we have admirable examples in this city, I am of opinion that polished work is the best, not only for securing durability to the stone, but also for bringing out the beauty of its texture and color. Hammer-dressed, nidged, pick-dabbed, broached, scrabbled, droved and tooled work, all tend to bruise the surface of the stone and thus expose it to the atmosphere, while the rubbing necessary for polishing removes the bruised material, and presents to wasting agents a surface more likely to prevent decay than any other kind of work we know of. I have endeavored to make this paper as practical as possible. Its consideration may be of some value to the architectural student, as it is a matter of regret that a building on which the architect rests his reputation, and to which his genius has been applied, should perish either from faulty stone or bad masonry.

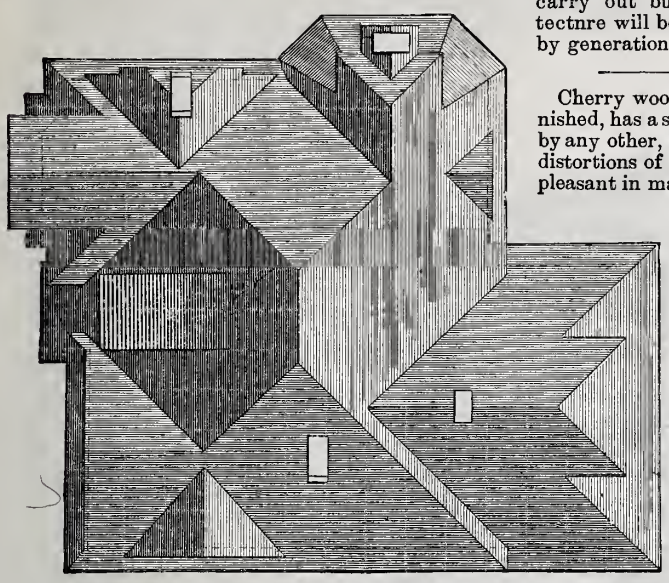
Five hundred years ago, when those beautiful examples of Gothic architecture were erected, with their traceried windows and vaulted roofs, the architect and builder seem to have gone hand in hand, not only in planning, but in building up on true constructive principles edifices which have withstood the ravages of time for so long a period. Before closing, I wish to allude to a custom which prevailed when such buildings as Heriot's Hospital were erected. Then every hewer indented his mark on the face of the stone he had hewn, and it may be of interest to visit this building and observe how carefully this was adhered to. You can by these means nearly ascertain how many hewers were employed on the work, how the structure was built up round and round, and how those most expert in their craft had allotted to them the stones to dress which required the greatest skill. I have seen the same marks on buildings I have examined all over the country. I had a hobby for collecting these some years ago, and visited many of the cathedrals and buildings in England. I made a large collection, but, unfortunately, have lost the record. But it is a custom I should like to see revived, as, in my opinion, it would not deface the stone if done with the delicate and enduring touch these old masons gave to work to which, no doubt, they attached a high value. Mark masonry, as one of the degrees in Freemasonry, had very likely something to do with the custom, but, although a Freemason myself, my paper precludes me following this phase of the craft further than to mention it as something that is at any rate suggestive.

With these examples before us, the appliances we have, and the teaching which every architectural student or working mason can get, we should be able to cope with those who have preceded us. I believe in the earnestness of the architectural student of the present day, but I am not so sure about the technical teaching or training the apprentice mason seeks after. When I first remember, there were in the city many drawing classes, chiefly attended by young men who were either masons, carpenters, engineers or mechanics of a like kind. There were Ruthven, on the Bridges; Milne, St. James Square; Moffatt, George street; Paterson, Stockbridge and others—all teaching drawing, and making good incomes from the crowded houses that attended them. Now we have such institutions as the School of Arts to take their place; but I question very much if the classes are as well attended there as the others were in the time I have referred to. Besides this, there was at every important building a drawing class, usually conducted by the chief foreman or clerk of works, which had the effect of theoretically educating the workman to a proficiency he could not otherwise have attained. In every squad there were numbers of men who were fit, from their intelligence and training, to



Second Prize Design, Ninth Competition.—Rear Elevation.—Scale, ⅛ Inch to the Foot.

act as clerk of works or foremen; and, in mentioning the former, I am of opinion that the well-trained mason is better for such a trust than the joiner.



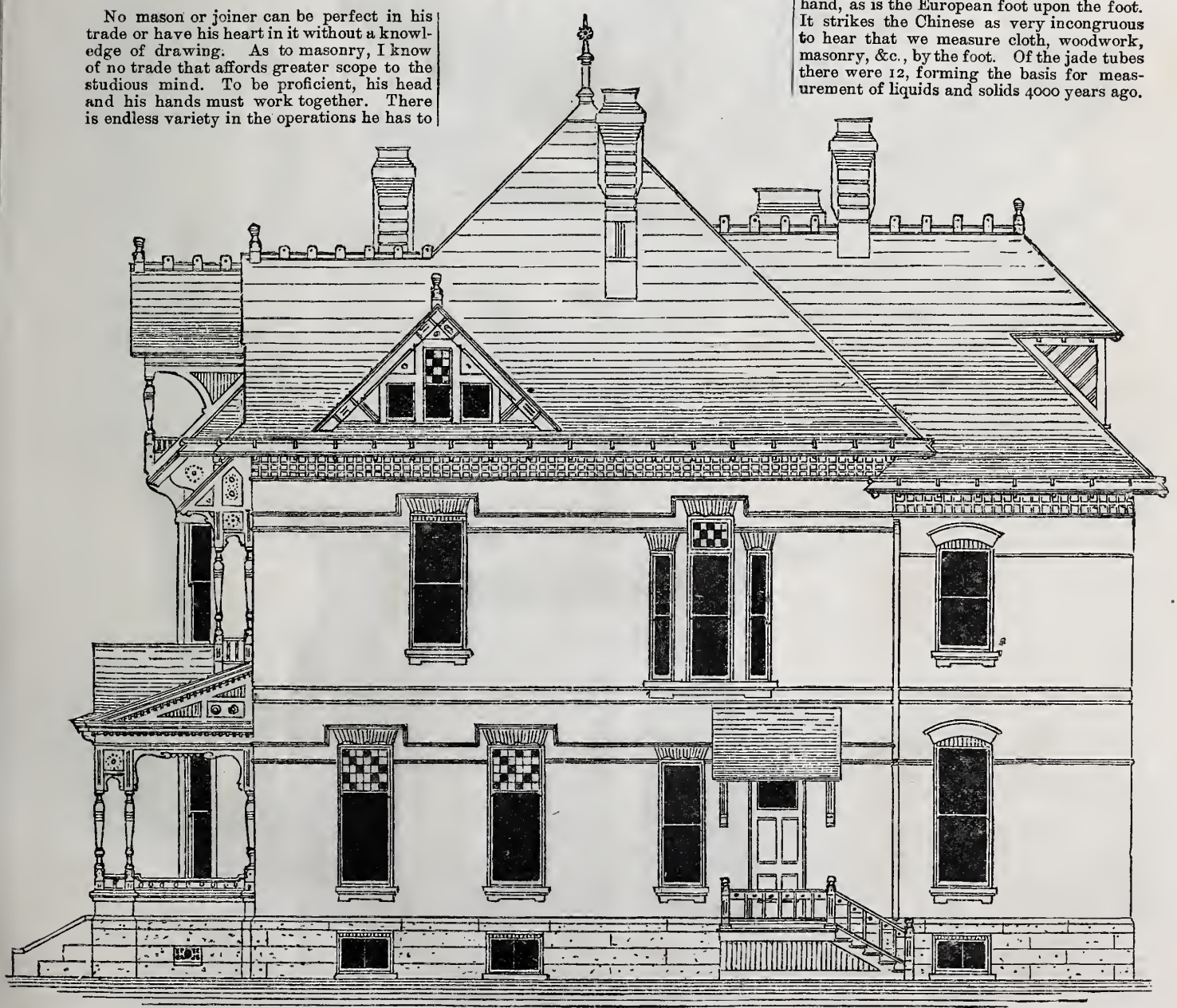
Roof Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

No mason or joiner can be perfect in his trade or have his heart in it without a knowledge of drawing. As to masonry, I know of no trade that affords greater scope to the studious mind. To be proficient, his head and his hands must work together. There is endless variety in the operations he has to perform, and it is far removed from work that is nearly, if not altogether, mechanical. I trust that as education (especially technical) advances, we may have a race of masons who will be something beyond mere machines, and who, by their training, will help in no small degree our architects to carry out buildings whose architectnre will be worth copying even by generations to follow us.

Cherry wood, filled and not varnished, has a soft glow not possessed by any other, and has none of those distortions of grain that are so unpleasant in mahogany. The timber is chosen from the wild cherry, which in New England and the North generally does not usually grow to a girth of more than 20 inches, but in some of the Western States and in the S uth frequently attains a diameter of 24 inches. The domestic fruit cherry gives some good specimens of small timber, but as the tree is rarely sacrificed until it is past bearing and is decayed, this source of supply is precarious. The facility with which cherry can be worked makes it a favorite with the cabinet-maker and wood-worker generally.

The Chinese Foot Rule.

A writer in the *North China Herald* gives some curious information respecting the foot measure in China. At present it varies largely in different parts of the country, and according to d fferent trades; thus the foot of the carpenter's rule at Ningpo is less than 10, while that of the junk builders at Shanghai is nearly 16 inches. But a medium value of 12 inches is not uncommon. The standard foot of the Imperial Board of Works at Peking is 12½ inches. A copper foot measure, dated A. D. 81 is still preserved, and is 9½ inches in length. The width is 1 inch. The small copper coins, commonly called *cash*, were made of such a size, sometimes, as just to cover an inch on the foot rule. In the course of two centuries it was found that the foot had increased half an inch, and a difference in the dimensions of musical instruments resulted. Want of harmony was the consequence, and accordingly in A. D. 247 a new measure, exactly 9 inches in length, was made the standard. Among the means employed for comparing the old and new foot are mentioned tho gnomon of official sun-dials, and the length of certain jade tubes used according to old regulations as standards. One of these latter was so adjusted that an inch in breadth was equal to the breadth of 10 millet seeds. A hundred millet seeds, or 10 inches, was the foot. The Chinese foot is really based on the human hand, as is the European foot upon the foot. It strikes the Chinese as very incongruous to hear that we measure cloth, woodwork, masonry, &c., by the foot. Of the jade tubes there were 12, forming the basis for measurement of liquids and solids 4000 years ago. They are mentioned in the oldest Chinese documents with the astrolabe, the cycle of 60 years, and several of the oldest constellations.

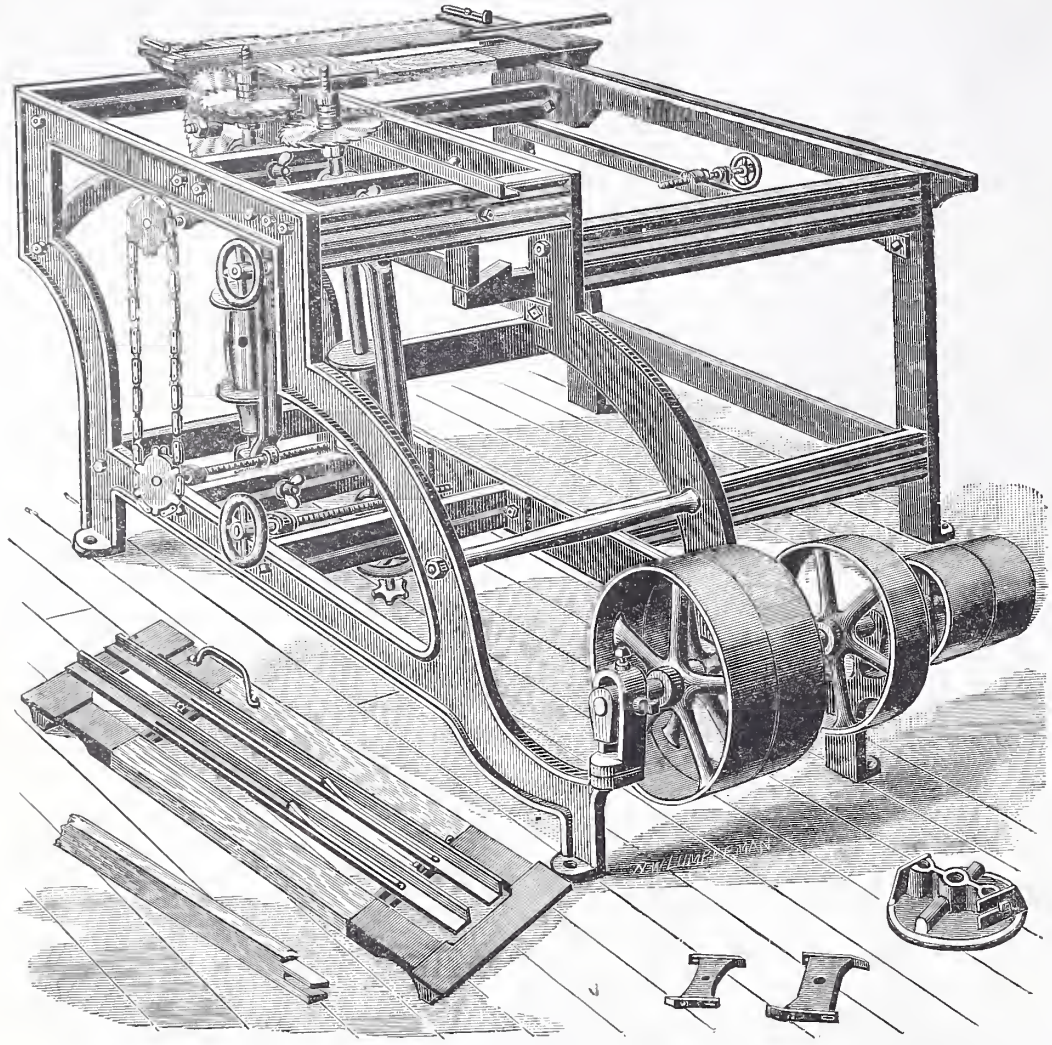


Second Prize Design, Ninth Competition.—Right Side Elevation.—Scale, ⅛ Inch to the Foot.

NOVELTIES.

Improved Combination Sash Machine.

Messrs. Greenlee Brothers & Co., of 227 and 231 West Twelfth street, Chicago, Ill., have recently brought out a combination sash machine, the general features of which will be understood by inspection of Fig. 1 of our engravings. This machine is adapted for cutting off to length and traversing the stile for sash. It sizes them for the meeting rail, making either square or dovetail mortises, and cleans out the core of two stiles at once. It tenons, copes and cleans out the relish in the meeting rail of dovetailed or slotted check sash at one operation, and fits the same to the stile by using the table shown in the engraving. It traverses the muntins to a length, copes and fits them to the sticking of the stile either singly or in blocks. It works grooves from $\frac{1}{16}$ to $\frac{3}{4}$ inch of any depth, and dados at any angle from a square to a miter. The machine is simple in its general construction, and has been so designed as to be durable. It is made entirely of iron and steel, and the boxes are filled with the best of metal. The boxes are also adjustable and self-oiling.



Novelties.—Fig. 1.—Improved Combination Sash Machine, Built by Greenlee Brothers & Co., Chicago.

Royle's Cabinet Saw.

In one of our earlier volumes we illustrated Royle's cabinet saw as then constructed. The device has been recently improved in various parts, which warrants our directing attention to it at this time. The general appearance of the saw as now manufactured is shown in Fig. 2 of the illustrations. The machine is strongly made and is suitable for saws as large as 16 inches in diameter. It is capable of doing heavy work, and is well adapted to a great variety of uses. As may be seen by the engraving, the table-top is made of a combination of wood and iron. Across the surface of the table, in the central part, and extending from the front to the rear, there is inserted a planed iron plate, 12½ inches wide. In this plate is planed the groove for guiding the cross-cutting slide and the opening for retaining the throat piece which adjoins the saw blade. At right angles with this plate is also inserted a planed strip of iron containing grooves for guiding and adjusting the ripping gauge. By the central iron plate the surface of the table is preserved from wear for a very long period. The parts are so combined and arranged that shrinking and swelling incident to changes in the weather never get the table out of true. From the construction we have described it is evident that should repairs become necessary the wood sections of the top may be readily renewed. The top is attached to the front of the machine by hinges. It may be raised for the purpose of changing the saws, throat pieces and the like. It may also be raised and lowered for sawing purposes by means of the worm and wheel shown on the side of the machine. By a universal adjustment of the hinges the table is made to conform to the wear of the mandrel in its bearings. By this means an accurate alignment with the saw may be secured both horizontally and vertically at all times. The special feature of the machine, and the one which gives it its name, is the manner in which it is fitted up. A closet for the reception of small tools is provided at the right, while on the opposite side of the machine, and under the saw, a spacious, closely-fitting sawdust drawer is provided, the whole making a neat and cleanly arrangement. Since sawdust from many varieties of wood is a valuable product, this means of preserving it will be greatly appreciated by users of machinery of this class. Besides those features to which we have already drawn attention, this machine possesses still other merits. The throat piece is of very simple construction, and may, at the will of the sawyer, be renewed in a very few moments. It may be removed when necessary, and is firmly secured to its place while in use. The tongues for guiding the cross-slides and ripping gauge are planed with beveled sides, and are closely fitted to the corresponding grooves in the table. The ripping gauge is provided with an adjustable iron fence, in which is arranged a convenient adjustable device for securing gauges of various shapes and for special work. Wrenches for adjusting and removing saws, wobblers and groovers are conveniently arranged within the frame of the machine, and

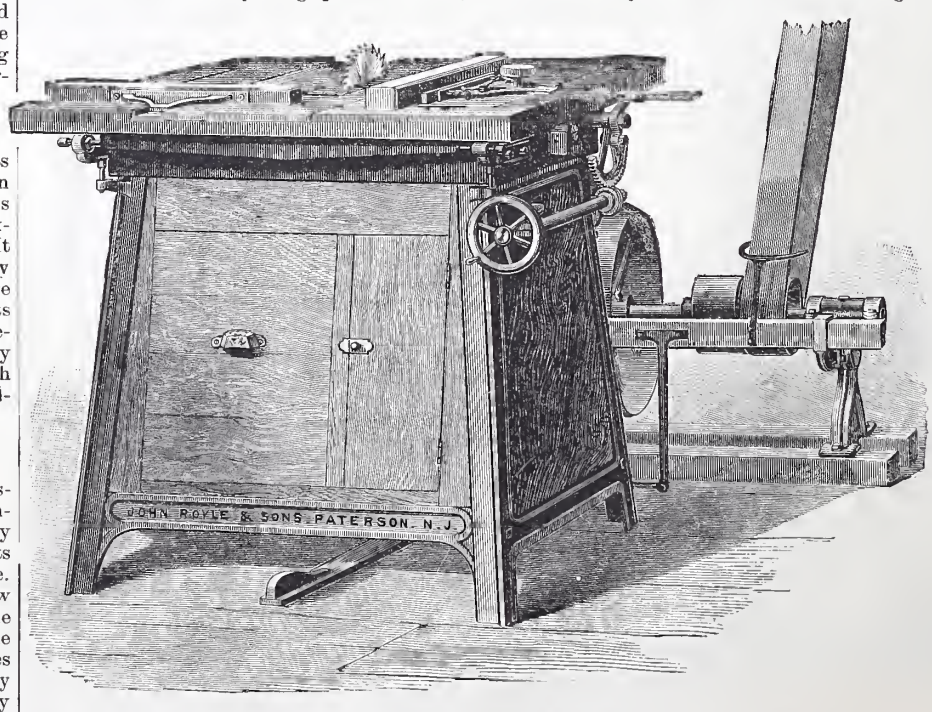
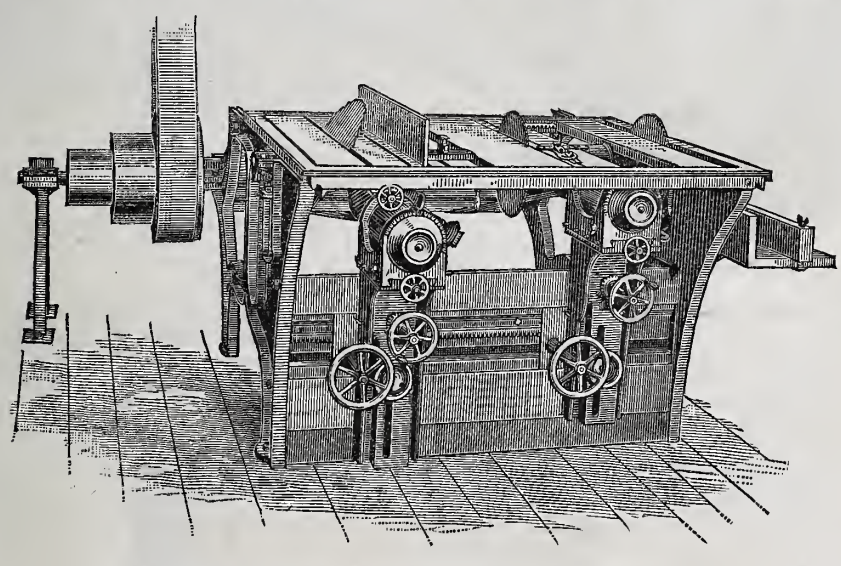


Fig. 2.—Royle's Cabinet Saw Table, Built by John Royle & Sons, Paterson, N. J.

so fixed as to prevent liability of being detached from their proper place. The spindle is steel, with V-shaped collars carefully ground to bearings. It is supported in boxes, which are cast with and form part of the frame of the machine. This tool is manufactured by Messrs. John Royle & Sons, No. 62 Railroad Avenue, Paterson, N. J.

Holt's Universal Wood-Worker.

Figs. 3 and 4 show a Universal wood-working machine invented and built by Mr. Henry A. Holt, of Wilton, N. H. The manufacturer directs attention to the fact that this machine includes six different articles in one, making it a double saw bench, a molding machine, a buzz planer, a lathe, a boring machine and an emery grinder. The changes necessary to adapt the machine to any of the uses above mentioned are produced by the use of two arbors, each of which has a swinging vertical movement, a vertical movement, a horizontal movement parallel to the front of the table, and a horizontal movement at right angles to the driving pulley. The arbor boxes are a part of the extension of a revolving arm (all in one piece), the center of which is the center of the arbor and its pulley lengthwise. The revolving of this arm by a worm gear gives the swinging movement to the arbor, and passing through fully one half a circle, as it does, allows the saws or cutters to cut at all angles with the top of the table. A circular index, marked in degrees, is placed around the end of the arm at the front of the machine, and aids in setting it to any angle quickly and accurately. Saws or cutters are used upon either end of



Novelties.—Fig. 3.—Holt's Universal Wood-Worker in the Form of a Saw Bench.

both arbors, as shown in the engravings. When used upon the inside end they will cut any angle up to a miter angle, and upon the outside end they will cut at any angle with the top of the table, the arbor even passing beyond a perpendicular and allowing the saw to cut downward at an angle of 15° or more in the opposite direction. The manufacturer directs special attention to this point as one of great superiority over competing machines. It avoids the inaccurate and inconvenient way of carrying stock against an inclined guage in order to cut angles more acute than right angles. The vertical movement is made quickly and accurately by a screw and hand-wheel, and allows the saws to cut at any desired hight above the table or to be placed entirely below it. The horizontal movement, parallel to the front of the table and driving pulley, is effected by rack and gear, and allows the arbors to be used at varying distances apart, making the machine specially useful in cutting stock to various lengths. The belts run satisfactorily in all positions of the arbors, and their tension is regulated perfectly by simply turning a screw, thus adapting them to the different positions, or to light and heavy work, or either belt may be loosened or fastened out of the way instantly, allowing its arbor to stand at rest while the other is in use. By this means the use of a binding pulley, sometimes employed in similar machines, is avoided. Among the special advantages which the manufacturer claims for this machine the following may be mentioned: For irregular or straight moldings it has the advantage of varying the distances between the cutter heads from a very few inches to nearly the entire width of the machine, and cutting at various angles with the top of the table. It may be changed to a lathe by fastening the dead center with one screw upon the side of the right arbor box when vertical, and placing the driving center in the other arbor. It may be used as an emery grinder by placing an emery-wheel on the left arbor when projecting through the side of the frame. In this position it runs outside in a convenient manner for use, and has a rest connected with the planer box which is adjustable for grinding upon the circumference or the side of the wheel. The hand-wheels for making the various adjustments of the machine are on the front, in reach of the operator, and all changes of the different attachments, for the various kinds of work, are made in a very short space of time. The machine is made as a saw-bench and is finished to receive the other attachments, which are made interchangeable by simply putting them in place at any time. Accordingly, it is possible to buy the machine with less than its full complement of attachments and supply others as they may be wanted. This machine was exhibited at the fair of the New England Manufacturers' and Mechanics' Institute, at Boston, where it attracted marked attention. It is thoroughly made, almost entirely of iron and steel, and has self-oiling arbor boxes and other features of first-class construction.

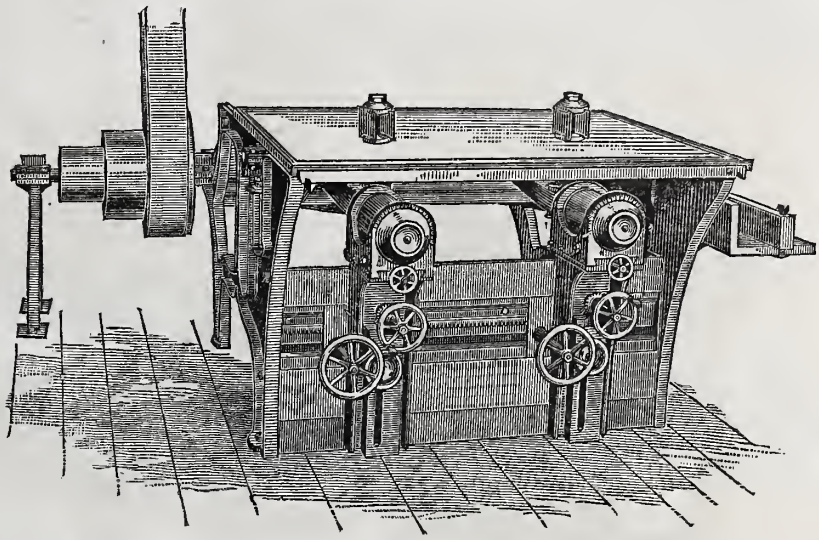


Fig. 4.—Holt's Universal Wood-Worker in the Form of Irregular Molder.

A New Saw Guard.

Ever since the buzz saw came into use the ingenuity of inventors has been taxed to devise means of protecting those persons who have occasion to use this useful article against the dangers attending its employment. A device now being introduced having these objects in view is shown in Fig. 5 of the engravings, and is made by the National Saw Guard Company, of Indianapolis, Ind. The engraving represents a sectional view through the saw bench, showing the saw mounted on its arbor and the guard in place. The construction of the guard and the general manner in which it is used will be readily understood from the engraving by every experienced sawyer. Among the points of superiority claimed for this device may be mentioned the following: Instead of being attached to the saw-table by bolts and nuts, it is fastened by a wedge attachment. By this means the operator can attach and remove the guard from the table in an instant without disturbing the fastening undern-ath the table. A second point is the thumb-nut by which the hight of the guard from the table is under the control of the sawyer. A brace holds the guard firmly in place over the saw. A combination fastening is employed which can be readily adjusted to attach guards from 10 to 16 inches in size without removing the fastening from the table or getting it out of line with the saw. The back stop, which is a feature of this saw, effectually prevents splinters and timber from flying back or riding the saw. The closed hood prevents dust from flying or disturbing the operator in any manner whatever, rendering the guard an eye and lung protector. In addition to these points the

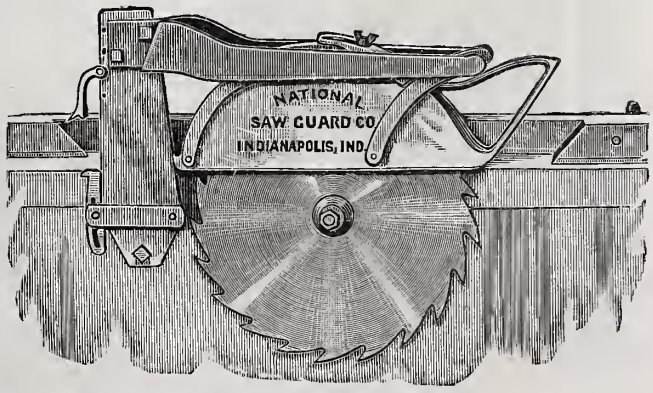


Fig 5.—A New Saw Guard.

manufacturers also direct attention to the fact that this is made with interchangeable parts, thus making the question of repairs a very simple oue.

Backus's Portable Cabinets.

A combination bath-tub, wash-basin and closet in the form of a neat piece of cabiuet work is being introduced by Mr. Q. S. Backus, of Winchendon, Mass. In Fig. 7 we show a form of this portable cabinet, adapted for use where there is a water supply, but no hot water. The cabinet, as represented in the engraving, contains bath-tub, wash-basiu and water-closet, also means for heating the water. The base of the cabiuet contains the bath-tub. A tank or reservoir for holding water is located at the top in the part covered by the cornice and finish above the doors in the engraving. A boiler of peculiar construction is located in the

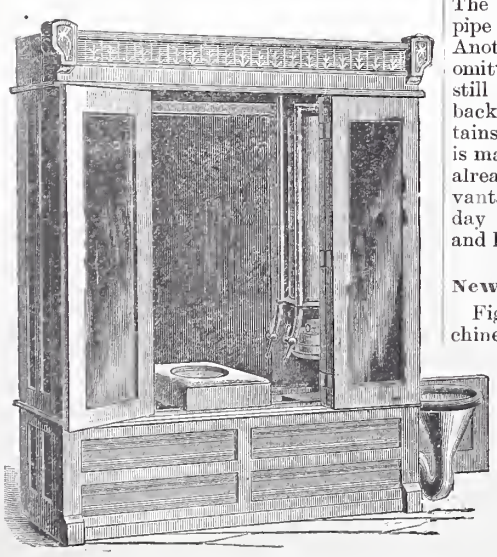
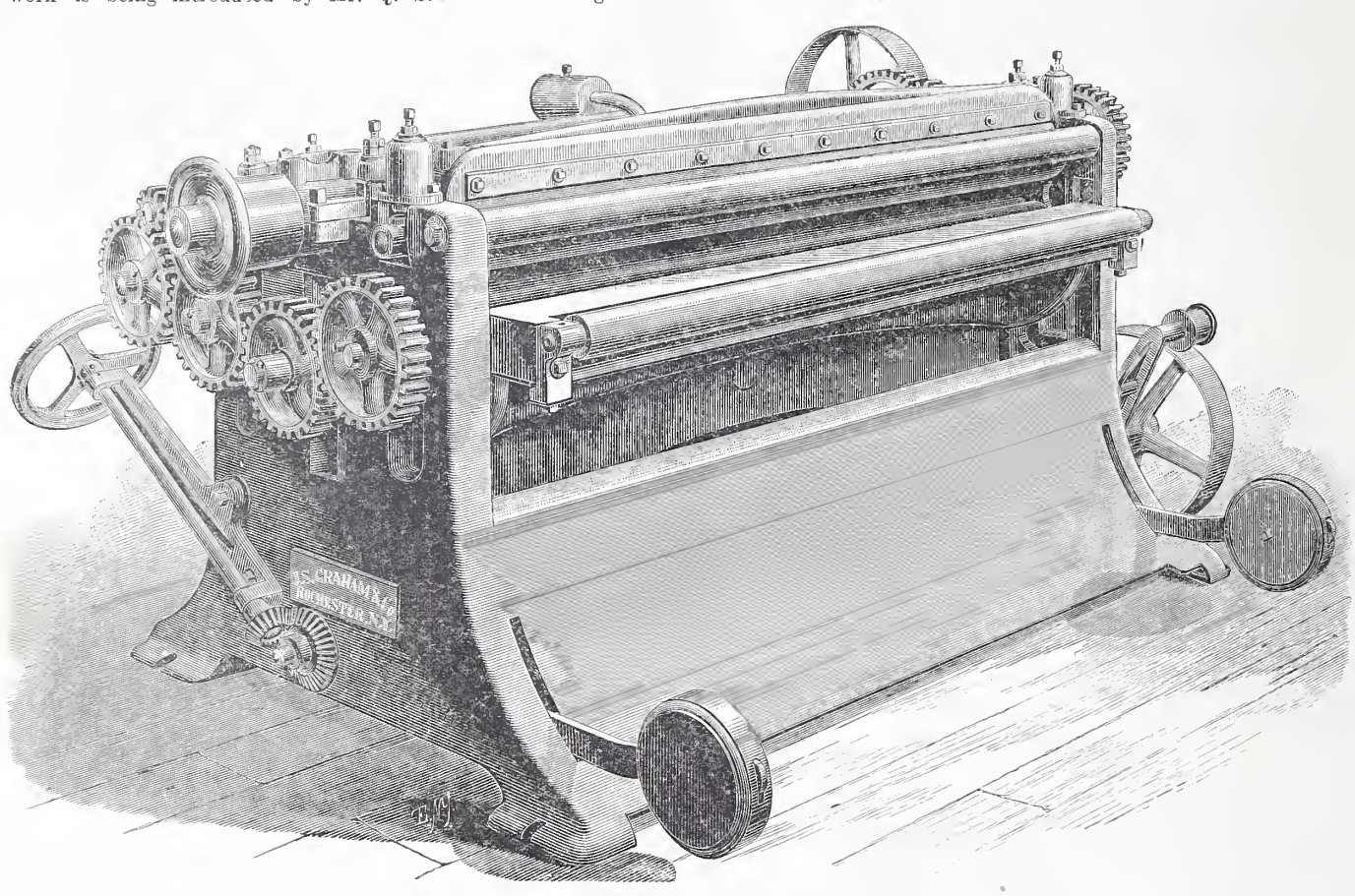


Fig. 7.—Portable Cabinet for Use with Water Supply.

right-hand end and is partially shown in the engraving. A marble-topped wash-basin sets over the bath-tub and is so adjusted as to be run back and forth, thus bringing it to the position showu in the engraving when it is to be used, and sliding back under the heater when the bath-tub is to be employed. The same faucets for supplying water answer for both bath-tub and basin. The water-closet is arranged at the end, and has its own proper connection with the reservoir above, as shown in the sectioual cut, Fig. 8. In use it turns out as shown in Fig. 7, and when not in use swiugs back into the cabinet and is concealed from view by the door shown in the engraving. The general appearance of the cabinet in a room is not unlike that of a wardrobe, and it has the special advantage of beiug adapted for use in any apartment, thus saving the necessity of fitting up a special bathroom. The boiler is arranged for heating by a kerosene oil stove or gas stove, which is placed under the boiler, and which the manufacturer claims is so arranged that no smell or smoke exists. By closing the doors of the cabinet a hot-air bath can be obtained. The only plumbing required is to attach a pipe to bring water in and conduct it out. Another form of this same cabinet is made, omitting the water-closet attachment, and still a third form, omitting the doors, the back of the latter being supplied by curtains. A fourth form, employing a heater, is made, adapted for use upon a set bath-tub already in place in the house, giving the advantages of having hot water at any time of day or night without heating up the range and house.



Novelties.—Fig. 6.—New Sixty-Inch Surfacing Machine, Built by J. S. Graham & Co , Rochester, N. Y.

New Sixty-Inch Surfacing Machine.

Fig. 6, shown above, represents a machine designed for the purpose of planing sounding-boards for pianos, also very nice work in piano, organ and other factories where very smooth surfacing in woodstuff is required. It is probably the widest rotary cylinder planer built. Its width is 60 inches, and it will plane from the thickness of a veneer up to 4 inches. It is of the pony type of surfacing machines, is large, heavy, and altogether a powerful machine. The cylinder is of steel, driven at both ends, and carries four knives. The cylinder bearings are 2¼ inches in diameter and 9 inches long. Pressure bars are provided on both sides, each one being within ⅜ inch of the revolving knives, thus making it next to impossible to tear or sliver cross-grained or knotty lumber. The pressure bar on the rough lumber side is so arranged that in yielding to the various thicknesses of uneven stuff it will always maintain its close relation to the cutter-head, as it swings on a circular concentric weight. The bar has a pivoted shoe that tips to allow a constant pressure on the board until it has passed from the shoe to the knife. The pressure bar on the finished side is set close to the knives and is provided with a yielding adjustment for wet or resinous lumber. These features euable this machine to plane very thin and short, since the lumber is held down

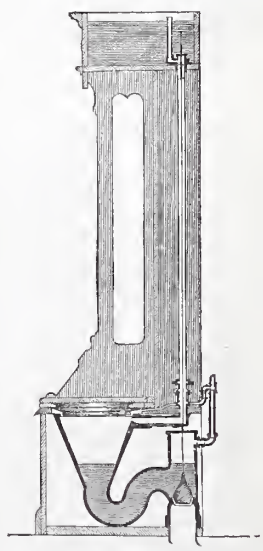
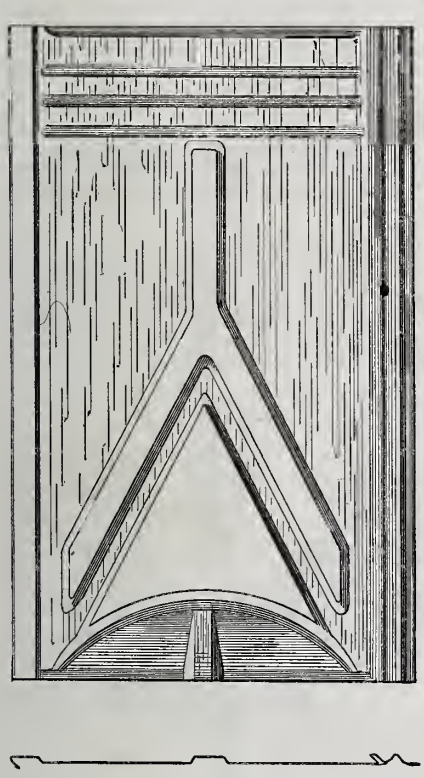


Fig. 8.—Sectional View of Cabinet, Showing Arrangement of Closet.

by the pressure bars very close to the knives, leaving an open space of only 3 inches from one pressure bar to the other. The manufacturers state that stuff as short as 5 inches in length can be successfully planed on this machine, as well as all kinds of hard, cross-graiued and knotty lumber, leaving a perfect surface. The principal novel feature of this machine is an arrangement to enable the operator to plane such stuff as souuding-boards for pianos, taper at one edge. Piano sounding-boards are made from 3½ to 5 feet

wide, from clear spruce lumber, glued diagonally together in pieces about 4 inches wide and ½ inch thick. They are usually finished ⅜ inch thick at one edge and $\frac{3}{16}$ inch thick at the other edge. To make these boards by handwork to meet the requirements of the trade requires great labor, as the slightest imperfection in the board or its surface would at once condemn it. The builders of this machine devised the bed or platen that carries the under rolls to use it either for parallel or taper work, and have succeeded in the highest degree. A heavy trussed



Novelties.—Fig. 9.—Walter's Metallic Shingle, about Quarter Size.

box frame is raised and lowered by the large hand-wheel on the under side of the machine. Upon this trussed frame is fitted the bed or platen in which the lower rolls are fitted and over which the lumber is passed. The bed is carefully planed to fit over the trussed frame and pivoted at one end with a large steel pivot. At the other end, and underneath the truss, a screw and hand-wheel that raises and lowers one end or side of the bed for the purpose of planing taper, is placed.

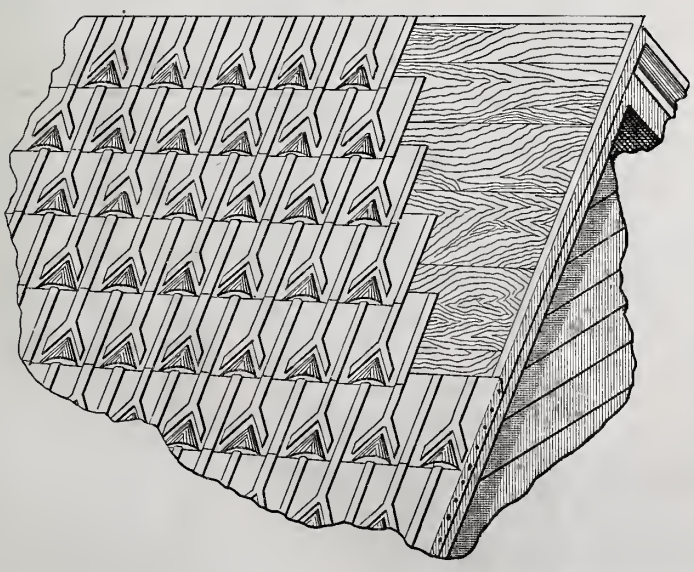


Fig. 10.—Appearance of Roof Covered with Walter's Metallic Shingles.

A hand-wheel on the opposite side, not shown in the engraving, is used for the purpose of securing the bed in any position after being set. The whole machine, the manufacturers assure us, is built from the very best materials, by skilled mechanics, and is guaranteed to be first-class for the purposes for which it is designed. The makers are Messrs. J. S. Graham & Co., Rochester, N. Y.

New Metallic Shingle.

The National Sheet Metal Roofing Company, of 24 Cliff street, New York City, are

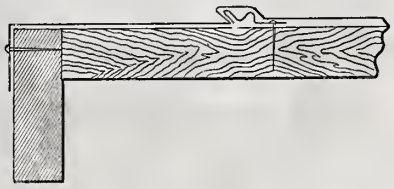


Fig. 11.—Common Method of Finishing Edge of Roof.

introducing a new form of tin roof, or, rather, a new form of metallic shingle, the general application of which will be understood by reference to Figs, 9 to 14, inclusive. We use the term "a new form of tin roof," from the fact that these shingles are made from roofing tin of various qualities, and their price in the market is based upon the current prices of tin plate of the brands from which they are struck. Three sizes are manufactured, which are nominally 7 x 10, 10 x 14 and 14 x 20 inches. The dimensions are slightly less than these figures, since the inches named represent the sizes of the sheets from which they are struck. Fig. 9 shows the general appearance of one of the shingles, and the irregular line at the bottom a profile section across the center. The section in the middle of Fig. 12 shows a profile of a joint. In applying these sheet-metal shingles, they are laid in almost the

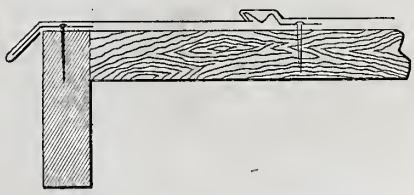


Fig. 12.—A Better Plan of Finishing an Edge.

same manner as an ordinary wooden shingle, with the exception that the lap is very much reduced. Referring to Fig. 9, the following shingle would lap down to cover the three horizontal corrugations above the pattern, just reaching on to the stem of the inverted Y which forms the figure. The general appearance of a roof laid with these shingles, and the general manner of applying them, can be gained from an examination of Fig. 10. They are laid on tight sheathing boards or upon lath, as may be preferred. In finishing the edges of roofs laid of these shingles, plans analogous to those in use with tin roofs are followed. Fig. 11 shows a common method of finishing along a gable or barge board, while Fig. 12 shows a better method. In the former the shingles are beaten over the corner of the board and are nailed at short intervals, while in the latter a strip of tin or sheet iron is first nailed along the edge and the shingles are bent so as to hook on to it, thus forming a drip, throwing the water away from the face of the molding. The finish at the eaves is the same as with wooden shingles or slate, the tin shingles being allowed to project over the gutter enough to throw the water into it. Fig. 13 shows a simple method of finishing a ridge or hip. One course of shingles is bent at right angles to the roof, while the course from the opposite side is laid against this edge and bent over so as to hook on to it. Another plan of finishing a ridge which the company recommend is shown in Fig. 14 Flanges are bent off from opposite sides on the shingles, and a sheet-metal roll is slipped on. The advantages which the makers claim for this roof are that by its construction each plate amply provides for

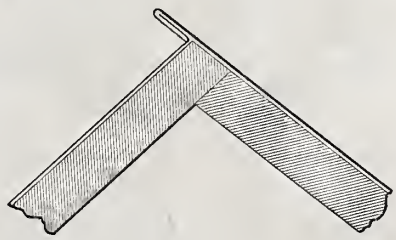


Fig. 13.—Finish at the Comb or on a Hip.

the expansion and contraction, which cause cracks and leakage in many metal roofs. Each plate is securely fastened to the roof boards in a way to prevent any liability of being blown off, and each plate, through the cupped gutter shown in section in Fig. 12, allows a passage of air, and consequently cools the rooms immediately under the roof. They also direct attention to the fact that each plate is finished, when laid, without being handled with tongs or beaten with a mallet, thus avoiding abrasions of the tin coating. Another advantage is the facility with which these shingles may be taken off, when no longer wanted, and relaid. Instead of drawing the nails, as

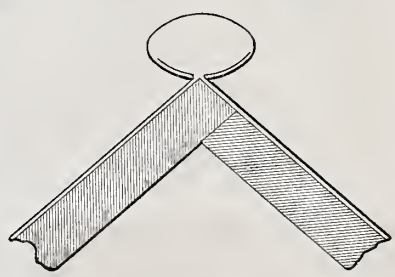


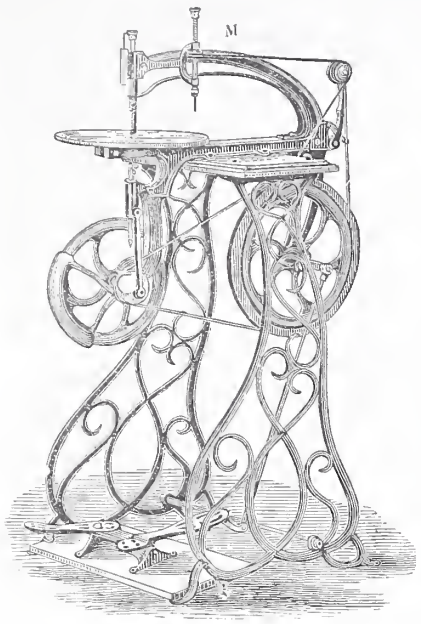
Fig. 14.—Roll Finish for Ridge.

would at first seem to be the best plan, they are simply driven through by a nail punch, and the shingles lifted out of place. New nail holes in the same vicinity as the old ones are easily made when the shingles are relaid. The manufacturers also claim that the roof is very ornamental and weighs very much less to the square than slate. They recommend it for use on roofs of one-quarter pitch and steeper. The features of this roof are such that carpenters have no difficulty in applying it when a sheet-metal worker is not at hand. The only tool necessary in laying, outside of what is contained in a carpenter's kit, is that of a pair of tinner's snips or hand shears.

The Challenge Scroll-Saw.

The very general employment of scroll-saws both in amateur work and in practical operations connected with carpentry, pattern making, model making and other departments of mechanical work lends interest to the description of any device that possesses points of excellence. In Fig. 15 we show a general view of the "Challenge" scroll-

saw, made by the Seneca Manufacturing Company, Seneca Falls, N. Y. In Figs. 15 to 20 inclusive are shown details of construction, from which our readers will be



Novelties.—Fig. 15.—The Challenge Scroll-Saw.

able to judge of the desirability of this tool for purposes of use or amusement. Among the special merits to which the makers direct attention may be mentioned the following: The saw is provided with a tilting table, held in place by a hollow ball joint through which the saw passes,

Fig. 16.

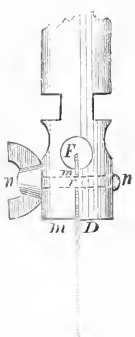


Fig. 17.

Fig. 16.—Enlarged View of Drill-Chuck.—Fig. 17.—Sectional View of Saw-Clamp.

thus making it possible to change the table to any desired position for the purpose of sawing inlaid work. How this is accomplished will be better understood by referring to

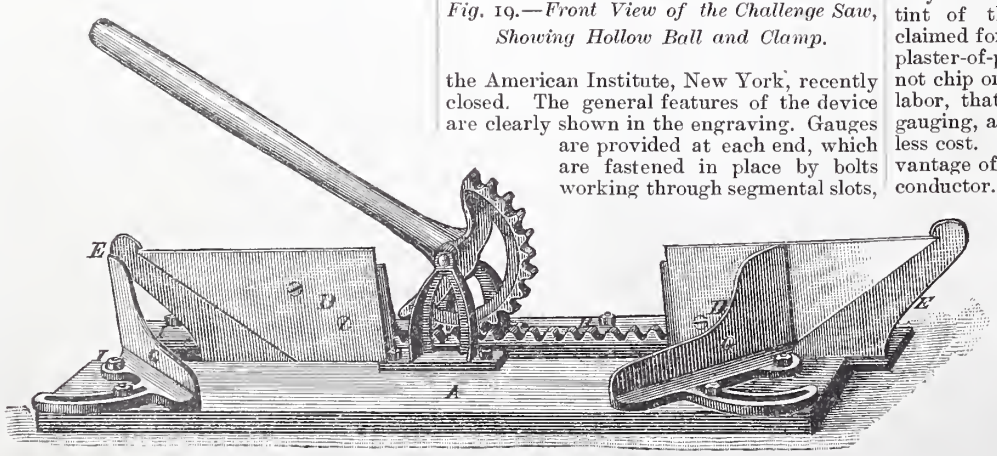


Fig. 21.—Schreppel's Adjustable Miter Planing Machine.

Figs. 19 and 20. The saw-clamp, a sectional view of which is shown in Fig. 17, is claimed to be one of the best in use, and is designed to hold firmly any width of saw from the finest up to ⅜ inch and wider. Another feature is the upright drilling attachment, indicated by M in Fig. 15. This attachment is fitted with the form of drill-chuck shown in Fig. 16, and is adapted for holding Morse twist drills, from No. 60 to 45, inclusive. Directly over the saw a dust blower is fixed, the operation of

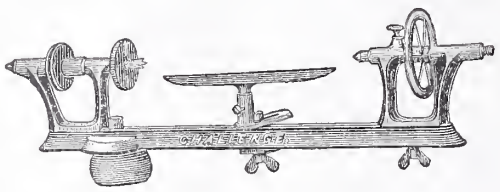


Fig. 18.—Lathe Attachment for the Challenge Saw.

which is to keep the lines of work free from sawdust. The driving-wheel is double grooved and takes a round belt ⅜ inch in diameter. In place of the table the lathe attachment shown in Fig. 18 can be used. It has a hollow ball similar to that of the table, and is attached to the machine in the same general manner. The length of the lathe bed is 18 inches, the distance between centers 11 inches, and the swing 4 inches. The rests are 4 and 8 inches in length; the head has a spindle of steel nicely fitted with a face-plate and spur-center. The Challenge scroll-saw is adapted for cutting wood 1 inch in thickness with a fair degree of rapidity. The distance between the saw and frame is 15 inches. The manufacturers offer this article as a first-class machine, suitable for every description of light scroll sawing in wood, bone, shell or metal.

Adjustable Miter Planing Machine.

In Fig. 21 we show an adjustable miter planing machine, made by Theodor Schreppel & Co., 101 Bowery, New York, a working model of which was exhibited at the fair of

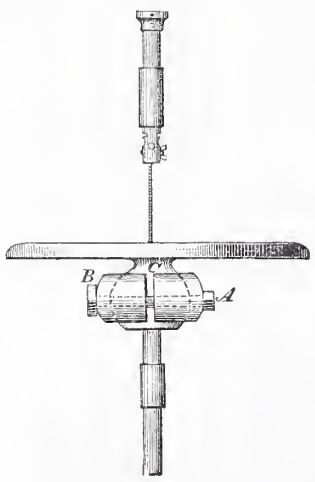


Fig. 19.—Front View of the Challenge Saw, Showing Hollow Ball and Clamp.

the American Institute, New York, recently closed. The general features of the device are clearly shown in the engraving. Gauges are provided at each end, which are fastened in place by bolts working through segmental slots, thus permitting ready adjustment. The knives are operated by a rack and pinion movement, shown in the center of the engraving, and as the slide is accurately adjusted, it causes them to work with great exactness. The manufacturers claim for this device that, the machine being entirely constructed of metal, the changes of temperature and atmosphere have no effect upon it. The facility with which it is operated does away with the necessity of the attendance of two men in order to produce good work. The employment of the lever and rack makes it possible for even a boy to use both cutters without changing his position or making unreasonable exertions. From this fact it is apparent that twice as much work can be easily performed by an unskilled mechanic with this machine as could be produced by two skilled men with devices of ordinary construction. The utility of the device in picture-frame factories, cabinet-making establishments and other places where accurately mitered work in molding is required is apparent.

Soapstone Finish.

A conspicuous feature in the recent fair of the American Institute, held in this city, was the display made by the American Soapstone Finishing Company, No. 35 Box street, Providence, R. I. This company are manufac-

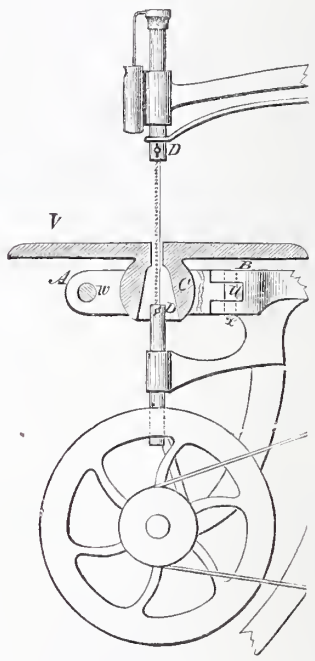


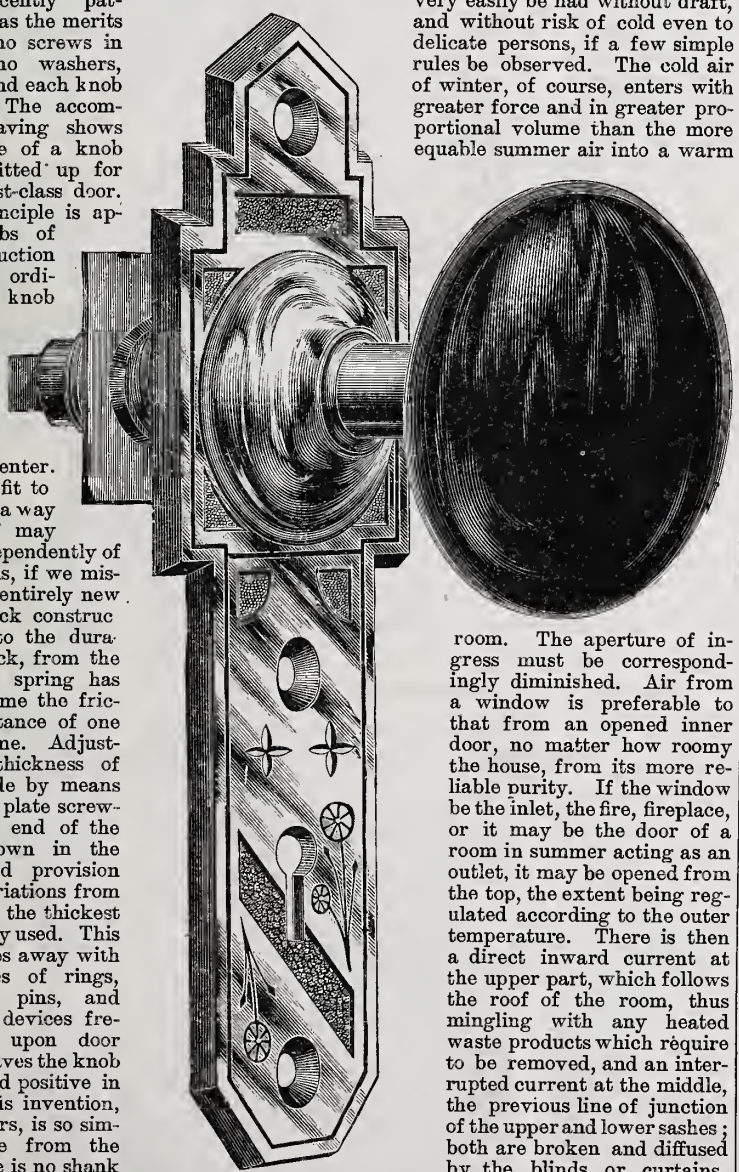
Fig. 20.—Sectional Side View of the Challenge Saw.

turers of a finish for walls made under Arroquier and Barret's patent, to which has been applied the general name of soapstone finish. In appearance walls finished with this material are not unlike a piece of soapstone, although they are somewhat lighter than the general tint of that material. The advantages claimed for the use of this substance over plaster-of-paris or sand finish are that it will not chip or crack, that it is applied with less labor, that there is no loss of material in gauging, and that it is painted or papered at less cost. The material has the further advantage of being a non-absorbent and a non-conductor. Hence, germs of disease and stains do not penetrate it. It can be washed without injury. One of the greatest advantages, it seems to us, is the appearance of the finish. It does away in a very satisfactory manner with the glaring white of ordinary finish, to which there are serious objections, and substitutes a softer tint, much more agreeable to the eye. We are assured by the manufacturers that this finish does not turn yellow by age, but instead improves in color and clearness. It is likely to be preferred by mechanics from the fact that it is less liable to injury when nailing on the finish of doors and windows than work finished with plaster-of-

paris, as commonly employed. The cost, we are informed, compares favorably with other kinds of finish in common use. In addition to the natural color, which, as we have above mentioned, is much like that of soapstone, this finish is prepared ready for use in red, blue, drab and other colors. All of these varieties have the merit of a beautiful surface, while the color retains its brightness. By their use the expense of painting walls and ceilings is avoided. As the color extends through the entire thickness, the walls do not readily show defacement. For brickwork this material makes a strong, close joint, and is unaffected by heat, exposure to the weather, or gases from chimney flues. The manufacturers recommend it for chimney tops, fireplaces, and also for laying up fire-brick. It is also recommended for pressed-brick fronts, where it makes a strong and permanent colored joint. For this purpose it is finished in red, black, brown and buff colors.

Independent Door-Knob Attachment.

The Clark Manufacturing Company, of Buffalo, N. Y., announce an independent door-knob recently patented, which has the merits of no spindle, no screws in the shank, no washers, quick action and each knob independent. The accompanying engraving shows the appearance of a knob of this kind fitted up for use upon a first-class door. The same principle is applied to knobs of cheaper construction down to the ordinary mineral knob for use with the cheapest locks. The lock hub is made of the ordinary shape, but is divided in its center. The two parts fit together in such a way that each half may be worked independently of the other. This, if we mistake not, is an entirely new departure in lock construction. It adds to the durability of the lock, from the fact that the spring has only to overcome the friction and resistance of one knob at a time. Adjustment to the thickness of the door is made by means of a threaded plate screwing on to the end of the shank, as shown in the engraving, and provision is made for variations from the thinnest to the thickest doors commonly used. This adjustment does away with the annoyances of rings, washers and pins, and other similar devices frequently used upon door fittings, and leaves the knob firmly fitted and positive in its action. This invention, like many others, is so simple that, aside from the fact that there is no shank running from one knob to the other, at first sight it appears like the ordinary article. By closer examination, however, its merits appear as we have recited them above. We understand that knobs, escutcheons and hubs are furnished in a form to be applied to ordinary locks, and that also the Clark Manufacturing Company furnish them in sets, including the lock, ready to be applied to the door.



Novelties.—Fig. 22.—Independent Door-Knob Attachment.

Fir trusses of the old part of the roof of the Basilica of St. Paul, at Rome, were framed in 816, and were sound and good in 1814, after a lapse of 1000 years. The timber work of the external domes of the Church of St. Mark, at Venice, is more than 840 years old, and is still in a good state of preservation. Souud logs are dug out of bogs where they have lain for an indefinite period. But the best seasoned timber will not withstand the effects of exposure to the weather more than 25 years unless the surface is protected by paint or some other coating to keep out the damp, or the wood is treated by some preservative process.

Window Ventilation.

The practice of window ventilation, begun in warm weather, may be carried on with proper care through autumn and winter. The constantly accumulating impurities derived from breath, from perspiration, from excreta of other kinds collected in sleeping rooms, from the use of gas or lamplight, and too often, even now, from suction of sewage gas from waste-pipes by the heat of house fires, &c., render it as necessary for health as for comfort that these should have free egress, and that they should be substituted by the pure outer air. Fresh air from without may very easily be had without draft, and without risk of cold even to delicate persons, if a few simple rules be observed. The cold air of winter, of course, enters with greater force and in greater proportional volume than the more equable summer air into a warm room. The aperture of ingress must be correspondingly diminished. Air from a window is preferable to that from an opened inner door, no matter how roomy the house, from its more reliable purity. If the window be the inlet, the fire, fireplace, or it may be the door of a room in summer acting as an outlet, it may be opened from the top, the extent being regulated according to the outer temperature. There is then a direct inward current at the upper part, which follows the roof of the room, thus mingling with any heated waste products which require to be removed, and an interrupted current at the middle, the previous line of junction of the upper and lower sashes; both are broken and diffused by the blinds or curtains. Venetians for this purpose should be turned upward. A window should never be made to ventilate by opening it from below, unless the open lower space be filled up in some way and ventilation be carried on at the middle where the sashes join—otherwise drafts are unavoidable. The ventilating pane is hardly less simple. Window ventilation is especially useful in bedrooms, and its efficiency or otherwise cannot fail to affect the vital powers of the occupant, who, in his slumbers, must trust to other energies than his own for the removal of those impurities and morbific germs which his every breath multiplies around him.

NOTES AND COMMENTS.

Our readers this month are served with some very desirable designs and details, ranging from a country chapel constructed in wood to a very elaborate brick house, and including some of the appointments of a handsome sitting-room in a first-class residence. Mr. Dimmock has presented a very neat chapel design, and one that, with very slight modifications, can be adapted to use in various sections of the country. Mr. Grodavent's design, received in our Ninth Competition, has been ready for publication for some time, but the crowded condition of our columns prevented earlier attention, and even at present we are obliged to defer publication of the details. This effort will be none the less welcome to a large circle because it is a few months late.

The conduct of architectural competitions is something in which we have long been interested. So great a fascination has the subject for us that we have often read lengthy advertisements to the end in which we had not the least interest, save in the fact that they contained the couditions under which competitive tests were to be made. As we have read the particulars in detail we have sometimes, in imagination, pictured the perplexities in which the committee of decision would find itself by the very terms in which the conditions were expressed. And then our sympathy has gone out toward the distressed judges who, in their efforts to do justice to competitors, to serve the best interests of the journal conducting the competition, and which always wants the best designs for publication regardless of small matters, and in endeavoring to please everybody, will manage, by hook or crook, to offend almost every one, and who will complete their task very much disgusted with themselves for ever undertaking the work. Such service is often worse than committee work at a country fair, where every influential farmer stands ready to enforce by vigorous means his opinion that his pumpkin is the biggest, and that his ox is the finest, and, therefore, ought to have the premiums whether or no.

We extend profound sympathy to one or two of our esteemed contemporaries who seem to be less successful in matters of this kind than we could wish to see them. In one instance, it is reported, the judges, in their wisdom, awarded the third prize in a certain contest, omitting entirely the first and second, notwithstanding the published conditions, expressly stated that the best of all received should have the first prize. The recipients of the prize which was awarded were dissatisfied, and claimed, certainly with a show of justice, that if they were entitled to anything and only one prize was awarded, they should have received the first prize. The competitors as a class were disgusted, because only one prize was awarded where they were led to expect three would be given. How the judges reached the conclusion mentioned we are not informed, but, figuratively speaking, they reached a hornet's nest, and the hornets commenced reaching for them with their business ends—in this case their tongues and pens. The complaints were loud and forcible.

Another of our contemporaries, who has had less experience in this line than it will have after a while if it continues in the example it seems to be following, is just now embarrassed in various ways. From innate modesty, or some other equally good reason, we presume, it suppressed the names of the authors of prize designs in a certain competition, and also the names of those whose efforts the judges deemed worthy of honorable mention, referring to them both on the published drawings and in the announcement of the decision by their *nom de plume*. That this course raised a buzz of disapprobation seems evident from the subsequent publication of the names in full. Another of its difficulties seems to be its inability to hold contestants (or judges) to the letter of the conditions under which the contest was instituted, especially in the item of cost. Accordingly, we are treated to the somewhat startling announcement, very gravely made, that it is possible to build $2600 houses for

$2500. The latter sum was the limit of cost stipulated, but the first prize schedule foots $2590. Since we are assured that the house can be built within the specified limit, and, as each of the individual items seems reasonable, we are forced to the conclusion that some trifling part is to be omitted. Scanning the estimate again in order to determine what it is likely to be, we find the only amounts that seem at all to fit the case are opposite the items "stairs," "doors and frames," "painting" and "architects' commission," the latter being somewhat less than the excess named. Now we know the latter cannot be avoided, for the architect, by common rumor at least, is sometimes a gentleman who draws pay from the other side if his palms get to itching too hard. So we are forced to contemplate a house unpainted, or else without doors and frames, or with ladders in place of stairs. Perhaps, after all, the house shown is not a $2500 house, but was "railroaded" through the hands of the judges, its real value not being discovered until too late to make a change.

We conclude in this number the series entitled "A Study in Suburban Architecture," so far as the text is concerned. The crowded condition of our columns compels us to defer to another issue some of the illustrations intended for this. We have no doubt all will enjoy Mrs. Archie's description of her new home, even though her husband has, unknown to her, allowed profane eyes to inspect her private correspondence. The very apt use of technical expressions upon the part of Mrs. Archie, in describing her new house to her bosom friend, demonstrates conclusively that she is in full sympathy with her husband's work, and has become so imbued with his methods and ways of thinking that perhaps, in the event of his sickness or other disability, she could continue his professional labors. It is certain she could do so to perfection, so far as talking to clients upon the merits of a given design is concerned. We are disposed to congratulate Mr. Archie upon the possession of such a delightful and useful helpmate, and to suggest at the same time that it will be just as well to have less bootmarks on the moldings and other finish of his "den" in the future. This number will reach our readers before the echoes of Christmas chimes and New Year anthems have all died away, and therefore the touch of romance and poetry with which our contributor concludes this study seems fitting.

A prominent feature among building operations in New York and other large cities at the present time is the erection of flats, apartment houses and family hotels. These names, to a certain extent, are synonymous, although in their local significance they refer to three distinct classes of houses. The most marked difference between these classes, at least to the uninitiated observer, is their relative expense and the style, not only of the buildings themselves, but also of the neighborhood in which they are erected and of the people who occupy them. At present the term "family hotel" is applied to the largest and best-appointed of these buildings. "Apartment houses" are a degree lower in both cost and social scale, while people comparatively common live in "flats." The latter are saved much humiliation by the reflection that there is still a lower level. No one with any claims to social position would live in a "tenement house." The planning of the better classes of tenement houses, flats and apartment houses is all upon the same general system. The object to be attained is the accommodation of the largest number of people in the smallest possible space. Ground is expensive. Hence the buildings of all these classes for the most part are narrow and high. Some of them are erected as investments, others upon a speculative basis, and still others upon the co-operative plan.

One of the most elaborate plans of buildings of the general character we have been describing that we have had the opportunity of examining lately is that of the Plaza Family Hotel, to be erected on the west side of Fifth avenue, this city, and extending from Fifty-eighth to Fifty-ninth street. The architect is George W. Da Cunha. The building is to be eight stories in hight, with cellar and attic. It has a frontage of 200 feet on Fifth avenue, 175 feet on Fifty-ninth street, and 125 feet on Fifty-eighth street. In the central portion of the front on Fifth avenue the main entrance is arranged, and is formed in a recess between the two principal wings of the building, affording an entrance both to the right and the left. The lower story of the principal portions of the building is devoted to office purposes, reception-rooms, general restaurant, private dining-room, kitchen, pantry, &c., and one suite of rooms. In each of the principal stories there are six suites of rooms in the front wings of the building and two in the rear wing. Referring to the principal apartments, each has a private hall communicating with the principal staircase hall and elevator; also a reception-room, salon parlors, library, chambers, dining-room and bathroom. Numerous closets are also provided; likewise a room for stores. The private hall permits communication between these rooms without the necessity of passing from one to another. An elevator or hoist is located at a convenient point for communication with the main kitchen in the principal story. From this it is evident that the cooking in this building is to be done in a wholesale manner, either upon the co-operative plan or otherwise. By the location of the building, each side facing a street and the recess formed between the two principal wings above mentioned, every room in each suite has ample light and an abundance of fresh air, advantages which very few apartment houses in this city can claim. The number of families to be accommodated can be readily estimated. There are eight suites on each of seven floors, one suite on the principal floor of the main building and two suites on the principal floor of the rear building, making in all 59 suites. Each of these, it may be safely estimated, will rent annually for a sum that would build a comfortable house in some of the smaller towns of the country. The latter, however, would not be fashionable, and would lack some of the conveniences and elegancies that are considered absolutely necessary in modern city life.

Those who are accustomed to living in detached houses in city or country, sufficiently removed from neighbors to feel under no restraint on their account, would perhaps be very loath to be hived in a building of this kind, however complete its appointments, and however elegant the style of living. It is certain that the independence of life in a separate house is largely sacrificed, and there is left very little of the old-fashioned home feeling. The objections to such a plan of living become even more forcible when the cheaper houses of the same general class are considered, and the lot of mechanics and laborers in the great city who are obliged to live in tenement houses is in many instances pitiable. To live in flats or apartment houses is unavoidable by a very large class in this and neighboring cities who are in moderate circumstances, because separate houses cannot be afforded. There is then presented in the construction of these buildings two general problems—that of providing elegant accommodations for those who live in the manner named from choice and in order to avoid the cares of common housekeeping and the responsibilities of maintaining a separate establishment, and who do not heed the cost, but rather fancy high figures, and that of providing shelter at minimum cost for families whose purse is such as to make them consider every dollar of expenditure. Of course, the speculator steps in and makes his profit out of both classes, so that it is seldom that either of them pay rent on a fair cost valuation.

Our department of "Novelties" in this issue is quite exteuded. It is none the less interesting because unusual prominence is given to wood-working machinery. Lumber is gradually advancing in cost. Hence those devices which are the most economical, both in amount of waste and also in amount of labor required for their operation and management, are of the greatest interest. Every improvement brought out by machine builders is of importance to a large class in every community. Safety devices for reducing the danger attendant upon the use of wood-working machines are always of interest to those who are employed in sawmills, planing mills and other establishments. Amateurs feel a lively interest in every device that is produced for their amusement or for facilitating their work. Novelties in building hardware are always in order, while improvements in roof coverings are of special importance both to those who erect buildings and those who live in them. It is such things as these that find places among our "Novelties" this month.

Our correspondence department this month is more than usually full of important topics, many of which are very intelligently discussed by practical men. A question from one of our readers about a reliable price list of building costs affords us the opportunity of a somewhat lengthy reply on the subject of intelligent estimating. We have not by any means exhausted the topic, and we shall be pleased to see the discussion of it continued by our readers. Another correspondent furnishes an interesting chapter on the subject of estimating, showing how, for his own convenience, he has formulated a list adapted for pricing materials by the square. No doubt what he has presented will call out similar plans from other readers, as well as a general discussion of the merits of the plan.

Among the miscellaneous articles contained in this number is another chapter on the water supply for country dwellings, and the second installment of lathe construction. In the latter, directions are given for building the frame and bed of the machine under consideration. "Country Plumber," in his article on water supply for country dwellings, gives special directions for calculating the capacity for storage cisterns under given conditions. Both articles, as well as others not specially mentioned, are written by practical men, and deservedly command marked attention.

It has been a mystery to some people why the dark wood so highly prized for furniture should be called "rosewood." Its color certainly does not look much like a rose, so we must look for some other reason. An exchange explains that when the tree is first cut the fresh wood possesses a very strong, rose-like fragrance; hence the name. There are a half-dozen or more kinds of rosewood trees. The varieties are found in South America and in the East Indies and neighboring islands. Sometimes the trees grow so large that planks 4 feet broad and 10 feet in length can be cut from them. These broad planks are principally used to make the tops of piano-fortes. When growing in the forest the tree is remarkable for its beauty, but such is its value in manufacturing as an ornamental wood that some of the forests where it once grew abundantly now have scarcely a single specimen.

Veneer Making.

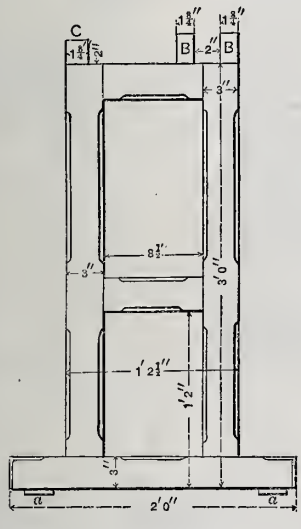
In an article on the subject of veneers, the *Northwestern Lumberman* gives some interesting facts. Straight grained and moderately soft woods are sliced off a log by a weighted knife with a drawing cut, the log being 10 feet long and the veneers varying from $\frac{1}{8}$ inch to $\frac{1}{40}$ inch in thickness, the width corresponding, of course, to the diameter of the log. A knife machine which gives a half-rotary movement to a semi-cylindrical turned log, allowing a veneer to be cut following the log's diameter, produces wide veneers from logs of small diameters. But while the knife has opened up new possibilities in veneer manufacture, the saw has by no means been abandoned; such woods as ebony and lignum-vitæ cannot be cut with a knife, while finely figured and consequently close-grained mahogany, and some rosewoods, are difficult to cut. The saw, therefore, has its place. Such saws must be very thin, and so finely adjusted that hardly the slightest variation will occur in the thickness of the veneers turned out. While a nicely

arranged circular saw will turn out boards varying the twentieth part of an inch, which would be imperceptible, such a lack of uniformity in thin sheets would prove a damaging imperfection. Before being cut the veneer material must be carefully steamed, the same as in bending. A tight box 12 feet long and 4 feet deep and wide is used, and exhaust steam is utilized. An ordinary wood like black walnut, which has an open grain, will steam sufficiently in six hours, but the close-grained South American woods require 36 hours. Mahogany will steam sufficiently in 24 hours. Mahogany, tulip, and rosewood, being hard to cut, require more and careful steaming and a knife in the best condition. The veneers wrinkle when laid together, but straighten out readily when glued properly to a body. Veneers will dry in the air in about 12 hours, but are not kiln-dried, although the latter method is used for lumber out of which veneers are to be made.

Construction of a Lathe.—II.

THE FRAMEWORK.

Now, our patterns being at the founder's, we will take advantage of the opportunity thus afforded to make the standards and bed.



Construction of a Lathe.—Fig. 10.—*End Elevation of Frame.—Scale, ¾ Inch to the Foot.*

With reference to the choice of wood for the bed, a word or two will not be out of place here. An iron bed suitable for a lathe of this size would, when cast and planed, cost perhaps $12 or $15—a considerable item. It may, certainly, by a vast expenditure of precious time, be filed up truly, in which case the only outlay incurred is the price of the rough casting and the necessary files. But for the ordinary run of home work a wooden bed is quite as useful as an iron one, and the lathe we are describing is very much superior to the average specimens of such wood-turners' lathes. For wood-turning alone it is suited admirably, and it is also, if properly made, rigid enough to permit of the use of a slide-rest in light metal-work. But if an iron bed should in some cases be deemed more desirable, it might even then be preferable to make a wooden bed in the first place, and at some subsequent period to transfer the poppets to the metal bed, for which they are equally well adapted; the gratification of using the lathe would not be so long delayed, and the filing of the iron bed could proceed at leisure intervals.

The most suitable woods to be employed, considering availability, are hard pine for the standards, and oak for the bed. The former it will be well to have quarter-sawed. Two 14-foot lengths of 3 x 2 inches quartering, quite sound, will be required for the standards. The oak, so small in quantity, had better be bought at a carpenter's shop, instead of at a timber yard, in order to secure a bit of old stuff; for oak, if not thoroughly seasoned, will become warped very badly after a few months' exposure of the grain. For the standards we require two frames like Fig. 10. Prepare four pieces (two for each frame) finished to 3 feet by 3 x 2 inches, Fig. 11, A A for the sides. Two pieces, 2 feet by 3 x 2 inches, B for the bottom. Four pieces, 1 foot 2½ inches by 3 x 2 inches, C C for the cross-bars. Mark and cut mortises and tenons to dimensions indicated (Fig. 11).

Shall we presume that all who read this article know exactly how to make mortise and tenon joints? Scarcely so, perhaps.

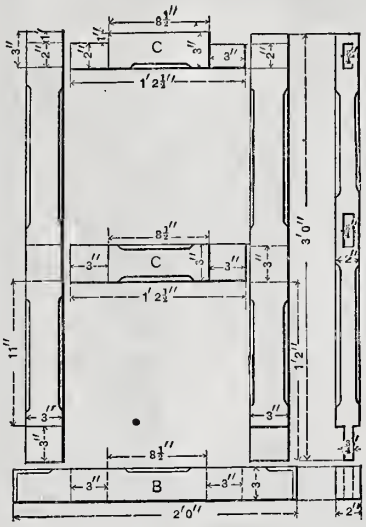


Fig. 11.—*Construction of Standards and Sides.—Scale, ¾ inch to the Foot.*

Mortises and tenons, then, are marked with a mortise gauge—that is, a gauge having two cutters instead of one only, as in the ordinary marking gauge, the lower cutter of the two, as well as the head, being capable of adjustment independently of each other. The amount of separation of the two cutters being adjusted to the required thickness of the tenon, the head of the gauge is set in such a position that, on being slid along the

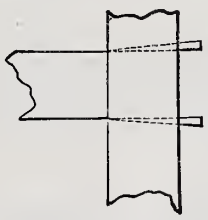


Fig. 12.—*Wedging Up the Joints.*

edge of the wood, the tenon is marked at its proper distance from the face. The same gauge is used for the mortise also. Here our tenons will be ¾ inch thick, and in the center of the stuff. So the cutters will be set to ¾ inch by the screw at the end of the stem, and the face of the head ⅝ inch away from the nearest cutter. If we do not possess a mortise gauge we must use a marking gauge instead, and take a little more time over the job. In either case, mark the

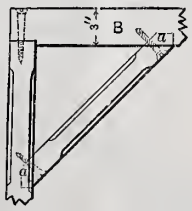


Fig. 13.—*Corner Bracing.*

tenons, and cut down their faces, keeping just a shade outside the lines with a fine hand-saw or panel-saw, shouldering them neatly, and square with a tenon-saw. Mark the mortises on both sides of the stuff, and cut them through with a mortise chisel just the width of the mortise, ¾ inch, using a mallet in the operation. The ends of the mortises will not be cut quite square, but, say, ¼ inch wider on the outside than on the inner side, where the tenon first enters. This is to allow of wedging up (Fig. 12).

The tenons of the top bar, Fig. 11, C C, will be shouldered back on their upper edges, to leave wood at the ends of the vertical rails. The vertical rails should be left a couple of inches longer in that direction, without which precaution they are liable to burst with the driving in of the tenon. The ends are cut off flush when the glue is dry. Chamfer the edges, as shown, to give lightness of appearance, gauging or marking with a pencil the parallel lines, and cutting with chisel when close to the ends, and with small thumb-plane where there is room to use it. Having now all the bars tenoned and mortised respectively, we just try them together to be certain there is no hitch anywhere, and then proceed to glue. Prepare a couple of dozen wedges, 4 x ¾ x ¼ inches at the thick end. Joint up quickly—first, the two cross-bars into one vertical rail, then the other vertical rail on their opposite ends, and, lastly, the vertical rails into the bottom, wedging up as we go, before the glue has time to set. If, unfortunately, you have not made a good fit of the tenons, it will be well to drive a wooden peg through the joints; but if the parts fit tightly together, pegging is not necessary.

When the frames are set, dress off all the joints flush, and try the two together, to be assured that top and bottom edges are in winding with one another—*i.e.*, correspondingly parallel. Plane up two strips, 4 feet by 2 x ¾ inches, and screw them underneath the standards, to maintain them at a fixed distance apart on the floor, Fig. 10, *a a*. Then plane over the cheeks for the bed

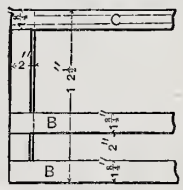


Fig. 14.—*Partial Top View.—Scale, ¾ Inch to the Foot.*

as accurately as possible—straight—parallel, and with the faces mutually at right angles—to 4 feet by 3 x 1¾ inches (Figs. 10 and 14, B B). Rebate them back at each end (Fig. 13) and screw them upon standards, just droppping a couple of distance pieces 2 inches thick between, to insure their parallelism. These pieces will not be permanent.

A rail is wanted on the back, 4 feet by 2 x 1¾ inches (Figs. 10 and 14, C) to support the back of the tool board and to keep the hinder part of the standards parallel. Then two struts or diagonals (Fig. 13, A) must be fitted. Two pieces, 18 inches by 2 inches by 1 inch, with ends cut to an angle of 45°. Stump tenons (Fig. 13, *a. a*) will be cut on the ends, and corresponding mortises on the under side of the back rail and in the standards. One end only of each diagonal can be fixed at first. Let that be the end attached to the standard. While both diagonals are thus fixed, bring the back rail down on the free ends, and secure with a stout screw, in addition to the glued and mortised joint. The tool board and rack would only be in the way if we made them now and as our castings have come home from the founder. So we shall prefer to leave the remaining odds and ends of woodwork for the present and commence fitting-up.

The cost of the material in the frame is somewhat difficult to estimate, as prices differ in various sections. The piece of oak may cost nothing or it may be very expensive, depending upon circumstances, but $2 or $2.50 will probably be sufficient for this part.

A clock was set going at Brussels which continued to go for nine months and is reported to be still running. An up-draft obtained in a shaft by exposure to the sun turns a fan which winds up the weight of the clock until it reaches the top. It then works a brake which stops the fan until the weight has gone down a little, when the fan is free to recommence.

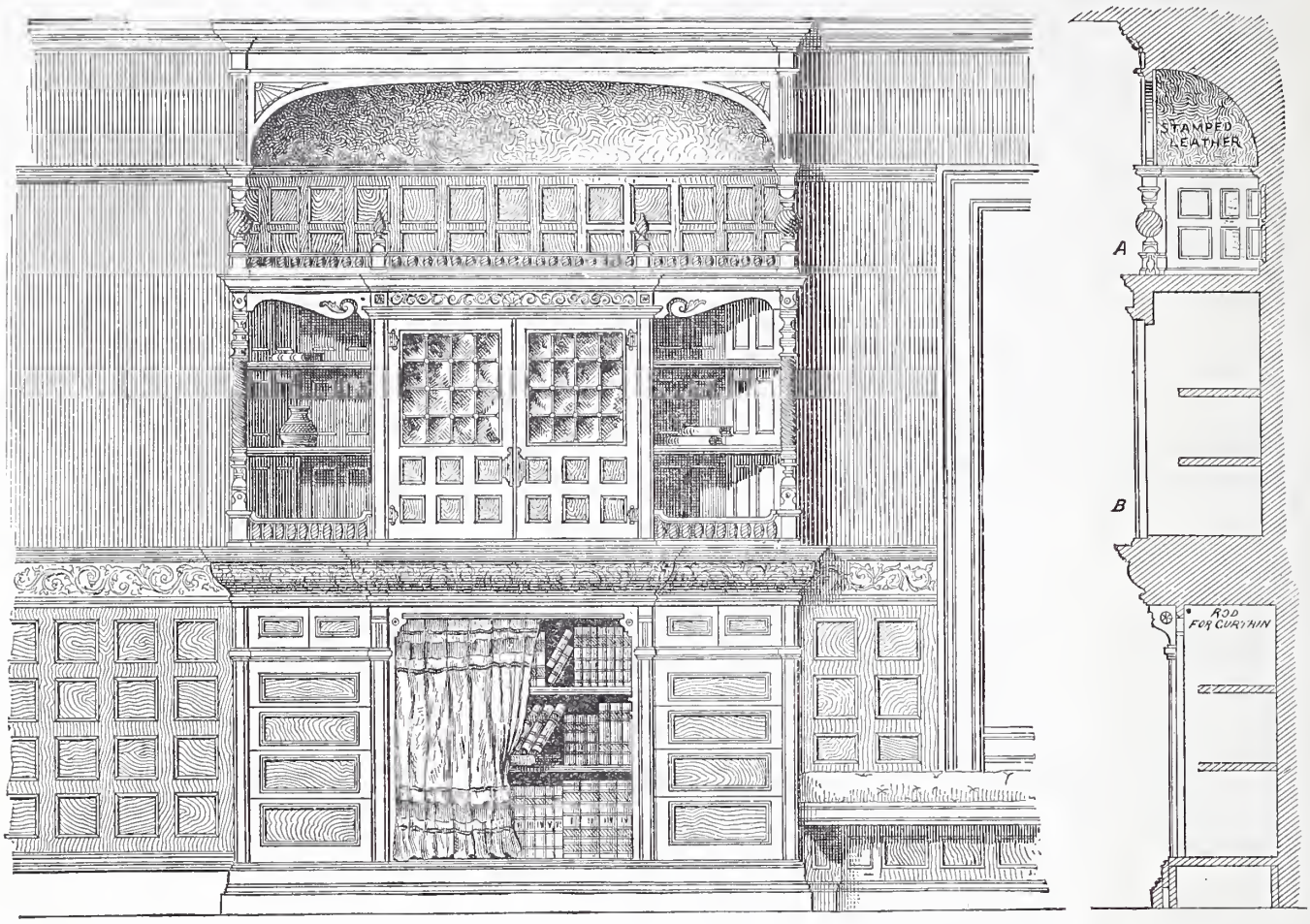
A Study in Suburban Architecture.*

BY AN ARCHITECT.

The Completion.

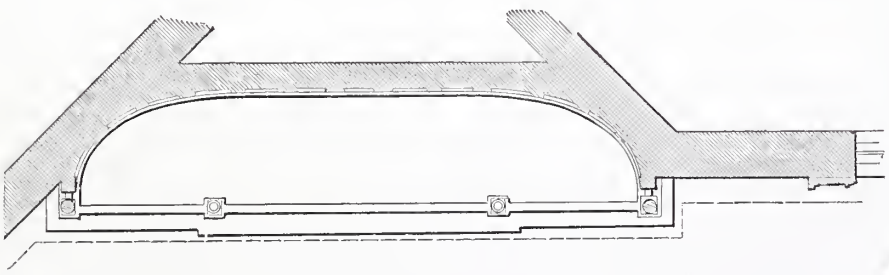
"I see," said the Doctor, you didn't follow my advice about the gravel roof, after all. Well, perhaps you are right. The flat roof would have made a bad sky line, and wouldn't have been particularly effective for color. Of course, you like it all, and I'm glad you had your own way about it; but it does cost to have your own way—now, don't it?" This last shot was delivered over his shoulder as he drove off. And so at last our house has gradually come to be called finished. The exterior has received its last coat of paint, and shines (a little too much, perhaps) with newness. The entire first story and the trimmings of the house are painted a rich bronze green. The shingles are stained and oiled a warm pumpkin color. The sashes are black, and some of the gables are treated with rough-cast in old-gold color, spattered with pebbles of various sizes and colors picked up on the shore. The roof shingles are stained a dark red.

On this snowy December night a year since we looked among the drawings in our portfolio for suggestions. We now find ourselves comfortably seated before an open fire in the upper hall. We have been talking, Mrs. Archie and I, of our neighbor, who for some months has been traveling in Europe, with the avowed determination of returning at last and building a house which shall just "lift the pins." Mrs. Archie has just concluded a letter to her, descriptive of the latest in our little history of house-building, in about the following style:



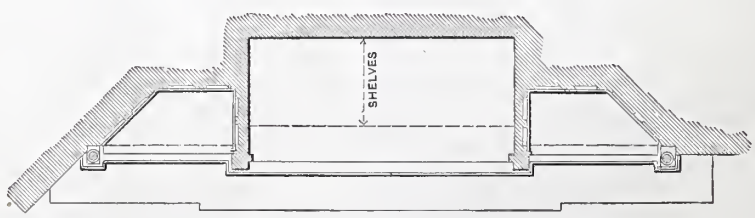
A Study in Suburban Architecture.—Elevation and Section of Cabinet in Sitting-Room.—Scale, ½ Inch to the Foot.

"Yes, dear Fanny, we are in at last, and it is just too lovely for anything! Of course, you have been well informed all along of the general character and treatment of our rooms, especially the more important ones; but you must know that there are no end of little beauties scattered about our new domain that cannot be half imagined, and which, I must admit, I am somewhat at a loss to describe. The open fire, before which I now sit, is framed with a triple row of golden Chelsea tiles on the side, and one row across the top. Above this and immediately under the mantel-shelf is a row of hand-painted tile done by Archie's sister, representing some of the scenes in the opera of 'Patience,' most conspicuous of which is one plainly setting forth that Grosvenor, beautiful as he is, will have Patience. This room, or hall, as we call it, is all done in white pine and painted a dull red. The over-mantel has a few slight shelves for a jug or two. Below the chair-rail we have used Lincrusta in a natural dark leather color; above the rail a simple paper hanging of yellow olive. For a frieze a small geometrical tangle of gilt lines and circles on a yellow ground is employed, the same being carried out on the ceiling part way as a stile for the ceiling, which is a light buff. Archie's studio, which opens from this hall, beggars description. It is finished in shellaced pine, has straw matting for a dado, anise bagging for a frieze, and a shelf for a chair-rail, which, by the way, swells around the room to the measure of a dozen different widths, according to the different degrees of bulk and breadth assumed by the various jugs, casts, placques, shields, pipes, tobacco, &c., which are placed here and there in most delightful confusion. Need I add that there are already sundry marks of boot-heels on this same shelf, which I dare not speak of to the owner of the heels, it probably being a part of the decoration. At all events, the room has, I must say, a charming aspect of neat disorder.



Plan of Cabinet at A.—Scale, ½ Inch to the Foot.

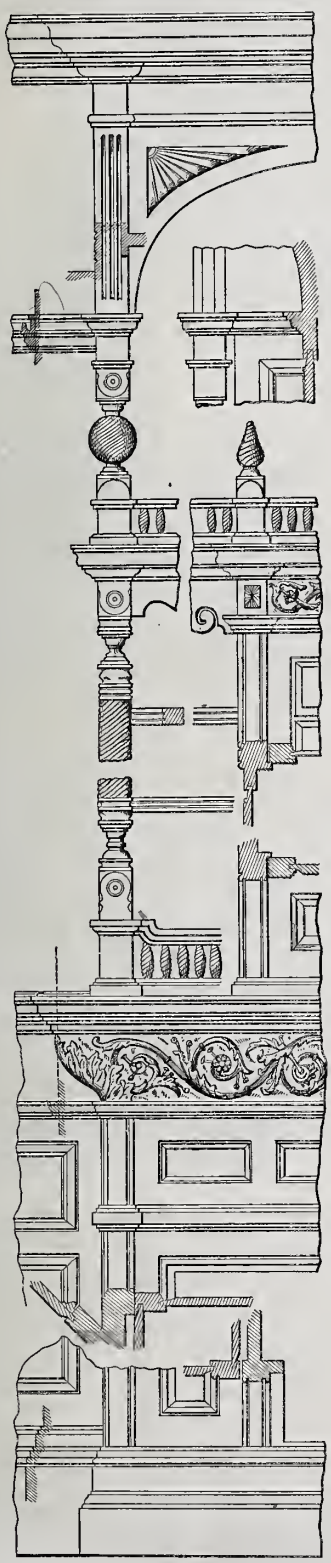
"The mantel in the first-story hall has a somewhat similar arrangement of tile to that I have just now described, and a slight projecting marble shelf above. There is no wooden shelf of any considerable projection, however until a hight about even with the



Plan of Cabinet at B.—Scale, ½ Inch to the Foot.

*The illustrations in this series of papers are from drawings prepared by Messrs. Gould & Angell, architects, of Providence, R. I.

head is reached. Here a shelf is inclosed with a row of small balusters. The intervening space between this and the slight marble shelf is occupied by a small mirror surrounded by small panels in wood. Designs have been made for all the mantels* throughout the house, but the one most needing a special mention is the one in the chamber over the library. Here the chimney came near the corner, and a nice effect is produced by introducing a few corner shelves. The

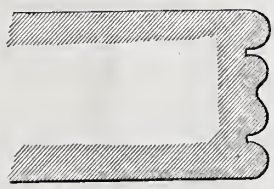


A Study in Suburban Architecture.—Details of Cabinet.—Scale, 1 Inch to the Foot.

field above the mantel-shelf is framed in with a small band of wood, and the panel thus formed is covered with a rich small-figured paper. A sconce mirror in the center of the panel adds greatly to the effect.

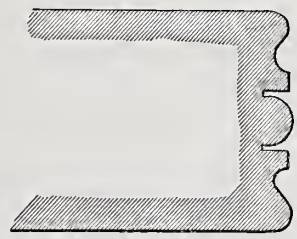
"The most ambitious piece of furniture we have, however, is a corner cabinet in our sitting-room. It is built in three stages. The first, coming even with the top of the wainscot, is provided with a space for books in the center and a row of drawers at either side. The second stage, occupying the hight from the wainscot to the picture molding, is occupied in the center by a locker with clear glass door panels in lead sash. At each side are shelves for rare specimens of bronzes, china, &c. The third and last stage completes the hight of room, and has a broad shelf at the base, and a curved recess at the back, which is decorated in gold and silver bronze. The whole is executed in cherry, and stained to match the color of the other wood work in the room. Last, but not least, let me commend to you the arrangement of our working corner of the kitchen, with its liberal counter, with cupboards and drawers below and the overhanging inclosed shelving above"

Mrs. Archie has finished her letter, and we turn down the lights and sit before the hearth for a long time in silence, while our shadows perform a wierd dance upon the



Edge of Lower Shelf, Full Size.

ceiling, keeping time to the fitful flashes of the fast-waning fire. One by one the flames burn themselves out, and the shadows dance more quietly upon the walls or rest in the dim corners, and a calm, quiet happiness falls upon our hearts. At length the old clock on the stairs measures twelve clear and solemn strokes and it is morning. Hand in hand we go to the southern window and gaze upon the lights of the distant city, twinkling in the winter air; then to the study window where the north star is shining. The storm has passed away, the air is clear and crisp.



Edge of Upper Shelf, Full Size.

Softly stealing up from the old rectory comes the sound of a chorus of voices—they are singing a Christmas carol!

TRADE PUBLICATIONS.

Corrugated Iron.

The increasing use of corrugated iron for various purposes offers the opportunity for firms making a specialty of the preparation of iron in this shape to do a large business. One of the handsomest exhibits of corrugated iron which we have had the pleasure of examining in a long time was that made by the Cincinnati Corrugating Company at the recent exposition held in that city. We have since received a catalogue and pamphlet issued by this concern, descriptive of the work that it is prepared to produce. It is a handsome oblong book, with a tasteful cover, fine paper and handsome letter-press. A red-line border graces every page. The advantages of corrugated iron are first briefly recounted, after which illustrations of the different classes of work made and the different applications of corrugated iron are given. Referring to the general quality of the work turned out by them, they make the statement that to build up their business to its present proportions they have been compelled to raise the standard of its manufacture to the highest perfection in quality of both metal and workmanship. This was fully borne out by the goods shown at the exposition above referred to. They firmly state that they are endeavoring to popularize corrugated iron on its merits, by selling it for general use at prices competing with other kinds of metallic roofing. With reference to the advantages to be derived from the employment of corrugated iron, the statement is made that it will not rattle from expansion and contraction or the effects of the wind; nor is it liable to sag and buckle, causing it to present ugly patches where dust and water settle, as is common to plain iron. Among the illustrations simple sheets are shown; also, curved sheets for use between iron beams in fireproof construction. A prominent specialty with this company is ridge-capping not unlike that long made by cornice manufacturers for use in connection with slate roofing. This, by means of special wooden ridge pieces, is made to finish corrugated roofs very neatly. Taking the pamphlet as a whole, it is one of the best expositions of the advantages of corrugated iron which we have ever seen.

Wood-Working Machinery

A catalogue issued by P. Pryibil, Nos. 461 to 467 West Fortieth street, New York, contains, among other tools of interest to those who are about to equip shops, the design and description of an adjustable bevel band-saw machine. This is a right-hand machine, designed to avoid the instability of inclined tables supported by segments, pivots, &c. The saw is inclined and the table simultaneously set to correspond with the inclination by turning a single hand-wheel. When a varying bevel is desired on work it can be easily produced by turning the hand-wheel while the work is being fed to the saw. Another new machine is an improved form of planer made in two sizes, 26 and 32 inch—a very powerful machine, geared, with double feed rolls, 4 inches in diameter, and capable of a ¾-inch cut. It is adjustable to different thicknesses of stuff by a single hand-wheel. The pamphlet also contains designs and descriptions of other sawing machines and planers, also jointing machines, shaping and molding machines, carving machines, boring and mortising machines, turning lathes, &c. Useful information with reference to joining band-saw blades, calculating speeds, determining the driving power of belts, &c., is interspersed among the catalogue matter, thus making the pamphlet useful to all who may possess it.

Messrs. J. S. Graham & Co., of Rochester, N. Y., have sent us their illustrated catalogue of wood-working machinery, which contains a number of illustrations and descriptions that are of interest to builders, planing-mill operators and others. In addition to the catalogue information contained in this pamphlet, there are some chapters of advice to owners and operators of wood-working machinery, rules for ascertaining the speed of pulleys and other matter of a similar character, making the book of more value than an ordinary catalogue. The plates representing the machines manufactured by this company are, for the most part, so large as to require folding. The machines and tools are shown by very handsome specimens of the wood engraver's art, and are a satisfaction to examine. Among the articles shown may be mentioned planing and matching machines, pony planers, hand or box-board matching machines, automatic knife grinder, resawing machines, saw tables, variety molders, wood-turning lathes, four-sided molders, power mortisers, sash-tenoning machines, band saws, scroll saws, &c.

Roofing Materials.

The Warren Ehret Roofing Company, Limited, No. 107 South Second street, Philadelphia, Pa., send us a neat 12-page pamphlet containing a descriptive list of the roofing materials in which the company deal. These embrace various grades of building papers, coal tar and coal-tar products for rendering the paper water-proof.

* Owing to the crowded condition of our columns, we are obliged to defer until another issue the publication of some of the designs to which Mrs. Archie refers. They will be none the less useful by a month's delay.—[*Editor*.

CORRESPONDENCE.

Notes on Plaster.

From J. McG., *Kalamazoo, Mich.*—I would say to S. H. P., in response to a letter published about a year since, that I think the outside walls, plastered in the way he mentioned, would stand the weather, provided the framework is built in such a manner that it would not cause the plastering to crack. Care should be taken that the water does not get behind the walls where the plaster joins with the woodwork. Some correspondents in Des Moines, Iowa, and Wakefield, Mass., some time since asked for information in regard to paper as a substitute for plaster in finishing buildings. I call attention to the following extract from "Reed's House Plans": "Many efforts have have been made to devise something cheaper than plastering for the inside lining of walls, but no substitute has yet been found to equal it in cheapness or durability. Plastering, as usually prepared and applied, conduces to the healthfulness of any apartment, emits no odor of moldiness, has no attraction or harbor for vermin, is impervious to air and a non-conductor of sound. Where linings of thin wood paper are used, it is necessary to deafen the partitions and ceilings, otherwise they will be noisy. Sound made in any one part will reverberate through the house with drum-like suggestiveness. Most of such materials absorb moisture rapidly from the atmosphere, and when at any distance from the house fires, so as not to be warmed and dried, the moisture is retained in them. This is especially the case in chambers and closets. Rather than seek a substitute for plastering is better to extend its use."

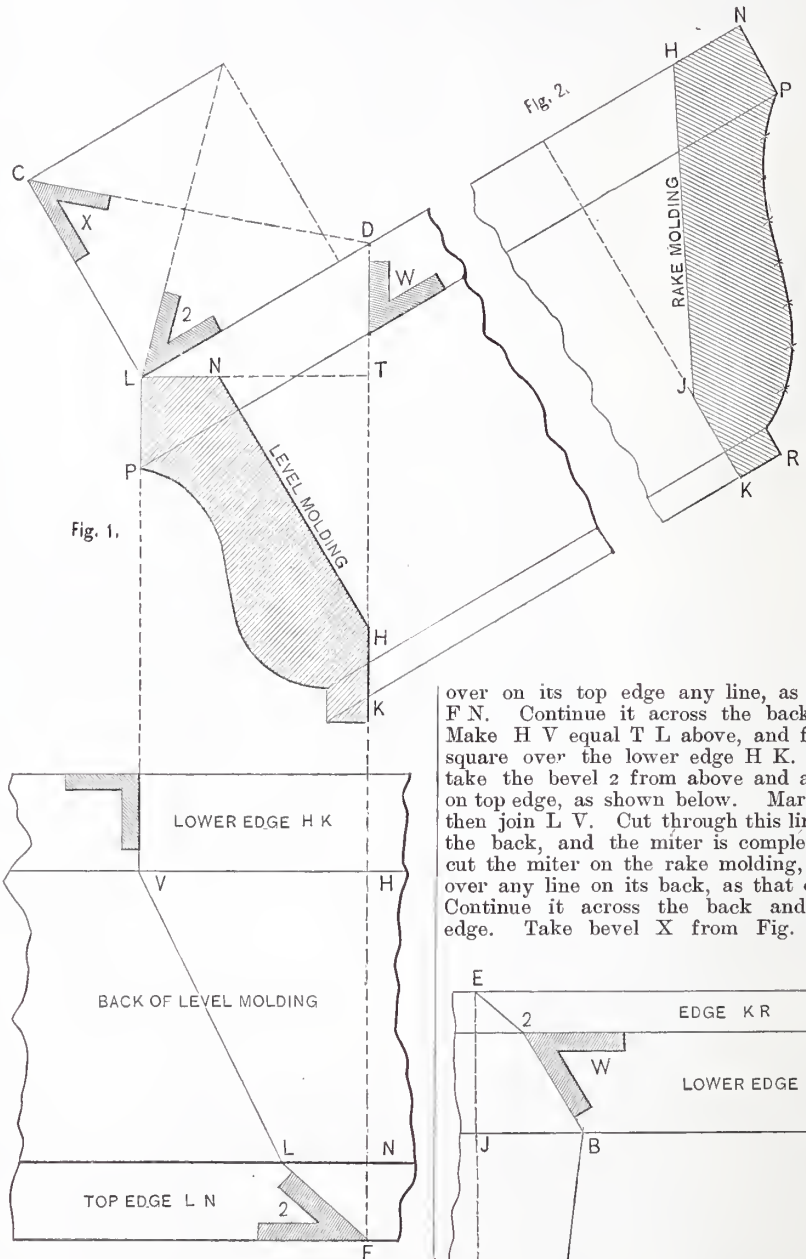
There is an important point which is not mentioned in the above extract—that is, the fire-proof qualities of plastering. In such winter weather as we frequently have in this country, I do not see how a person could take any comfort in a house composed entirely of pine lumber and straw paper. It would certainly be no more than a tinder box, liable to take fire at any time from the heat of a stove. When once on fire, it would be impossible to save anything but the cellar. I think people would not willingly pay money for such buildings, which not only risk the investment, but also the lives of the occupants.

From C. M., *Lock Haven, Pa.*—Several communications have been published on the subject of the best condition of lath for plastering. Referring specially to the letter from S. K. F., published in the January number, 1883, I would say that, while I agree with him that plasterers prefer putting on dry lath, I do not agree with him that wet lath are the best. My experience of 39 years as a plasterer is that dry lath do not absorb the water too speedily, but rather assist greatly in absorbing the moisture which would otherwise deposit in the kiln, dried flooring, jamming, &c., making always a more substantial job of plastering. In a repair job, I take the brush and sprinkle water and brush the surface of the lath. The object is not to wet the lath, but to lay or remove the dry, loose sand on the surface of the old lath.

I noticed another article in the same journal from E. M. H., on the cause of plastering cracking. There is a practice among plasterers of limited experience of putting on their first coat very light. The second coat, therefore, is naturally the heaviest. It should be the reverse. A heavy first coat, scored or scratched, if you please, never will separate, where a first coat light and not scored will crack and separate, and be prepared for plenty of patching in the near future. It is argued by this class of plasterers that it weakens the first coat to score. This is true, because they do not put mortar enough on to score, but, instead, merely skin on a first coat. When the second coat is being put on the water will strike clear through to the clinch and will seriously affect the first coat, which should be the solid foundation to the plastering. It is no wonder plastering executed in this modern style will crack, separate and fall. I also disagree with this correspondent that to put on mortar in the winter is the best time, leaving the hard finish to be put on the following spring. I find by giving plastering a good, strong clinch, using plenty of hair-coating, heavy scoring, letting stand until thoroughly dry, then putting on second coat, letting it get thoroughly dry, then hard finishing, I can always do the best work in the absence of frost, freezing or artificial heat.

Raking and Level Moldings.

From F. H., *Albany, N. Y.*—Referring to the question of A. M. F., of Tilden, Tex., to miter rake and level moldings of like dimensions is an impossibility. It cannot be done, and any one who undertakes to do it will discover that he has attempted a problem equal to the invention of perpetual motion or the discovery of a literal north pole. The profile of one or the other of the moldings must be modified. In the accompanying diagrams, I show a simple method for performing this sort of work, which may be of interest to the readers of the paper. It may not be generally known that if a level molding is cut to a miter, the extreme parts of the miter, when in a certain position, will give the exact form of a raking molding, and that it will intersect a miter correctly with that of a level molding. To accomplish this, continue the level piece of molding which has been mitered. Lay its flat surface on the drawing-board and make its point P in Fig. 1 stand opposite the point P in Fig. 2. Keep the outer edge fair with the line N L. The piece being in this position, take a marker and hold it plumb against the miter and prick off any number of points, as shown, through which trace the curved line, and the result is a correct pattern by which the rake molding is worked. This simple method gives the exact form of any rake molding to intersect with one on the level. To cut the miters without a box, take, for example, the back of the level molding and square over on its top edge any line, as that of F N. Continue it across the back to H. Make H V equal T L above, and from V square over the lower edge H K. Now, take the bevel 2 from above and apply it on top edge, as shown below. Mark F L; then join L V. Cut through this line from the back, and the miter is complete. To cut the miter on the rake molding, square over any line on its back, as that of H J. Continue it across the back and lower edge. Take bevel X from Fig. 1 and apply it in Fig. 3, on the top edge, and mark D A. For the same bevel apply it on the small square at E and mark E 2. We next want the plumb cut on lower edge, J K, and the same cut on front edge, N P, shown at Fig. 2. Take the bevel W at the top in Fig. 1 and apply it as shown in Fig. 3. Mark 2 B. Join B A. This done, apply



Raking and Level Moldings.—Figs. 1 and 2. —Developing the Form of a Rake Molding Required to Miter with a Given Level Molding, and Cutting the Miter on the Level Molding.

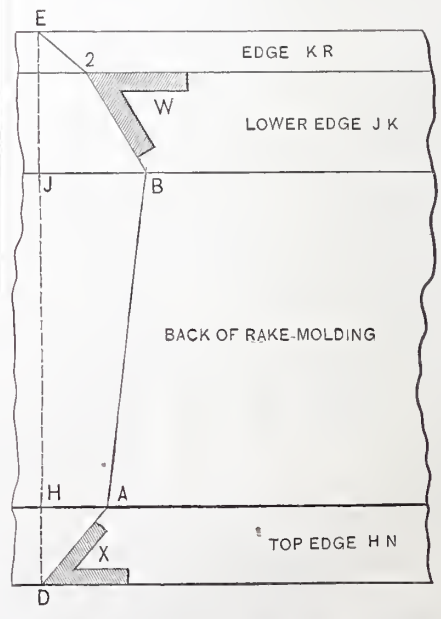
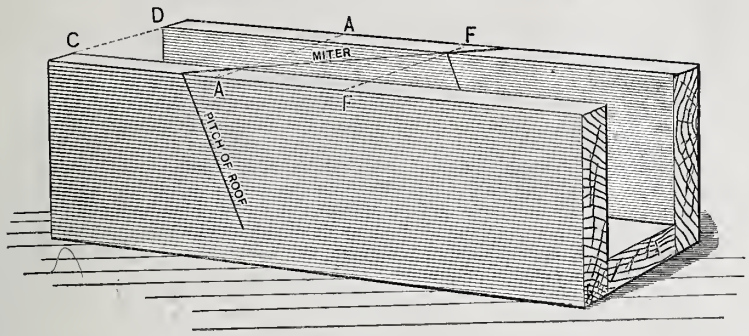


Fig. 3.—Cutting the Miter and the Rake Molding.

the same bevel on front edge, N P, and mark the plumb cut, the latter being parallel with that of 2 B in this case, K J in Fig. 2. Now, cut through the lines on the back and the miter is complete.

From J. B. G., *Louisville, Ky.*—In reply to an inquiry of A. M. F., published in the issue of January, 1883, I inclose a sketch of the method I have used in cutting the rake and level moldings of any corresponding dimensions. Instead of cutting molding even on the plumb cut, I substitute the true



Raking and Level Moldings.—Fig. 4.—*The Miter Box With Cuts as Arranged by J. B. G.*

miter. This answers in all ordinary work whenever it is not convenient to change the mold to suit. My sketch shows a method of getting the cuts for the rake moldings. Referring to Fig. 5, draw the line D D, from which erect A B equal to the pitch of the roof. Draw C B at right angles with A B, making the length of C B suit the inside of the miter box which is to be used for cutting the molding. Draw C F parallel to A B; then A F will be the cut across the box. Transfer A F to the miter box, as shown in

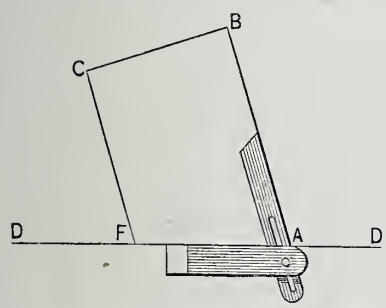


Fig. 5.—*Establishing the Angle.—Method Described by J. B. G.*

Fig. 4. Applying the square to the points A F on the edge of the box, draw the line A F, as shown, using the pitch of the roof to suit the cuts.

From J. M., *Marianna, Ark.*—Referring to a question proposed some time since by A. M. F. about mitering raking and level moldings together, I would say that the thing cannot be done where the ends of the rafters are cut plumb unless the mold is worked specially for the purpose. My method of construction in work of this kind is to cut the rafters square, in which case an ordinary square miter answers the purpose.

Bronzing Castings.

From A. G. W., *Buffalo, N. Y.*—I desire to obtain, through *Carpentry and Building*, a recipe for bronzing articles of cast iron.

Answer.—The following has been recommended for the purpose: Dip the articles in a bath composed of hydrochloric acid, 6 pounds; sulphate of iron, half a pound; white arsenic, half a pound, until black. Then wash in hot water. Dry in sawdust, polish to suit with plumbago, and brush and lacquer. The following is recommended in Spohn's "Workshop Receipts:" Take 1 pint of methylated finish, add 4 ounces of shellac and ½ ounce of benzoin; put the bottle in a warm place, shaking it occasionally. When the gum is dissolved, let it stand in a cool place two or three days to settle, then gently pour off the clean mixture into another bottle, cork it well, and keep it for finest work. The sediment left in the first bottle, by adding a sufficient quantity of spirits to make it workable, will do for the first coat or coarser work, when strained through a fine cloth. Next get half pound of finely-ground bronze-green—the shade may be varied by using a little lampblack, red ocher, or yellow ocher; let the iron be clean and smooth, then take as much varnish as may be required and add the green color in sufficient quantity, slightly warm the article to be bronzed, and with a soft brush lay on it a thin coat. When that is dry, if necessary lay on another coat, and repeat until well covered. Take a small quantity of the varnish and touch the prominent parts with it; before it is dry, with a dry pencil lay on a small quantity of gold powder, and then varnish the whole.

Lettering Tools.

From W. McC., *Erie, Pa.*—Will you please explain, through *Carpentry and Building*, how I can letter polished steel, such as razor blades or knives? I am under the impression that the letters are cut in with an acid, but I am not informed how it is applied, nor what tools are used.

Answer.—The etching of razor and saw blades is done by drawing with a fine hair brush the design or letters in an asphalt varnish. Cover all the parts with the varnish except the letters, and dip in an acid bath. If the design is very small, a rim of beeswax may be set round it, this saving the use of varnish all over the tool. A few drops of the acid put into the rim thus constructed will cut or bite the figure. Another plan is to cover the whole tool with etching varnish or wax, and scratch the design in the wax and then bite with acid. The acid to be used for this purpose may be composed of the following: To one gill of acetic acid or good strong vinegar take 20 drops of nitric acid, 20 drops sulphuric acid, and, say, ½ teaspoonful of salt. The varnish may be made in a closed bottle, using asphaltum and spirits of turpentine. Set the bottle in warm water until the asphaltum is dissolved. Make it thin, so that a trail with the brush makes a fine, smooth line.

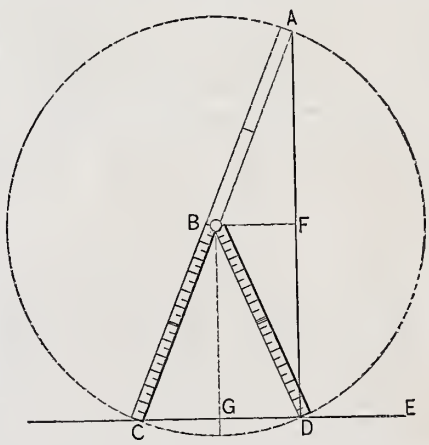
Calculating Tanks.

From G. D. C., *Philadelphia, Pa.*—Will you please give me brief directions for ascertaining the number of gallons in square tanks or cisterns, and also in cisterns of circular form? I want a convenient rule for determining the contents in gallons. At the same time, will you please define the different gallons which are in use. I am confused by certain tables which I have seen, one of which states that the wine gallon contains 231 cubic inches, and another of which defines the gallon as containing 277¼ cubic inches. In still another place I have seen the bushel given as 2150½ cubic inches.

Answer.—The legal gallon of the United States is the Winchester wine gallon, and contains 231 cubic inches. To compute the contents in gallons of round tanks the following rule is useful. Square the diameter in feet and multiply by .7854, which will give the area in square feet. Multiply this by the depth in feet, which will give the cubic contents, and that product in turn by 7.48. The latter amount is the number of gallons in one cubic foot. For tanks of square or rectangular outline multiply together the length in feet of both sides, and the result by the depth of tank in feet, which will give the contents in cubic feet, and again as above by 7.48. In other words, obtain the cubic contents in feet of the required vessel, whatever its shape may be, and multiply by 7.48, which will give the contents in legal United States gallons.

Novel Method of Erecting a Perpendicular.

From C. D. K., *Lockport, N. Y.*—There is a method of erecting a perpendicular line, using a common pocket rule, a knowledge of which may be of advantage to some reader of the paper. Open the rule as shown in the accompanying sketch, and let the two ends rest against the line or straight-edge C E. This may be the edge of a board in case a square cut across it is desired, and the ordinary steel square used for such work is not at hand. With the rule in this position, hold one part, C B, firmly in place, and open the rule to its full length by carrying the arm B D around, as shown by the dotted lines, thus determining the point A. Now, if a straight line be drawn from A, thus established, to the point D, where the foot of the rule first rested, it will be perpendicular or square with C E. The angle A D C will be a right angle. The most satisfactory proof of this proposition to many readers no doubt will be a practical demonstration, and this, it is evident, is very easily tried. For those who like to see the mathematics of a thing explained, I submit the following: First bisect the angle D B A with the line B F; then the angles A F B and B F D will be equal, and consequently right angles. Bisect the angle C B D in like manner with the line B G; then the adjacent angles B G C and B G D will be right angles. Now, all the angles about the point B, viz., C B G, G B D, D B F and F B A are equal to two right angles, and as the angles F B A and D B F are equal, and the angles C B G and G B D are also equal, it follows that the angle G B D added to the angle D B F must equal a right angle. It has now been shown that the angles D F B, B G D and G B F are each right angles, and it remains to be proved that



Erecting a Perpendicular With a Pocket Rule.

the angle F D G is also a right angle. The sum of the angles of the two triangles B G D and B F D is equal to four right angles; but it has been shown that the angles B F D, F B G and B G D are respectively right angles; therefore, it follows that the two angles B D F and B D G, or their equivalent F D G, is a right angle.

Note.—This same rule in effect, if not in statement, has heretofore appeared in our columns, and hence may not be new to all our readers. The demonstration or proof, we believe, has not before been presented in this form.

Steady Work for Carpenters.

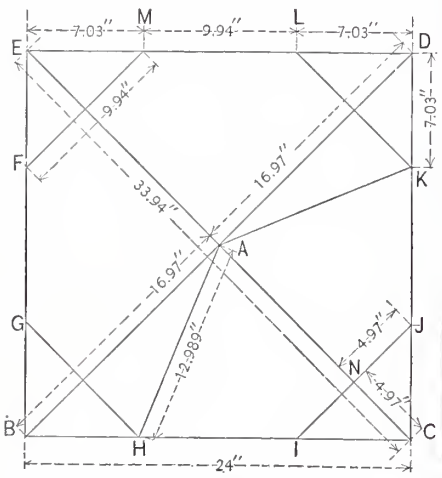
From J. F. W. *Danville, Pa.*—I desire to learn, from practical readers of *Carpentry and Building*, where a carpenter can get steady work the year round. Please explain in what State, and the rate of wages. My specialty is framing barns, houses, grist mills, saw mills and the like.

Note.—We fear that if an answer to this question were published, so many of our

readers would rush to the locality named that the labor market in that vicinity would soon be overstocked, and that, accordingly, the same unsatisfactory state of affairs would exist there that now prevails generally over the country. Notwithstanding all the efforts that are being made by labor reformers and philanthropists generally, employment and the rate of wages are regulated by the old law of supply and demand. When building is brisk, either on account of unusual prosperity in a section of the country or by reason of the peculiar season of the year, wages are good and mechanics generally have steady employment. When the reverse of this is the case, circumstances are less promising, and then the question arises in the minds of those living in that vicinity whether or not a more desirable location cannot be found. We regret that our correspondent is not likely to receive a satisfactory answer to his inquiry.

The Principles of Octagonal Construction.

From E. J. F., *Denver, Col.*—In perusing the columns of *Carpentry and Building*, especially in the back volumes, I have noticed that some of the craft seem to be in need of more light regarding the principles of octagonal construction. A correspondent who writes under the initials of F. A. R., in the issue for December, 1882, appears to be laboring under a delusion, dispelled, however, by the Editor's note. I do not think that he has been sufficiently enlightened as to the solution of the problem in question.



Principles of Octagonal Construction.

Therefore I come forward, thinking I may offer something of value, simply because others have not done the same at an earlier date. I have no doubt that many are employing the principles to which I shall direct attention. The accompanying diagram is calculated to explain itself and elucidates the principles underlying this form of construction. Referring to the drawing, which represents, we will say, a 24-inch square, B D and E C are diagonal lines, crossing at A, which is the nominal center of the figure. Take the space A B in the dividers, which is one-half of the diagonal distance, and apply it to the surface lines B E, E D, D C and C B. There will then be represented by this method the spaces D E, E G, E L, D M, D J, C K, C H and B I. This is practically a solution of the problem, its accuracy, of course, depending upon the draftsman. A mathematician, however, would not be quite satisfied with lines. He must know their length or measurement. To ascertain this fact, we proceed to find the diagonal B D, which is the hypothenuse of a right-angle triangle corresponding to half of the square. By the usual rule, squaring the sides, which, as we have said, is 24 inches, and taking the sum of the squares thus obtained, we have 1152, the square root of which is 33.94, or the length of the diagonal line B D. One-half of this is 16.97. Let it be remembered that these figures are inches and decimals of an inch. The figures, though not absolutely accurate, are nearer than measurements can be made with instruments. Referring to the sketch, the line A B, being one-half of the diagonal line and measuring 16.97 inches, is applied to the surface line, producing B F, E G, &c., as above mentioned, which are all of one length. By subtracting 16.97 inches from 24 inches, we have 7.03 as the length of the spaces E F, E M, &c. Right here I may remark that .03 inch would in practice be about $\frac{1}{32}$ inch, and in setting the gauge at $7\frac{1}{32}$, we would be getting as near to the truth, probably, as a mechanic is able to work. To determine the width of the faces of the octagon, we proceed to add together the spaces E M and L D, thus: 7.03 + 7.03 = 14.06. Subtracting this from the side E D equals 24 inches; we have as a remainder 9.94. This we assume to be the width in inches and parts of an inch of each octagon. To prove our assumption we will take the triangle E F M. By the rule, squaring the base and hight, which in this case is 7.03, and adding their squares together, we have 98.8418. The square root of this is 9.94 +. The lines A H, A K, though germain to this figure, are not essential to it. They, together with the outlines of the square terminating at C, form the outlines of one-quarter of another octagon of larger size, the width of the faces of which is given. A mathematician having the width of the faces of an octagon given is able to determine the size of the square inclosing it.

Price List of Building Costs.

From G. W. P., *Salem, Mass.*—Will some of the practical readers of *Carpentry and Building* give me some ideas about figuring labor and contract work? I want to know how much per thousand to allow for framing, raising and boarding. I want to know the difference in cost between balloon framing and full framing, and what is the cost of running cornices. How should shingle roofs be figured? I want similar information with reference to clapboard walls and general finish of good dwelling-houses in detail. If those who answer these questions will name the standard of wages upon which they are based, it will put the matter in shape to be used. If a practical builder will answer these questions in full he will confer a favor on me as well as on other readers of your paper.

Note.—We have not the least doubt but that a favor would be conferred upon this correspondent and upon numerous other readers of this journal if an adequate and comprehensive answer could be given to the questions proposed. The subject of estimating has frequently come up for attention in these columns, and, we think, long before this we have convinced readers that, in our opinion at least, no royal road exists to the art of figuring the cost of work. We believe it impossible for any man, however practical, to satisfactorily answer such questions as are above proposed. Yet this correspondent, or any other person, really desiring ready-made figures and tables for estimating, boiled down and presented something after the style of the multiplication table, can procure something of the kind from some of the "Price Books" or "Builders' Pocket Companions" which are from time to time published. These works, no doubt, have their utility, and we would not, by thus referring to them, cast a shadow upon their usefulness; but those parts which give the prices for doing certain work are, we believe, the least valuable of all of their contents. No one who relies upon such helps in estimating can hope to be intelligent in his work, or to be ready to take advantage of new conditions as they arise. Constant fluctuations, not only in the price of labor and the cost of materials, but also in the manner of doing work and the facilities employed in its execution, conspire to render any such tables and price lists inoperative and delusive, rather than helpful, after a very short time from their calculation. In England this plan of figuring work is carried further than in this country. It is more applicable there than here, because styles and ways of working are more stable than with us. Things generally in the building trades are more systematized than in this country, and withal there are far less fluctuations in prices. Yet it is found necessary, even there, to correct the printed price lists every three months. What shall be said of the lists published in this country, which are seldom, if ever, revised?

There is another fact to which we would call attention in this connection. We do not remember now that it has before been alluded to in our columns. It is that the estimates of any two persons on a given piece of work should not necessarily agree. In their final footings the gross price for the work may be substantially the same, but unless their facilities for doing the work, their methods of performing the labor, their management of men, and, in fact, every detail of their business, as well as their mental and physical temperament, agree in all particulars, there should be corresponding differences in the schedules of their estimates. This is perhaps less apparent in small work where the conditions are of an ordinary character and well defined than in the case of large engineering enterprises, but still we think we can illustrate our point by a familiar example. In figuring upon a dwelling-house, for instance, A calculates upon buying his windows from a planing mill, and, therefore, the entry for this item in his estimate is the price the planing mill will charge him. B, on the other hand, expects to make the window frames, and his estimate, therefore, contains the items of the required lumber, nails, screws, pulleys, &c., and the estimated labor for constructing the frames. It is possible there is no great difference between the two estimates of cost; they may be practically the same. In any event, both are right, for they are based upon the exact plan proposed for doing the work. Perhaps there is a marked discrepancy between the estimates on these two items, and yet the figures of the respective contractors on the house as a whole may very closely agree. It is possible that A's figures, based upon planing-mill prices, are considerably above what B believes he can make the frames for in his own shop, and what in all probability they would cost A if furnished in this manner. A is aware of this at the time, but he puts into his estimate their cost by the plan he proposes to obtain them. The fact that he believes it better to buy them from the mill, in order to put his work through with less hands, or to be able to handle another contract at the same time, or because ridding himself of this detail will enable him to superintend the work more closely and thus save more than their extra cost in some other direction, is no reason why they should be figured at any other price. It is evident, therefore, that while both A and B's estimates are correct for themselves, they would be wrong if exchanged. From this there may be deduced the general rule in estimating, that every item should bear its own proper cost, that work should be figured as nearly as possible in the way it is to be performed, and that intelligent discrimination based upon experience, together with a thorough acquaintance with the market for materials, must be constantly exercised. After a contract is once obtained the estimate is to be again scanned in order to see if by some change in plan of working a saving in cost cannot be made. As it stands it represents what the contractor honestly believes he can do if no better method of operation is discovered. He follows that plan, therefore, unless by a change he can do better.

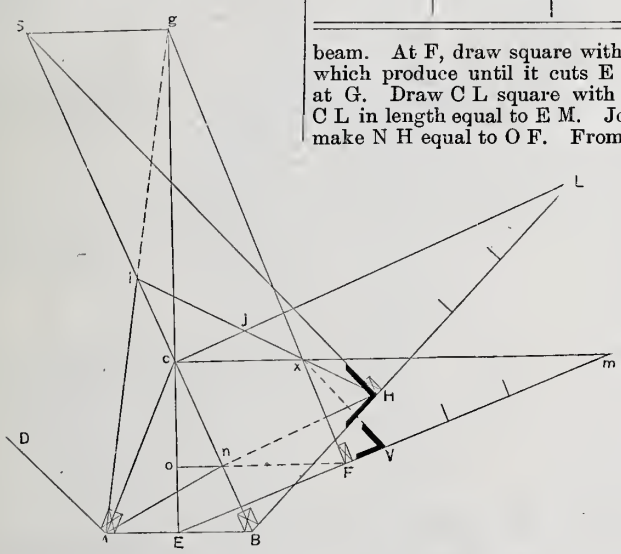
A fixed price list of the cost of doing work, among other shortcomings, makes no provision for going from one community to another to execute contracts. A builder who is in the habit of figuring brick in the wall, for example, at so much a thousand, without being familiar with the items entering into that price, such as lime and sand for mortar, the cost of the brick at the kiln, the cost of hauling the materials to the building, the labor of laying the brick, &c., is helpless when required to figure closely upon a large job 20 miles in the country, away from ordinary sources of supply. The man who has always itemized his estimates, on the other hand, knowing the ordinary cost of each item, looks the ground over, finds out what a kiln of brick can be burned for, discovers a good bank of sand and secures a price from a teamster for hauling it, finds a disused limekiln which can be reconstructed and put into operation at small cost, and which he determines will make lime cost so much, and

so he proceeds item by item through the entire work, constructing an estimate which is quite as reliable as though made in the regular course of his everyday business. The intelligent advantage which the latter man has over the former is not likely to be overestimated.

The point to these lengthy remarks about our correspondent's questions, which are only the counterpart of others we are constantly receiving, is—look in some other direction than stereotyped price lists for your basis for estimating. No man can afford to risk his capital by estimating upon and contracting for work with which he is not practically familiar. He may occasionally, when meeting some exceptional construction, depend upon outside disinterested professional advice, but this principle cannot be extended indefinitely. If he buys his estimates ready made, to assure himself against loss he must also buy the ability to execute the work in the way it has been calculated, which, to say the least, would be a difficult matter at the present time. We like to have such questions as these from our readers occasionally, because they give opportunities for referring to the general principles underlying those calculations which are of the greatest importance in the building trades. If any of our readers are disposed to discuss the subject further, we shall welcome their communications.

Framing an Octagon Spire.

From E. W. C., *Randolph, Mass.*—I have been wishing that some of the practical readers of *Carpentry and Building* would give their methods of framing spires. My attention has been specially directed to this subject while working on a church edifice recently put up in this place. As likely to be of interest to some of the readers of the paper, I inclose a diagram of the framing of the spire, which is original with myself. If it is not correct in all particulars, or if better methods can be suggested, I shall be pleased to have it criticised freely by practical readers. The result will be the discussion of a subject which will be valuable to me, and, I think, to many others in the trade. Referring to Fig. 1, to obtain bevels and length of braces for an octagon spire, or for a spire of any number of sides, let A B be one of the sides. Let A C and B C be the seat line of hip. Let A N be the seat of brace. Now, to find the position of the tie beam on the hips so as to be square with the boarding, draw a line through C, square with A B, indefinitely. From C, and square with E C, draw C M, making it equal to the hight. Join E M. Let O F be the hight of the tie beam. At F, draw square with E M a line, which produce until it cuts E C prolonged at G. Draw C L square with B C. Make C L in length equal to E M. Join B L, and make N H equal to O F. From G, draw the line G S parallel with A B, cutting B C prolonged in the point S; then the angle at H is the bevel on the hip for the tie beam. For a bevel to miter the tie beam make F V equal to O N. Join V X; then the bevel at V is the bevel on the face. For the down bevel see V, in Fig. 2. To find the length of brace make A B, Fig. 2, equal to A B, Fig. 1. Make A L and B L equal to B L, Fig. 1. Make B P equal to B H. Join A P and B C, which will be the length of the brace. The bevels numbered 1, 3, 5 and 7 are all to be used, as shown on the edge of the brace. No. 1 is to be used at the top above No. 5. For the bevel on the face to miter on the hip, draw A G, Fig. 1, cutting B S at J. Join J H. Next, in Fig. 3, make A P equal to A P, Fig. 2, and make A J equal to A J, Fig. 1. Make P J equal to J H, Fig. 1, and make P I equal to H I. Join A I; then the bevel marked No. 5 will be correct for the beam next to the hip, and the bevel marked No. 6 will be correct for the top. Bevel No. 2 in this figure will be correct for the beam next to the plate. The edge of the brace is to correspond with the boarding.



Framing an Octagon Spire.—Fig. 1.—Obtaining Bevels, Lengths of Braces, &c.

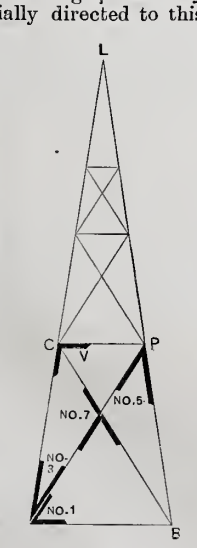


Fig. 2.—Obtaining Down Bevel, &c.

Estimating Cost of Building Work by the Square.

From J. I. D., *Des Moines, Iowa.*—The accompanying table will give the readers of *Carpentry and Building* an idea of my plan of figuring on contracts by the square. It is very convenient for use on plain work: Take from the total column (extreme right-hand) such items as are necessary to compare the part you are estimating. Add them together and multiply by the number of squares in the given work. The result will be the price of the work in one amount. I submit this for the examination and criticism of practical readers.

TABLE FOR ESTIMATING BY THE SQUARE.

CALCULATIONS BASED UPON JOISTS 16 INCHES BETWEEN CENTERS AND RAFTERS 24 INCHES BETWEEN CENTERS.

Article.	Dimensions.	Grade.	Price per M.	Amount per sq.	Value per sq.	Labor.	Total.
Joists.	2 x 14	Rough.	$20.00	162	$3.64	$1.50	$5.14
"	2 x 12	"	20.00	150	3.00	1.50	4.50
"	2 x 10	"	20.00	125	2.50	1.50	4.00
"	2 x 8	"	20.00	100	2 00	1.50	3.50
"	2 x 6	"	20.00	75	1.50	1.50	3.00
"	2 x 4	"	20.00	50	1.00	1.50	2.50
Siding.	6 inch.	D.	30.00	130	3.90	2.00	5.90
Sheeting.	6 "	D. M.	25.00	125	3.12	1.50	4.62
Paper.	.....	.....	per lb., .06	12	.72	.50	1.22
Flooring.	6 inch.	D. M.	35.00	125	4.39	1.50	5.89
Plastering.	.....	3 coats.	per yd., .40	11 1/9	4 45	.....	4.45
"	.....	3 "	" .30	11 1/9	3.34	.....	3.34
"	.....	3 "	" .25	11 1/9	2 78	.....	2.78
"	.....	3 "	" .20	11 1/9	2.22	.....	2.22
Shingles.	5 inch.	Roof.	3.50	900	3.15	2.50	5.65
"	4 "	"	3.50	1,000	3.50	2.50	6.00
Sheeting.	1 "	"	20.00	100	2.00	1.50	3.50
Rafters.	2 x 6	"	20.00	50	1.00	1.00	2.00
"	2 x 4	"	20.00	33 1/3	.67	1.00	1.67
Wall.	8 inch.	18 brick.	12.00	1,800	21.60	.....	21.60
"	10 "	22 1/2 "	12.00	2,250	27.00	.....	27.00
"	12 "	27 "	12.00	2,700	32.00	.....	32 00
"	14 "	31 1/2 "	12.00	3,150	37.80	.....	37.80
"	18 "	40 1/2 "	12.00	4,050	48.60	.....	48.60

Dragon's Blood.

From W. A., *Indianapolis, Ind.*—I frequently meet in books of receipts the expression "Dragon's Blood," to be variously employed. I desire to inquire what is Dragon's Blood and the source from which it is obtained?

Answer.—Dragons' Blood is the name applied to resins obtained from several different species of plants. The most important of the resins, and the one known by the name of Dragon's Blood, is afforded by a plant under the botanical name of *Calamus Draco*, abounding in Eastern Asia. Other kinds of less value are found in the Canary Islands and the West Indies, also in Mexico. In color Dragon's Blood is red, or dark brownish-red, and it is used chiefly for tinging varnishes and tinctures, staining marbles, &c.

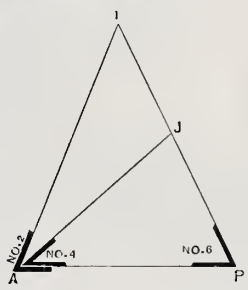


Fig. 3.—Obtaining the Face Bevel, &c.

Intersection of Pediment Ridge with Main Roof.

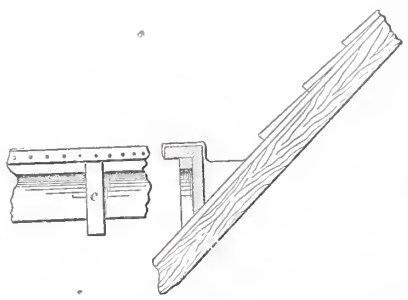
From G. W. W., *Stamford, Conn.*—In the February number of *Carpentry and Building* for 1883, H. E. G., of Plainfield, N. J., asks how to determine where the ridge of a pediment will strike the rafters of main roof without the necessity of leveling the ridge board. I answer, first, divide the hight of pediment in inches by the rise of main rafters per foot. This gives the length of ridge pole; we now have a base to work from. To make this plainer, suppose we had a house to build with a pediment 5 feet high, and rise of main rafters 8 inches per foot. We would first find the length of ridge pole by this rule: Hight of pediment,

60 inches; divide this by 8 inches, rise of main rafters per foot, and we get for an answer $7\frac{5}{10}$ feet, which is the length of ridge pole. This rule applies to any pitch of roof. To find the seat of ridge board, take a rod with one straight edge, and measure off as for rafters with steel square, taking 8 inches on tongue and 12 inches on blade, and measure in this way seven times; then take 4 inches on tongue and 6 inches on blade for the half-foot, and we have the length from the base line of pediment to top of ridge board. Cut bevel of ridge board same as foot of main rafters. The pediment roof not being the same pitch as main roof makes no difference with seat of ridge board.

REFERRED TO OUR READERS.

Philadelphia Gutter.

From K., *Westerly, R. I.*—The term "Philadelphia gutter" has come into vogue in this locality within a short time past. I have never seen any authority for calling the



Philadelphia Gutter.—Fig. 1.—Paneled Front.

gutter to which it is applied by that name, nor, on the other hand, have I ever heard any other name applied to that kind of a gutter. I desire to inquire if there is any other name for it; also, Are there other methods of constructing gutters of this kind besides those shown in the accompanying sketches? In this locality we make the gutters in both of the two ways shown. In Fig. 1 the face of the gutter is vertical and is broken into panels by pieces *c*. The tin extends up under the shingles and over the cap of the gutter. The second method

Fig. 2.—Bracketed Front.

of construction is shown in Fig. 2. The face of the gutter in this case is at right angles with the roof and has brackets *d* in front.

Designs for Railway Stations.

From RICHARD J. EVANS, *Holly Springs, Miss.*—The courteous compliance with which you have conceded the request of other correspondents of *Carpentry and Building* influences me to suggest, through your columns, that it would prevent some of the unsightly railroad station buildings being constructed which now disfigure the landscape of our country, particularly in the South, if some of the accomplished architects who are patrons of your journal would contribute artistic designs for cheap frame buildings appropriate for the purpose. If they were accompanied by specifications of construction and bills of materials, they would be still more acceptable.

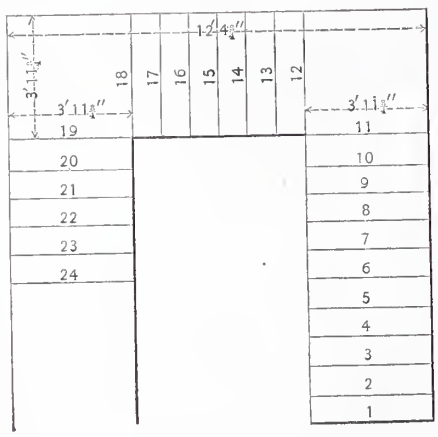
Note.—This request, coming from the chief engineer of one of the railroads in the Southern States, has more than usual importance, and we trust that some designer among our readers will respond to this request. We shall take pleasure in engraving such designs as are sent us as seem appropriate for the purpose, and thus submit them to a discriminating public.

Portable Wood-Working Machinery.

From S. D., *Bridgeport, W. Va.*—I desire to learn, through *Carpentry and Building*, where a combined planer, matcher and molder for light job work can be obtained. The machine must not exceed 2500 pounds in weight, and must be so constructed as to be portable without danger of breaking, and at the same time must do its work smoothly and perfectly. I am a builder of farm residences in a section of country where each farmer is in the habit of furnishing the lumber for his house from his own farm. The locations are often remote from stationary planing mills. I desire a portable machine suitable for operating by horse-power or otherwise, which may be taken with me from job to job the same as my regular kit of tools.

Position of Newel.

From J. F., *Central Valley, N. H.*—I have a staircase to build, and, accordingly, would like a little advice as to the proper place to set the newel posts. I also desire to learn what will be the proper width of the top and bottom flight under the conditions named. I inclose a sketch of the plan of the staircase, from which my wants can be ascertained. The run on top and bottom flight is 11 inches; on the middle flight, $10\frac{3}{4}$ inches, with $7\frac{1}{16}$ inches rise. Oak panel work, 4 feet 1 inch



Position of Newel.

high, exists on the lower floor and the same 3 feet 8 inches high on the top floor. Similar work is to be continued up the stairs. The stairs are also to be of oak, with inclosed carriages or spandrels underneath. What I would especially like is a sketch, published in *Carpentry and Building*, showing where the posts should be set on the platforms.

Practical Stairbuilding.

From A. L., *Fairfield, Iowa.*—As I have more or less work to do in stairbuilding and handrail making, I desire to ask a question or two of the practical stairbuilders among the readers of *Carpentry and Building*. I would like to ask F. S. W., of Cleveland, among others, how long it will take to get out a first-class ogee 4-inch rail corresponding to Fig. 1 of the illustrations in "Practical Stairbuilding, No. XXIII," published in the issue for December, 1882, the work being done by hand. I find it very convenient in my work to employ a double-bitted spokeshave having one part concave for working on the nosing of the rail, just as would be done with hollow rounds on straight rails. I like Bailey's circle plan for squaring up wreaths when the twist is not too short. I find building paper both cheap and good for face molds. In getting out wreaths for large cylinders, in order to simplify the work and to save material, I get the face mold out for the quarter-circle, but make a joint at the minor diameter of the wreath. As the top and bottom of the rail are parallel with the face of the wreathed piece at that point, no bevel is required. When no mill is convenient for sawing out the crooks they may be ripped out with a rip saw.

STRAY CHIPS.

WORK ON the Washington Monument was suspended for the winter a few weeks since, leaving the shaft at a hight of 410 feet. At this elevation it is the loftiest artificial structure on the Continent, and, with a very few exceptions, the highest in the world. Its ultimate hight is to be 550 feet. Its nearest neighbor in the air, when both have been completed, will be the main tower of the new City Hall, Philadelphia, which is designed to be 535 feet.

THE ATCHISON, TOPEKA AND SANTA FE RAILROAD COMPANY are erecting a general office building on the corner of Jackson and Ninth streets, Topeka, Kan. The structure is 180 x 68 feet in plan, and four stories and basement in hight. The materials used are St. Louis pressed brick, with terra-cotta trimmings, laid in red mortar. The interior of the building will be, for the most part, finished in ash, with floors of maple and deadened with mineral wool. The Durham system of drainage and ventilation is to be employed, and the heating will be by steam. All ceilings and partitions are of the Wight Fire Proofing Company's patent. An allowance of 20 feet of ground has been made each side of the building, the same to be used as a park. The architects are Messrs. Burnham & Root, of Chicago, and the contractor Mr. James A. McGonigle, of Leavenworth. Mr. C. A. Jordan is the superintendent. It is expected to have the edifice ready for occupancy by May 1, 1884. The total cost is placed at $160,000.

MR. W. H. FLOYD, of Terre Haute, Ind., has furnished the plans for a number of buildings to be erected in that place. Among some of the more important of these may be mentioned a residence for the Hon. Jonathan E. Lamb, to cost $4000; one for Dr. Allen Pence, to cost $8000; one for Mr. J. T. H. Miller, to cost a like amount, and a building that will be used for a residence and business purposes for Mr. W. A. Gleason, to cost $8000.

MRS. DULIN, of Baltimore, Md., is about putting up two three-story buildings on the south side of Monumeut street, between Cathedral and Pearl streets, in that city. Each structure will be 25 x 80 feet in plan, and have a marble front. The estimated cost of these improvements is placed at $30,000. Mr. Charles E. Cassell furnished the plans.

THE DENVER STREET RAILWAY COMPANY are putting up on Seventeeenth street, between Wyncoop and Wazee streets, Denver, Col., a brick stable and car depot. The structure is 100 x 125 feet in size, and four stories in hight, and is estimated to cost $50,000. Mr. J. W. Roberts was the architect who furuished the plans.

MR. SAMUEL S. HANNAFORD, of Cincinnati, was the architect who furnished the plans for the building in progress of construction at Terre Haute, Ind., that will be known as the "Orphans' Home." The estimated cost of the structure is put at $65,000. Mr. Hannaford has also furnished the plans for the Vigo County Court-House, to cost $300,000, and the United States Governmeut building, to cost $200,000, which are being put up at Terre Haute.

WE ARE INFORMED that the Parker & Russell Manufacturing Company, of St. Louis, have purchased of the Eastern patentees the right to manufacture and sell terra-cotta lumber, an article now coming into use as a substitute for wood where fireproof construction is desired.

AT BUTLER, PA., Dec. 11, the county court-house was discovered to be on fire at 8 o'clock a. m., and an hour afterward the cupola and roof fell in. The fire originated in one of the flues, and, on account of the scarcity of water, the firemen were powerless.

ONE OF THE oldest contractors and builders in Minneapolis, Minn., gives his opinion of the building prospects in that city as follows: "One of the safest predictions that could be made is that more blocks and buildings will be erected along our business streets next summer than in any two previous seasons in the history of our city. Architects are overworked, and in some cases it has been found necessary to send elsewhere for plans. An immense quantity of building material has been ordered for delivery early next spring; contractors are piling up orders in advance, and six months hence will see busy times on our business streets. I think that it may safely be predicted that among other structures upon which work will be begun early will be several suitable for the jobbing trade. I personally know of two parties who are desirous of locating here in the jobbing trade if they can secure proper buildings in the right locality."

THE NEW exposition and music hall at St. Louis, Mo., is being pushed forward as rapidly as the weather will permit. The building will be about 325 feet in width by 445 feet long. The masonry is well advanced, and portions of the brick wall are already up to the level of the first-story window caps. Contracts have also been awarded for the ironwork and for the laying of the floors. The brickwork is to be finished before spring opens.

A NEW county court-house has just been completed at Ida Grove, Ida County, Iowa. The structure is 85 feet in length, 69 feet in width, and 2 stories and basement in hight. The material used in its construction is best quality Boone brick, with cut stone for sills and caps. The cornice is of galvanized iron and the roof of Bangor slate. The building is situated on a high elevation in the southeastern part of the town. The contractors for the work were Messrs. D. W. Townsend, of Le Mars, and J. M. Starbuck, of Cherokee, Iowa. The plans were furnished by Mr. J. P. Bryant, of Princeton, Ill. The cost of the building was $29,289.

MR. N. B. BACON is the architect for the brick store building now in course of erection on Superior street, Toledo, Ohio, for Messrs. Heitt & Hartupee. The edifice is 76 x 116 feet in plan, and will be four stories in hight. Mr. John Murphy has the contract for the stonework. The cost is estimated at $28,000.

CARPENTRY AND BUILDING

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Second Prize Design—Eleventh Competition.

We present herewith the elevations and details submitted by Mr. S. A. Bishop, of Smethport, Pa., in the Eleventh Competition, being the set of plans to which was awarded the second prize. The author, in describing these drawings, says that he does not set up a distinctive claim to originality. On the contrary, his aim has been to keep within prevailing styles. Since one of the essential conditions of the competition was that the designs should be suitable for erection by builders of average intelligence and experience, the author has deemed it expedient to introduce nothing out of the ordinary run in order to keep well within those requirements. In all particulars superfluous ornament has been omitted, and the result is a design neat in its general appearance and easy of execution. The elevations in connection with the perspective and the selection of details which we publish herewith are so clear and easily understood that further description is not necessary.

SECOND PRIZE DESIGN, ELEVENTH COMPETITION.—S. A. BISHOP, ARCHITECT, SMETHPORT, PA.

Room Adornments.

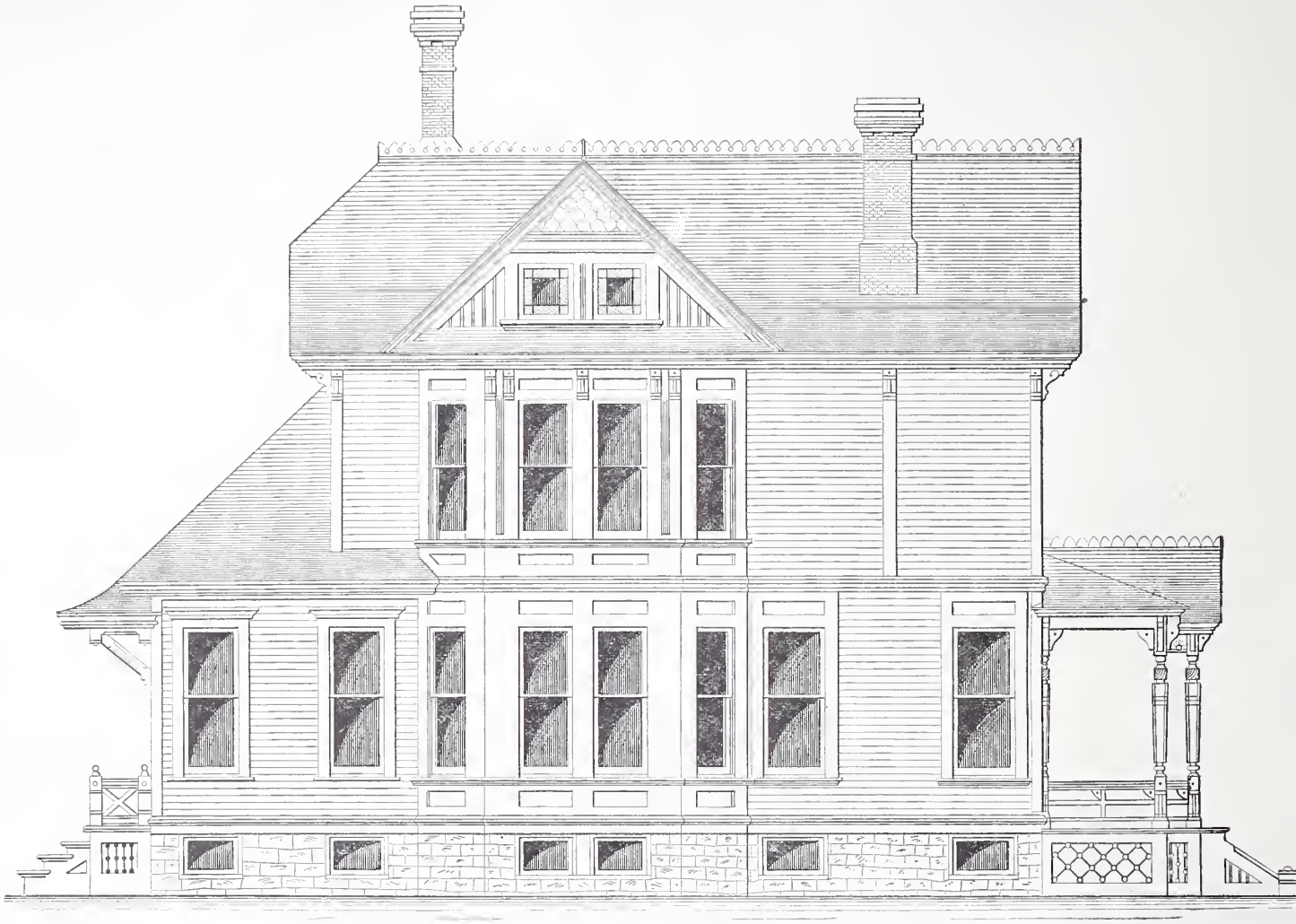
Of course, says the *Independent*, there should be pictures in the parlor. The language of art is a universal language; old and young, learned and unlearned, bond and free, people of every race, all understand pictures—at least as far as their subjects go. But what pictures? Well, that depends, first, on the taste, and, secondly, on the length of the purse. This order is kept advisedly, because it is possible with a very short purse to have very excellent pictures. It does not make any difference, either, how much money a man may have to spend on pictures; the chances are that if a man is a vulgar man he will have vulgar pictures. Some of the grossest atrocities of art ever perpetrated have been purchased by American millionaires. In the first place, with an independent art judgment one may have good oil paintings without a very great expenditure of money. The man who knows how to tell genuine merit in a picture need not wait for its painter to become famous before he buys. After all, it is the indorsement of the critics that we pay for instead of the merit in a picture. He who has learned to see beauty in a picture with his own eyes, and to recognize it when he does so, may buy his pictures before any fictitious values are put on the signatures in the corner. To buy of young artists, and to buy with discretion born of knowledge, is to make an excellent investment. It is on record of a man who fancied the work of a certain obscure young artist, and bought all his works as fast as they were produced. Suddenly the artist became famous, and the knowing connoisseur found himself in possession of a fortune. The pictures for which he had paid ten dollars were worth hundreds.

Good paintings are also to be picked up at low prices at the auctions. Not at the auctions of new pictures, but when collections are sold or when a household is broken up, and the accumulations of a lifetime sold. As good a copy of the "Marriage of Ste. Catharine," by Correggio, as ever was made—an early copy, too—is in the collection of a New York art critic, who bought it at auction for the ridiculously low sum of $5.75. He values it at $300, and would probably have little difficulty in getting that sum for it. But if one may not have oil paintings he can still have etchings or engravings. There are no reproductions that come so close to being original works as etchings. There is but one process between the hand of the artist and the purchaser. They are not expensive, and one never tires with the work of such men as Seymour Haden, Charles Platt, Stephen Parrish, the Morans, or Mr. Farrar.

And there are engravings—steel and copper-plate engravings. These bring the great masterpieces of the world into our houses. All the great Madonnas and the countless subjects of the old masters are so faithfully reproduced in lines that the lacking color is all but forgotton in admiration of the delicate precision of imitation in form. And engravings—unless in the case of certain rare impressions—are not dear. Any reputable dealer will find in his portfolios prints of excellent artistic merit that are within the reach of any one who is able to have a home at all. And if one has engravings or etchings, one should be careful about the subjects and the framing. Many a young housekeeper has bought at random certain fancied prints in the shop, and taken them home to tire of them in a few days because their subjects were wearisome, or because, though agreeable subjects, their white margins and bright frames made the dark walls of the parlor look patchy. The white margins should never show, unless the wall is a very light-colored wall. The frames should never be of clear, bright burnished

gold leaf, unless there is a great absence of light in the room and the frames are necessary as an important part of the furnishing. The simple plain wood frames, in natural wood colors, with ornaments of oxidized silver or brouze, are generally effective. There should be with them, and coming close up to the picture, mats of gray or blueish or brown rough paper. As to oil paintings, no rule for framing can be given. The tone of the picture must determine the color of the frame; the size and character of the picture must determine its width, and both in color and width there must be a thought of the color scheme upon which the decoration of the room is based.

As to the hanging of pictures, let there be one inflexible rule—to hang them flat. There is something always suggestive of insecurity in seeing a picture tipped forward. The picture cords are better not to show at all; but if they do show, let them not start from each top corner of the picture and meet at a point on the wall just over its center, thus forming a triangle, inharmonious with the lines of the room, but let a separate cord be attached to each top corner and go straight to a hook directly above it. And there should not be too many pictures, nor pictures having purely a family interest. Family portraits, if themselves works of art, are not altogether out of place in a parlor, but photographs had best be kept for the more private rooms. The subjects of pictures should be such as can be quickly understood by anybody. A picture that has to be explained is almost as bad as the picture that has to be apologized for.



Eleventh Competition.—Fig. 2.—Side Elevation.—Scale, ⅛ Inch to the Foot.

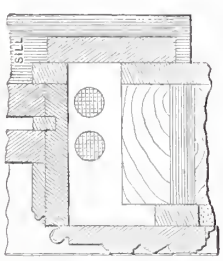


Fig. 3.—Section Through Window Frames. Scale, 1½ Inches to the Foot.

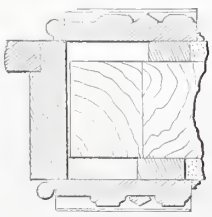


Fig. 4.—Section Through Door Frames.—Scale, 1½ Inches to the Foot.

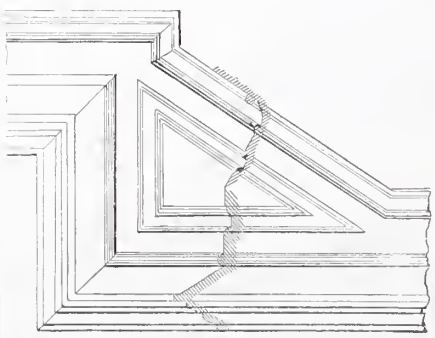
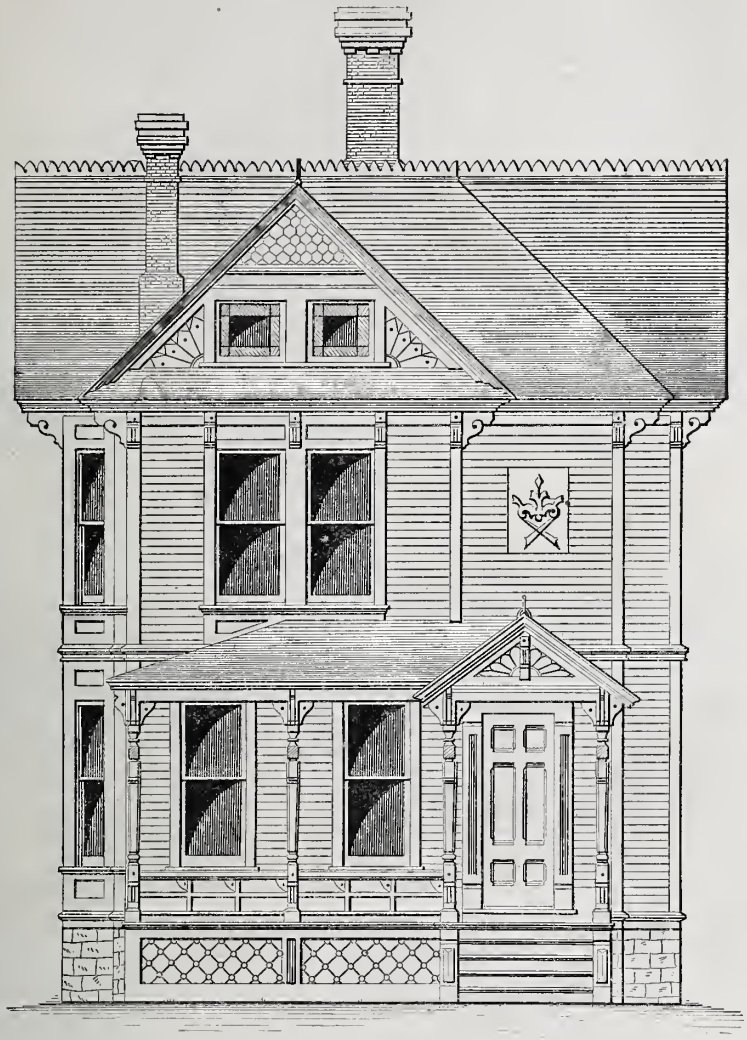


Fig. 5.—Soffit of Cornice at Angles of Bay Windows.—Scale, ⅜ Inch to the Foot.

Blackboards.—Various kinds of so-called "liquid slating" have been sold for converting any smooth board or wall into a blackboard for school or other purposes. The following, we are informed, give very good results. No. 1 is probably the best, but is somewhat expensive: 1. Take alcohol (95 per cent.), 4 pints; shellac, 8 ounces; lampblack, 12 drams; ultramarine blue, 20 drams; powdered rotten-stone, 4 ounces; powdered pumice-stone, 6 ounces. First dissolve the shellac in the alcohol, then add the other ingredients, finely powdered, and shake well. To apply the slating, have the surface of the board smooth and perfectly free from grease. Shake well the bottle containing the preparation, pour out a small quantity only into an old tea-cup, and apply it with a new flat varnish brush as quickly

Fig. 6.—Doors and Trim.—Scale, ⅜ Inch to the Foot.

as possible. Keep the bottle well corked, and shake it up every time before pouring out the liquid. 2. Instead of alcohol, take a solution of borax in water; dissolve the



Eleventh Competition.—Fig. 7.—Front Elevation.—Scale, ⅛ Inch to the Foot.

shellac in this and color with lampblack. 3. Dilute silicate of soda (water-glass) with an equal bulk of water, and add sufficient lampblack to color it. The lampblack should be ground with water and a little of the silicate before being added to the rest of the liquid.

The Sand Works at McVeytown, Pa.

An interesting description of the extensive sand works situated near the village of McVeytown, Pa., is given by a correspondent of the Harrisburg *Patriot*. Two drifts or veins, 110 feet wide, and running, the one 800 feet, the other 600 feet, in opposite directions, yield over 400 tons of snow-white sand for the manufacture of the best American plate glass. The vein now being worked is 85 feet from the surface, and is underneath another, the two being separated by about 15 feet of sand-rock, which can at any time be cut through. It is pitch dark, and the atmosphere is permeated with fog, which renders the little oil lamps worn by the miners useless at a distance of a few feet. The rock is so hard as to require blasting, Atlas powder being used, but crumbling into powder on exposure to the air. The entire output is transported to the mouth of the drift by a single mule, hauling two cars on a tramway. The cars are hauled one at a time up an inclined plane into the "works" proper by steam power. The buildings are 100 feet long, a single story in hight. A new engine room, containing a 35-horse-power engine, replaces the one not long ago destroyed by fire. The largest pieces of rock are fed to a vibrating breaker of great weight and sufficient power to considerably reduce the sandstone. These smaller stones, together with all not needing breaking, pass under a pair of broad iron wheels, each weighing 3200 pounds, revolving in such a manner that one follows the other, water freely circulating all about them.

The sand is now carried by a sheet-iron strainer, from which the coarser particles are returned to the crusher. It is then washed in inclined wooden troughs, being forced upward against descending streams of water by means of the Archimedes screw, a principle much in use throughout the building. A continuation of this process results in depriving the now clean sand of most of its moisture. After draining on a sloped floor it is wheeled into several drying machines, some using hot air and others steam as the drying agent. Archimedes screws bring the dried sand to the foot of an elevator, where it is carried up in small triangular buckets to the top, from whence it is poured into wagons, and hauled in six-mule teams to the freight depot, nearly a mile distant. The power by which the machinery is run is furnished by the canal, 1000 feet distant. A large turbine wheel connected with iron-wire ropes running on large wooden wheels in two towers transmits the force necessary to operate one set of crushers, while the engine runs another. Both sets can use canal power when, for any reason, the engine fails to work. The works have doubled their capacity during the past year, and if the Pennsylvania Railroad Company build the line now in prospective, across the river, the output will again be increased.

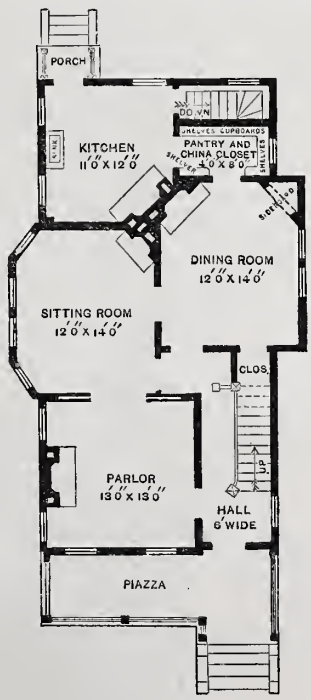


Fig. 8.—First Floor.

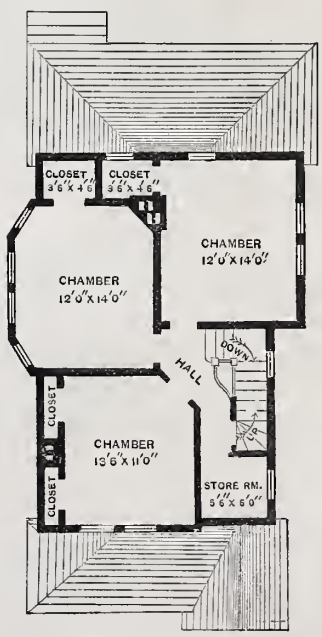


Fig. 9.—Second Floor.

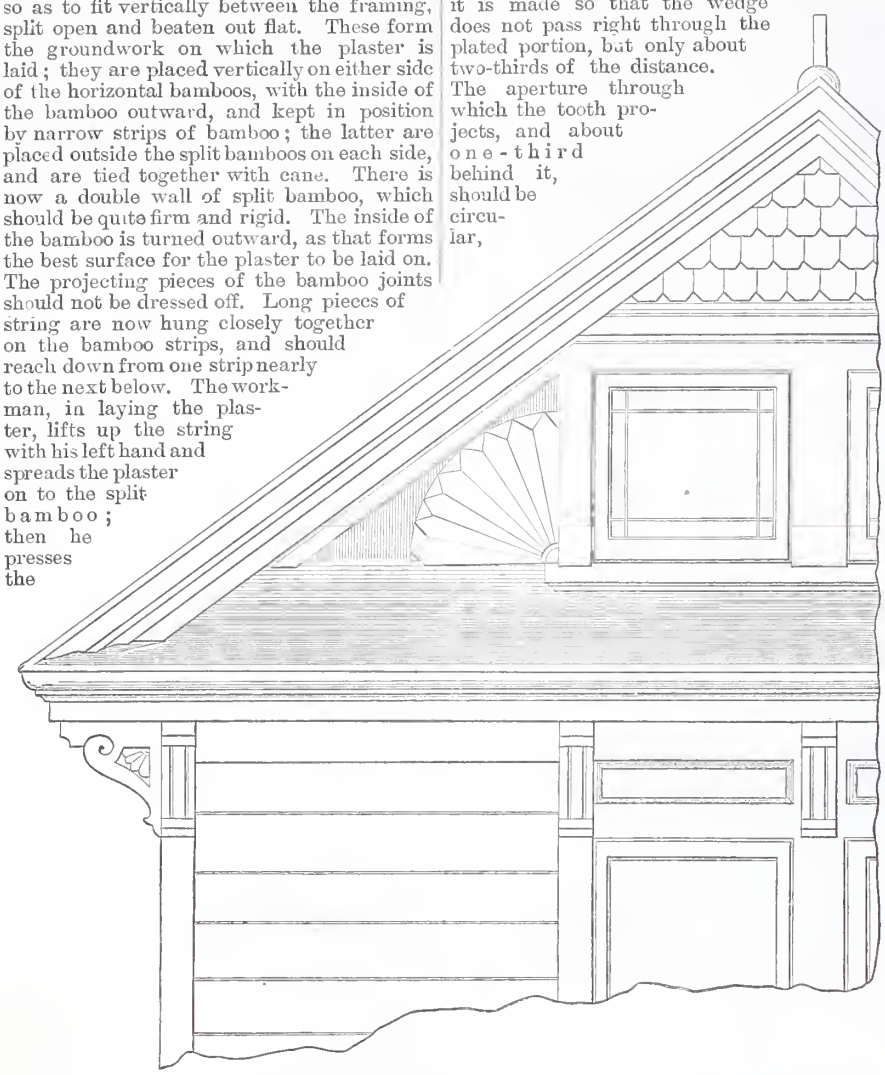
Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.

Plaster Walling as Used in India.

In both Sandoway and Kyoukpyoo, where there is an annual rainfall of over 200 inches, the walls of many of the Government buildings and private houses are made of plaster instead of planking, as is generally the case in Burmah. This plaster walling seems to have great advantages over planking. It is cheaper, cooler, prevents sound passing from one room to another, and is easily and cheaply kept clean by white or color washings; it may also be painted if preferred. Although the plaster walls are double, they do not appear to harbor vermin, insects, &c., as might be expected; and, if the work is done as described, the wooden framing separates the wall into squares of about 3 feet, and it is impossible for rats to work from one square to another. It is necessary to provide some ventilation for the rooms, either by wooden lattice-work at the top of the wall or by any other method. The plaster walls, if properly made, last well, even when exposed to the weather.

For one bay of walling 10 feet square, framing 4 x 3 inches is put up in the ordinary way between the posts. Small green bamboos 1½ or 2 inches in diameter are then cut into such lengths that they may fit tightly when placed horizontally between the vertical pieces of framing. When sawn wood can be got cheaply, it would be better to substitute for these bamboos battens which could be nailed to the frames. There is a little trouble experienced in get

ting the bamboos fitted in nicely; if they are slightly too long they are apt to split in being put in, and if too short it is, of course, difficult to fix them except by wedging. Dry bamboos of as large diameter as can be obtained are then cut into lengths so as to fit vertically between the framing, split open and beaten out flat. These form the groundwork on which the plaster is laid; they are placed vertically on either side of the horizontal bamboos, with the inside of the bamboo outward, and kept in position by narrow strips of bamboo; the latter are placed outside the split bamboos on each side, and are tied together with cane. There is now a double wall of split bamboo, which should be quite firm and rigid. The inside of the bamboo is turned outward, as that forms the best surface for the plaster to be laid on. The projecting pieces of the bamboo joints should not be dressed off. Long pieces of string are now hung closely together on the bamboo strips, and should reach down from one strip nearly to the next below. The workman, in laying the plaster, lifts up the string with his left hand and spreads the plaster on to the split bamboo; then he presses the string into it, and so ties the plaster down. Two coats of plaster are laid, the first having a very rough surface to receive the second. The plaster is mixed as usual for good plastering work, laid on as dry as possible, and well worked by hand; it is then kept damp for three days by being sprinkled with water before the second coat is put on.



Eleventh Competition.—Fig. 10.—Half Elevation Front Gable.—Scale, ⅜ Inch to the Foot.

Marking and Cutting Gauges.

The gauge, says a writer in an exchange, is a tool frequently used, being required in some stage or other of all cabinet-work. Gauges are of three kinds—cutting, marking and mortise—the names indicating the purposes for which they are used. It is with the first and second we have to deal, the last not presenting any feature of interest to call for notice here. The marking gauge can be dispensed with, as a properly sharpened cutting gauge may be used for the same purpose.

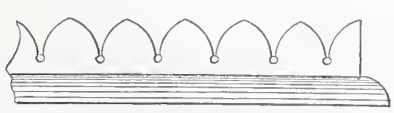


Fig. 11.—Detail of Cresting.—Scale, ⅜ Inch to the Foot.

When purchasing a gauge it is advisable to select a good make. The cheaper kinds occasionally wear well; but you find the most economical plan is to get one of the best at first, especially as they are not very expensive. Several varieties are made in beech, box, rosewood and ebony. A rosewood or ebony one is preferable, and it should be plated at the end, as this increases its durability. The manner in which the tooth is fixed differs. In some it is secured by a brass wedge, in others by a steel screw. If you select one having a wedge, see that it is made so that the wedge does not pass right through the plated portion, but only about two-thirds of the distance. The aperture through which the tooth projects, and about one-third behind it, should be circular, the remainder being cast the shape of the wedge. In those having the tooth fixed by a screw the aperture is square, and passes right through, one side of the tooth resting against it, and being kept in position by a brass plate, with a projecting semicircular head, the other portion fitting easily in. This plate is pressed firmly down upon the tooth by a steel screw working at right angles to it through the center of the stem. This latter modification is the better, the manner of securing the tooth being the most convenient for readily removing it for resharpening, or making any alteration in the distance it is out.

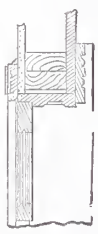


Fig. 12.—Door Jamb.—⅜ Inch Scale.

To sharpen the tooth, hold it on the grindstone inclined at an angle of about 65°, resting one edge and half one side on the stone; keep it in this position until you have ground a facet ⅛ inch or ⅛ inch wide. Now reverse, and grind the other edge in the same manner. The tooth is to be ground only on one side. The unground one will show triangular-shaped, and the one where the facets are will have the appearance of an elongated rhomboid, or a triangle having beveled edges to two of its sides. Now smooth the tooth with one or two rubs on the oilstone and it will be ready for use. Place it in your gauge, with the flat part, the unground side, toward the top. The wedge is placed on this and driven tight or screwed, as the case may be. The distance the tooth should project will vary according to the purpose for which it is required. For marking, a distance of $\frac{1}{16}$ inch will be sufficient; for ordinary cutting or thicknessing, as required in drawer-making, this may be increased to ⅛ inch, while for some purposes, like the cutting out of material for the sides, ¼ inch, or ¼ inch bare, is requisite.

When using a gauge, hold it so that the point of the tooth is at right angles to your work. The first finger is placed upon the top of that portion which guides it, the other three being placed below it, resting on the stem, while the thumb should be above, the inside of it pressing against the lower square part of the stem. If using for marking, set it the requisite distance; hold it as lightly as possible, and just allow the tooth to mark the surface as slightly as possible. If for cutting, press it downward and forward. In both cases always work it from you. It is almost superfluous to add that all edges from which it is intended to gauge must be previously straightened or shot.

The Army of Incompetents.—Who does not know them? They are thick, says an exchange, as locusts, apply to you every day for business, abound on every street corner, and pass through life a miserable, shuffling, dejected and seemingly god-forsaken class of men. Never was there an age when the call was louder and more urgent for men competent to do things; and never, we fear, was the supply in its meagerness so disproportioned to the demand. If one needs help—help competent to aid in great enterprises, competent to look men in the face and bring about important results—let him advertise, say, in the "Help Wanted" column of some leading daily journal. The result is appalling. The string of moral imbeciles and the abundant list of dissipated, vicious, repulsive and utterly incompetent men who present themselves as fit for important service, is discouraging beyond expression to the reflect-

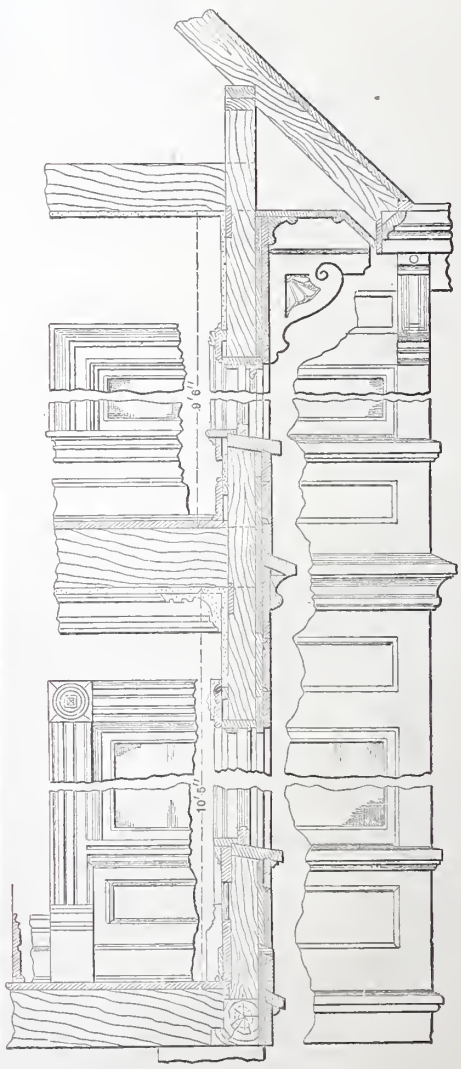
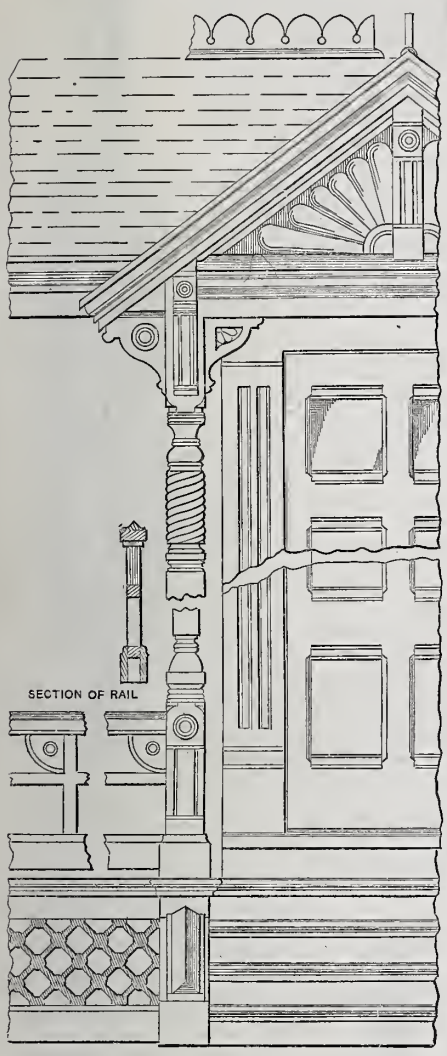


Fig. 13.—Combined Elevation and Section Showing Interior and Exterior Finish.—Scale, ⅜ Inch to the Foot.

ing mind of him who would fain extend a helping hand to his fellows. Young man, middle-aged man, learn to do something! Study a good address, study men and things, and absorb from the abundance about you some knowledge in which you can become



Eleventh Competition.—Fig. 14.—*Details of Porch and Front Door.—Scale, ⅜ Inch to the Foot.*

proficient. Be clean in speech, in person and in soul; and, inspired by such intentions as these, a thousand profitable avenues of industry stand pleading for your entrance.

Purchasing Machinery.

Mr. J. Richards, in his work on "Wood-Working Machinery," gives some very interesting points relative to the above subject, and, among other things, states that operators generally understand the subject better than proprietors, and machines are usually bought upon their judgment and advice, only so far, however, as a choice between the machines of different makers, for it is very seldom that they can get just what is wanted, no matter how well they may understand what is needed for the work. Wood machines are made in America at this time like boots and shoes, or shovels and hatchets. You do not, as in most other countries, prepare a specification of what you want, as to the capacity, belt power, adjustments, and so on, but must take what is made for the general market. That this is not right need not be argued, and that it is as much the fault of the purchaser as it is of the maker is also true. Purchasers are too apt to barter and beat down the price to the lowest point, and then go to another maker to see if he will furnish machines for less, just as though it was a circular saw, a roll of belting or a barrel of oil that was wanted. This not only degrades the business of machine manufacturing, and provokes competition and bad work, but it leads to a state of affairs that allows almost any one to engage in machine-making without the engineering knowledge and skill that is needed.

This is not the way to construct and sell machines that will earn the most money. They should, whenever practicable, be specially adapted to the work to be performed, by makers who not only understand the nature of the work and the principles of

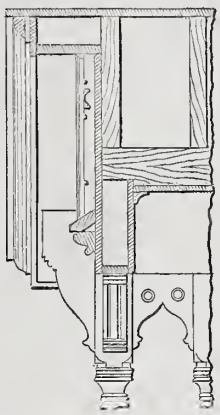


Fig. 15.—*Section Through Porch Gable.—Scale, ⅜ Inch to the Foot.*

the machines, but have proper facilities for designing and modifying them without enhancing their cost. In most cases a man who is to run a machine upon some special work knows how it should be made and arranged for that work, and he should have it arranged accordingly. If a machinist applied to has not the skill or the engineering knowledge to modify the machine, go to one who has such knowledge, and the chances are that what is saved at such a shop by skill and system will fully make up for the extra cost of the changes needed. This commercial system of machine manufacture has, among other troubles, led to a kind of conditional sale system. Machines are bought—and, what is stranger, furnished — on trial. The purchaser is afraid to trust his own judgment, and the maker is not to be depended upon; the managers or the operators have no choice except between the stereotyped machines in the market, and the builder is allowed to send a machine on trial, or, rather, to send one with a guarantee of its working. The way to reform this, which all must admit is a wrong system, is for the machine operators to educate themselves in the principles of constructing as well as operating wood machinery; to study the theory of cutting edges, the proportion and composition of bearings, the diameter and length of the spindles, the size of the pulleys and the width of belts, speeds and everything pertaining to wood manufacture. They must not depend on machinists, who, as a rule, know nothing of woodwork, to do this. It is altogether a different thing from making lathes and planer drills for metal work—tools which machinists understand and continually use in their own business. Wood machines are not only peculiar and difficult to build, but are also peculiar to operate. A machinist is expected to run a lathe or planer, to drill or do vise work; but, on the contrary, they are only a few wood workmen who can run the different machines found in the wood shop, so that it is unreasonable to expect a machinist, without specifications, to fill an order satisfactorily for a machine which even the operator may not understand. In ordering machines, therefore, take time to investigate their adaptation to what you want to do; if the work is of a regular character, the public reputation of the machine may be trusted; but it is due to the dignity of any shop to at least attempt to improve their manipulation by modifying machines whenever useful improvement suggests itself.

Utilizing Ashes.

A patent has lately been granted for the use of ashes in making mortar. It has been found that the fine portion of domestic ashes is capable of being converted, with a small proportion of lime, into a mortar having, when a month old, a tensile strength of from four to five times that of common sand and lime mortar, or about 80 pounds per square inch. Sand-mortar a month old has a tensile strength of 20 pounds Ashes and lime, mixed as béton, gives a tensile strength of 140 pounds and a crushing strength of over 1100 pounds per square inch. It will thus be seen that, by utilizing the ashes for mortar, a large part of the expense of removal could be saved, together with the whole cost of procuring sand for that purpose, and, at the same time, a very superior article of mortar be produced. In consequence of the small quantity of lime required (10 per cent.), it would be necessary to mix the mortar by machinery at a mill and deliver it ready for use. This practice prevails to a great extent in European cities on account of the superiority of milled over hand-made mortar. Ash-mortar has the additional advantages of resisting the action of water as soon as it has set (in from two to three days), and also the combined action of fire and water, the quantity of lime being so small and the chemical union with the ash so complete that the application of heat does not produce free oxide of lime, as in the case of sand-mortar, and consequently does not swell when water is applied to the heated mortar. The ash-mortar forms when set, a silicate of lime and alumina, and hardens uniformly throughout, like cement; while sand-mortar, when set, is but an imperfect carbonate of lime, the sand furnishing the nucleus around which the carbonate forms.

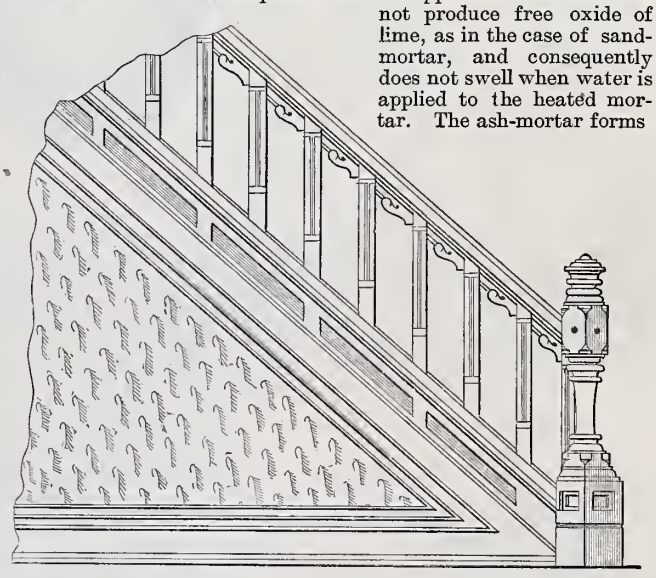
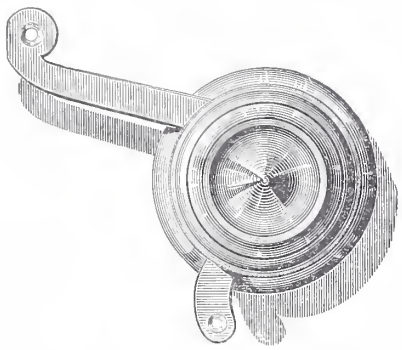


Fig. 16.—*Elevation of Hall Stairs.—Scale, ⅜ Inch to the Foot.*

Fig. 17.—*Plan of Stairs.—Scale, ⅜ Inch to the Foot.*

Bell-Hanging for Inside Rooms.

Our article on "Practical Bell-Hanging," published a short time since, has attracted such wide interest, and has, apparently, been of such service to our readers, that we are induced to continue the subject and to furnish an additional chapter on the art of adjusting bells. At the present time we shall give some general particulars with reference to hanging bells that have communication with



Bell-Hanging For Inside Rooms.—Fig. 1.—Purchase Lever Pull, About One-Third Size.

chambers, parlors, halls and the like. In this case, as in the former instance, we shall depend, in the main, upon manufacturers' and dealers' catalogues for our illustrations, and shall give such particulars as are, in the estimation of old and experienced bell-hangers, of the greatest importance. For much that follows we are indebted to Messrs. J. B. Shannon & Sons, 1009 Market street, Philadelphia, Pa., who, as we have already mentioned, issue catalogues specially devoted to this line of trade.

To hang bells that serve to communicate between rooms in a house, as, for example, from the parlor, dining-room and library and the various bed-rooms to the kitchen, requires more experience, or, at least, the exercise of more careful judgment, than hanging a bell from the front door, as described in our previous article. Yet the work is done in the same general way and with the same tools. If the building is finished and all the plastering is done, and the painting and decorations are completed, the wires must be run on the outside of the walls, and to make a good job of them it is necessary to keep the cranks and wires as far as possible out of sight. To do this successfully is a somewhat severe test of the knowledge and skill of the bell-hanger. A man of long experience will undoubtedly succeed the best with a job of this kind, but still it is not

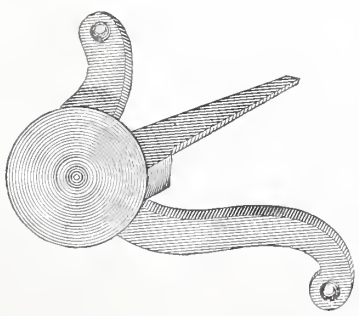


Fig. 2.—Plain Purchase Lever Pull, Mounted on a Shank.

impossible for a beginner to do the work successfully if he gives careful attention to the principles involved, and discriminates carefully with reference to all the details. The first step is to examine very closely into the construction of the building in order to determine how best to get the wires from the various rooms to some angle or recess, using the smallest number of cranks, thus leading them from the principal story of the building mostly out of sight and in a way least likely to be injured. Cranks when near each other on the same wire strain it and make the bell pull hard, even though the wire has been ever so carefully stretched. This causes the cranks sometimes to get out of position, so that they are not in the best shape for operation. The point to be considered, therefore, is how to get into the cellar and thence to the kitchen with the least show of wires and fixtures in the principal story.

Sometimes it is best to run up from the principal rooms to the attic, or from the parlor, for example, into a room not much used or especially valued on the second story, thence going to some wall against which the wires can be carried straight down. It is to be observed in all cases that bell hanging must be done at right angles and in straight lines. The less cranks and wire used the better the bells will ring. Every hole to be bored must be straight and large enough for the wire or wires, if there be more than one, so that they shall work freely.

The pull of a chamber bell is frequently placed near the ceiling and has attached to it a cord finished with a tassle, which hangs where it can be easily pulled by a person lying in bed. This arrangement gives comfort and confidence to an invalid, enabling him to summon an attendant whenever required, and saving him their presence when he would be alone. One of the best styles of pull used for the purpose named is that shown in Fig. 1, and is commonly known as a purchase lever pull. The wire is attached to the short arm and the cord to the long arm, and as the longer arm is considerably greater in length than the shorter one, a very slight exertion in pulling the cord will ring the bell satisfactorily. A purchase lever pull should be put up near the angle of the ceiling or below the plaster cornice. From it the wire should run in a horizontal line to the first crank. Care is necessary in order to mount the cranks strougly and true and at the same time smoothly, so as not to look

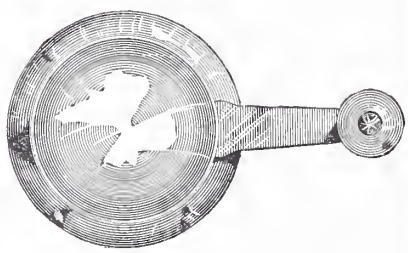


Fig. 3.—Form of Pull for Parlor Use.

clumsy. If the lever is colored to suit the border of the wall paper or the tint of the wall it will greatly lessen any possible objection to the presence of the fixture in the part of the room named. Another form of purchase lever pull is shown in Fig. 2, which represents an article mounted very plainly and having a shank instead of a plate. A lever of this kind is frequently used where appearance is of small moment. Both the purchase lever pulls here represented are reversible, making it possible to use them on either side of a room, with the wire running either right or left, as circumstances may require. Pulls of this description may be had in various styles and qualities.

A form of bell lever in common use for parlors and libraries is shown in Fig. 3. Like the kind we have just described, it is manufactured of various qualities. It is placed on the side of the chimney breast, or on the wall near a chimney, or on a partition near the casing of a door. It should be placed high enough to escape being struck or hidden from view by the back of an ordinary chair. The wires from it are run downward to the cellar or basement. In adjusting wires to fixtures of either of the kinds meutioned, too great care cannot be taken to run them straight, and also to see that the cranks are well mounted and firmly driven or screwed into place. Staples should be used for supporting the wires, but not more than two wires, or, at most, three, should be run under one staple. The staples should be used sparingly, and care should be taken to see that they do not bind the wire. If the wires are allowed room to shake they will be kept free from dirt and dust.

When the cranks turn into the kitchen, provided the bells from the various rooms are located there, they should be kept as far away from the bell board as possible, and should have the eyes of the cranks a little lower than the eyes in the bell carriages. Where several bells are thus placed in the kitchen, it is desirable to have their tones different, so that no difficulty will be experienced by an attendant in recognizing the bell that has been sounded, even though the eye does not detect its motion. A pull called a slide bell-pull, such as is shown in Fig 4, is often used in dwellings, although its more common use is found in steamboats, hotel offices, factories and the like. It is put in place by screwing to the edge of a door or window casing, and running the wire from it up or down, as the case may be. A pull of this kind is not adapted for use upou a horizontal wire. A foot bell-pull is shown in Fig. 5, which is of use in the floor of a dining-room, where it is arranged in such a manner as to come directly under the table, where it may be reached by the foot of the mistress when she desires to summon a servant, and saves the necessity of an ordinary call bell upon the table. Bell wires, wherever exposed, should be covered by a piece of hollow astragal molding or by a box large enough to give plenty of room for the wires to work. In putting up wire covering of this kind it is well to fasten it in place with screws, so that in the event of its being necessary to repair or change the work in any way the wires can be reached without difficulty. Instead of having the front-door bell as mentioned in our last article, where there are several bells in the house its wire is occasionally run into the cellar or basement, and thence with the wires from other rooms to the back part of the house. It sometimes happens that householders desire two bells to ring in different parts of the house from the front door. To do this run the wire from the front-door pull to the first bell, and attach it to the eye of the bell carriage; then attach another piece of wire to the eye and run on to the second bell, where the check spring will be employed, as illustrated in our previous article. By this arrangement the two bells are rung nearly as easily as one, and only a little additional wire and a little more work are necessary to accomplish the desired result.

Fig. 4.—Slide Bell-Pull.

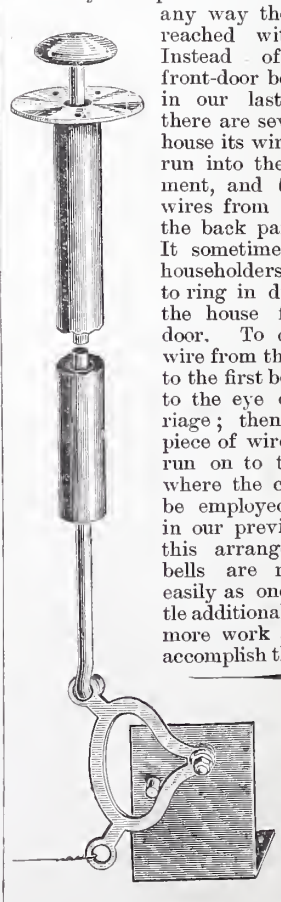


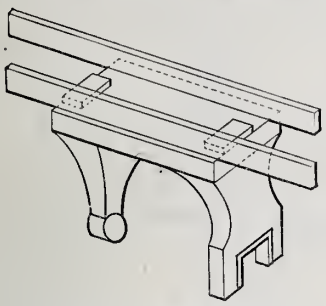
Fig. 5.—Foot Bell-Pull.

A metallic plastering surface for buildings, in place of laths, consisting of a wire cloth which is corrugated horizontally at certain equal intervals, has been patented by J. Stanley, of New York City. At the points where the corrugations cross the joists the cloth is fastened to them by staples. Inasmuch as the corrugations extend outward—that is, toward the joists—an ordinary short staple will do. At the same time, the main body of the wire cloth will be well in front of the joists.

Construction of a Cheap Lathe.—III.

THE HEADSTOCK CASTINGS.

In these papers we shall not assume the possession of much elementary knowledge of workshop practice on the part of the readers, since such an assumption would not be fair to some of them, at least. Hence, we trust those who have had experience will tolerate remarks upon subjects which



Cheap Lathe.—Fig. 15.—Checking the Headstock with Winding Strips.

"everybody knows," but which wood-turners, cabinet-makers, students, carpenters and amateurs unpracticed in workshop matters do not know. We will, therefore, give such sketches and descriptive details as will render the whole process clear to every one who is interested in the matter.

Now that we have our castings, let us look them well over to see if there are any "blow-holes" or "scabs" about them, particularly in those portions which have to be bored or screwed. If bad, send them back without wasting labor in their fitting. Before marking out the centers, we shall either plane or file the bottom faces, which slide on the bed, as true as we possibly can. Perhaps it will be better to assume that the use of a planing machine cannot be procured, and that it is preferred to file everything up rather than put the work out. Given a small surface-plate, a steel straight-edge, a square and a scraper, with the necessary coarse and fine files, we shall be able to do all we require without a planing machine. We must, however, have the use of a lathe, or pay for our turning, and among our friends there should be some one or more who would be both able and willing to allow us the use of a workshop, with its lathe, vises and common tools. At least, we must presume that such is the case with most of our readers.

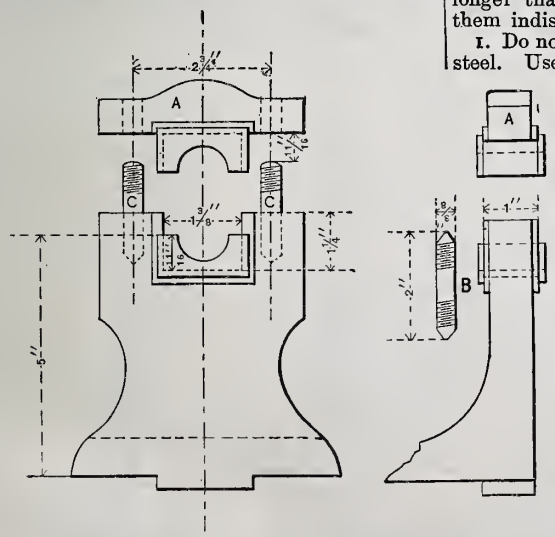


Fig. 16.—Fitting the Brasses in the Headstock.

Next fit in the brasses. File the facings for the brasses 1 inch through (Fig. 16) parallel with each other, and square with bottom and sides of headstock, trying with calipers, and rubbing on the surface-plate from time to time. File the seating for the brasses 1¼ inches deep from the top by $1\frac{7}{16}$ inches between, and perfectly parallel and square. It is very easy to say, "perfectly parallel and square," I can hear somebody growl who has not finished the bottom of his headstock yet. So it is, and when one attempts the filing of a flat surface for the first time, especially if the surface be of small area, he meets with discouragement because it will not come flat, but rounding. But, never mind; practice enables one to overcome this difficulty. Beginners are sometimes told to try and file hollow. Not till we come to the slide-rest, however, shall we meet with any very severe test. In filing these seatings for the brasses, do not attempt the long strokes when taking the last cuts, but use the point of the file rather, and feel the cut with the forefingers of the left hand.

Take the headstock in hand first. With an old file take off some of the hard skin and sand from the bottom of the casting, or, better still, remove it at the grindstone. Then file approximately true with a coarse flat file, trying the surface with steel straight-edge, up and down, across and obliquely; check with winding strips as well (Fig. 15). Two steel straight-edges, or thin wooden ones for the nonce, planed perfectly parallel, and laid down as indicated, should show their upper edges perfectly parallel with one another when the bottom of the casting is true. Then, when true, use a finer file; lastly, try on a surface-plate colored with red lead mixed with oil, and touch off the slight projection and irregularities left by the file with a scraper.

Let us have our say about the files, once for all. They are expensive tools and we shall require several of them. In the hands of a careful workman they will last much longer than in the hands of one who uses them indiscriminately and roughly.

1. Do not use new files for wrought iron or steel. Use them, first of all, for brass, then for cast iron, and afterward for wrought iron and steel. If they are used on wrought and cast iron first, they will not cut brass afterward. A file useless for brass will cut soft cast iron moderately well and wrought iron excellently.

2. Always keep a partly worn-out file for taking the skin and sand off forgings and castings, before using the better files upon them. The scale of oxide on forgings, and the sand and hard chilled skin on brass and iron castings, will ruin a new file almost immediately. A grindstone furnishes a more expeditious method of removing these extraneous matters.

3. Always take off as much as it is safe to do with a rough or a bastard file before a finer one. This economizes both time and files.

4. Relieve the pressure from a file when drawing it back on the return stroke. The cutting edges of the teeth are thus preserved.

5. Keep a piece of card wire at hand to clean out from time to time the fragments of metal that stick between the teeth.

Well, by using the point of the file with the fingers, and checking with straight-edge and square, we have got our seatings pretty true. The $1\frac{7}{16}$-inch space between is just the least shade wider at the top than at the bottom—just enough to swear by. All the better, because the brass will tighten itself when it goes in by, and by. Color the seating with red lead mixed with oil, and file the brasses to a fit. Be very careful and merely scrape at the last, lest we overdo the matter and they fall in. The joints of these brasses will coincide with the centers of the lathe = 5 inches. The cap which keeps the top brass down will be filed flat across its lower side (A, Fig. 16), and its two facings will be filed to fit between the flanges of the brass = 1 inch wide.

We have no drilling machine, so we will do our drilling in the lathe. Mark the centers for the hold-down bolts, both in the cap and on the top of the headstock, at 2¾-inch center, popping them rather deep. Screw the drill-chuck on the mandrel, put the drill-plate on the poppet, and, placing the cap first against the plate (Fig. 17), drill a couple of ⅜-inch "clearing holes" in that—namely, such that a bit of ⅜-inch rod will just pass through. Then, placing the headstock in a similar position, drill in that two ⅜-inch "tapping holes"—namely, holes to be screwed with a ⅜-inch tap. The drilled holes should be barely $\frac{5}{16}$-inch diameter by 1 inch deep. Tap these holes, entering with a taper tap in the first place, and finishing with a parallel or "stump" tap. Then file up two bits of ⅜-inch round rod, 2 inches long, in the lathe, and cut a thread to a distance of ¾ inch from each end (Fig. 16, B), one end of which will be screwed tightly into the holes just now tapped (Fig. 16, C C); the cap will be slipped over, and two nuts threaded over the free end of each screw will tighten the cap down on the brass and "lock" it there.

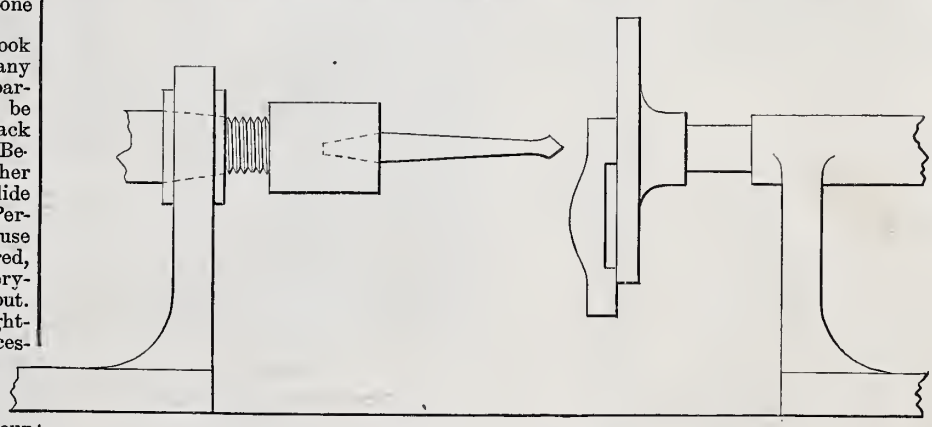


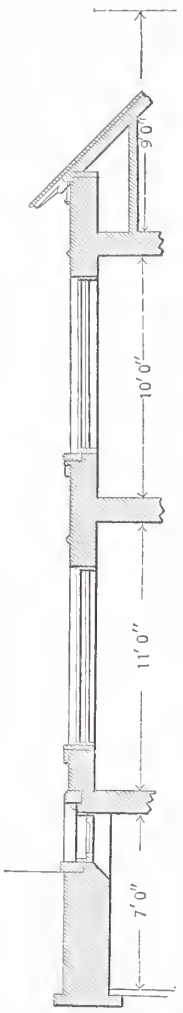
Fig. 17.—Drilling the Cap of the Headstock.

Wooden Fences.

An English exchange gives the following useful recommendations for preventing the decay in wooden fence posts: There are several remedies proposed for the very frequent decay of wooden posts used in fencing. Charring the part of the posts put into the ground is often resorted to, and is found to answer better than any outer coating of paint or tar; but Mr. Scott, in his treatise on "Farm Roads and Fences," says the "best defense against the decay of the posts is to leave the bark on at that part which is to remain immediately above and below ground." Another recipe is given as follows: "Take boiled linseed oil, and stir in pulverized coal to the consistency of paint. Put a coat of this over the timber, and there is not a man alive who will live to see it rot." It is evident the post should be perfectly dry before it is coated with either this or boiling tar, or the moisture within will tend to rot the timber all the more. There are other points to be observed in the construction of post and rail fences which are often disregarded. One is that the tops of posts and rails should be well beveled or splayed off, to throw off the wet; the mortises in the posts should not be too deep, or the strength of posts will be impaired, and care should be taken to cut the mortises so that there should be no lodgment of water.

Second Prize Design—Ninth Competition.

In our January issue we presented the perspective view, elevations, floor and roof plans, designed by Mr. F. J. Grodavent, and to which was awarded the second prize in the Ninth Competition. We now lay before our readers a portion of the details forming a part of Mr. Grodavent's effort. The most casual inspection of the diagrams presented herewith will show that the designer has given this subject the most careful attention, and has presented a set of details which would leave very few questions in the mind of any competent builder with respect to the construction and exterior finish of the building represented. Several of the views are very nearly equivalent to elevations upon an enlarged scale. They show such large portions of the building as to answer a very fair purpose where the elevations are not at hand. These details, taken in connection with what was published in our January number, form as complete a set of working drawings as ordinarily falls to the lot of a builder by which to work.



Second Prize Design, Ninth Competition.—Fig. 1.—Vertical Section, Showing Story Hights.—Scale, ⅛ Inch to the Foot.

Care of Bearings.

One of the most intricate and difficult things in connection with wood-working machinery running at a high speed is a proper care of the bearings, and even after long experience it is difficult to tell at once or with any certainty the true cause of a hot journal. When a bearing becomes hot the machine stops, and, if on the engine or line shafts, all the machines stop, so that it is an important matter to know how to treat it. To remove the cause is, of course, the best plan and the first thing to be done, but the cause, as may readily be imagined, is sometimes not easy of determination. Aside from becoming dry for the want of lubrication, the cause of heating may be want of truth in the shaft, either from not being round or from being sprung. It may be for the want of a fit and lack of surface, from being too tight or from overpressure—that is, too much pressure for the amount of surface. Among all these, the question is, first, to tell with which the trouble lies, and, next, how to apply a remedy in the least time and best manner. When a bearing heats, if the shaft is small and can be freed from gearing and belts, first determine whether it is loose enough; if so, screw down the cap until it binds a little, and then turn the shaft by hand, watching carefully whether it binds more at one place than at another. The least irregularity can be discovered in this way, indicating that the bearing is not round and needs turning. If the shaft is crooked, it is detected by holding a point against it while running—a matter that any one understands.

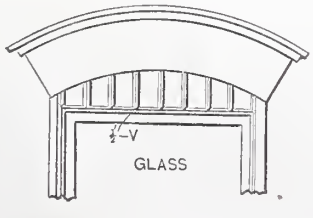


Fig. 2.—Head of Window in Wing.—Scale, ⅜ Inch to the Foot.

If none of these things appear, take out the shaft and examine the bearing; see where the shaft bears, whether at one end only or on a line through the bottom or on the sides. Examine the cap to see whether it shifts so as to bind on the sides. This want of surface is the most common cause of heating with the bearings of new machinery, and perhaps the most common in bearings that have been remolded; if out of truth scrape the points where the shaft bears until it touches throughout. Use good oil in starting, and, if necessary, cool the bearing for some time with water. It is well not to place too much faith in compounds of plumbago, soap or anything of the kind. They may have claims as lubricants, but it is generally a waste of time to try to conquer a hot bearing by any other plan than to correct the mechanical defect which lies at the bottom.

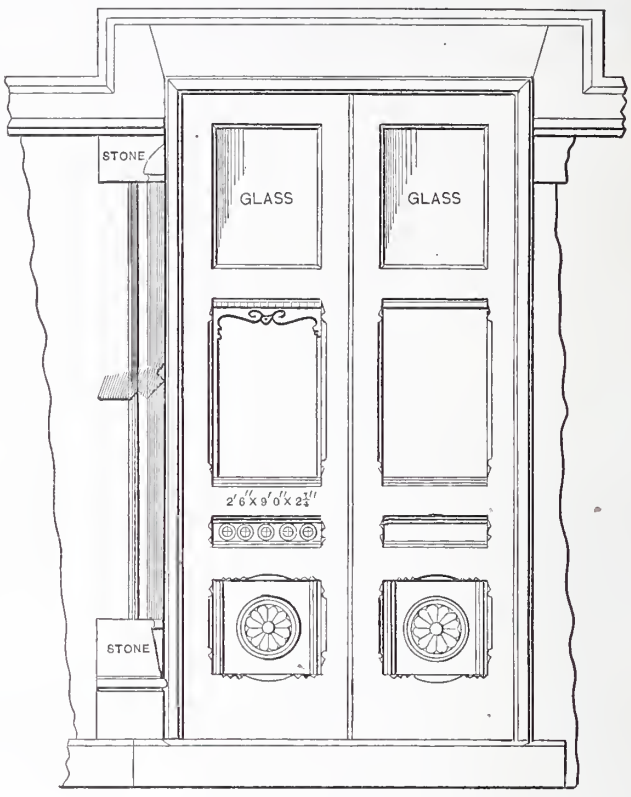


Fig. 3.—Elevation of Front Doors.—Scale, ⅜ Inch to the Foot.

TRADE PUBLICATIONS.

Low's Art Tiles.

Those who were fortunate enough to procure a copy of the beautiful catalogue issued something over a year since by Messrs. J. G. & J. F. Low, Chelsea, Mass., will be eager to inspect the first supplement, which has recently been issued. The book in question is a quarto, of the same size as the original, measuring 11 x 13 inches. The cover is of appropriate design, worked out of some of the tile patterns peculiar to the Messrs. Low. The work reaches us through Messrs. Caryl, Coleman & Co., Limited, of No. 9 East Seventeenth street, New York, who are general agents for the Low tiles in this city. The work may be described as consisting of a collection of very handsome heliotypes. The designs represented are, for the most part, those applicable for use in mantel work, and represent jambs and friezes in a great variety of designs and of the highest artistic value. It would be impossible to convey an adequate idea of any of the goods represented by mere verbal description, as articles of this kind need to be seen in order to be appreciated. The utility of these tiles both for mantel work and also for various decorative purposes, including their use in stoves and grates, is too well known and appreciated to require mention at this time. The Messrs. Low were the first to make a success of the production of dust tile, and in their manufacture they have combined high artistic experience with the best mechanical facilities, resulting in a line of goods nowhere excelled.

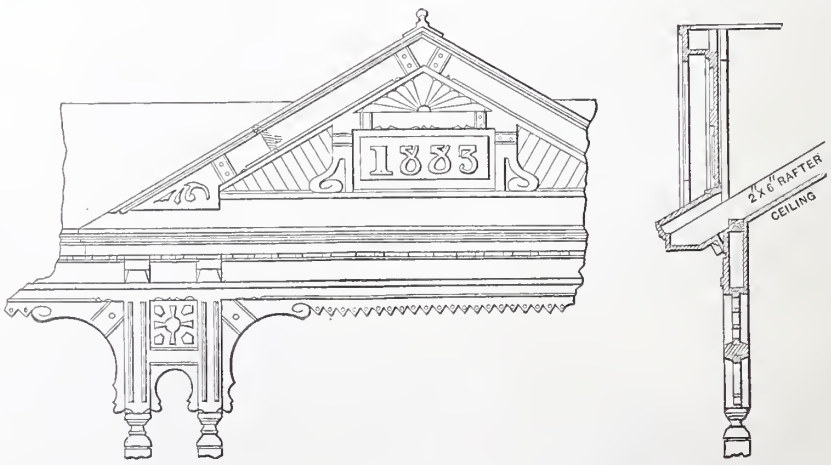
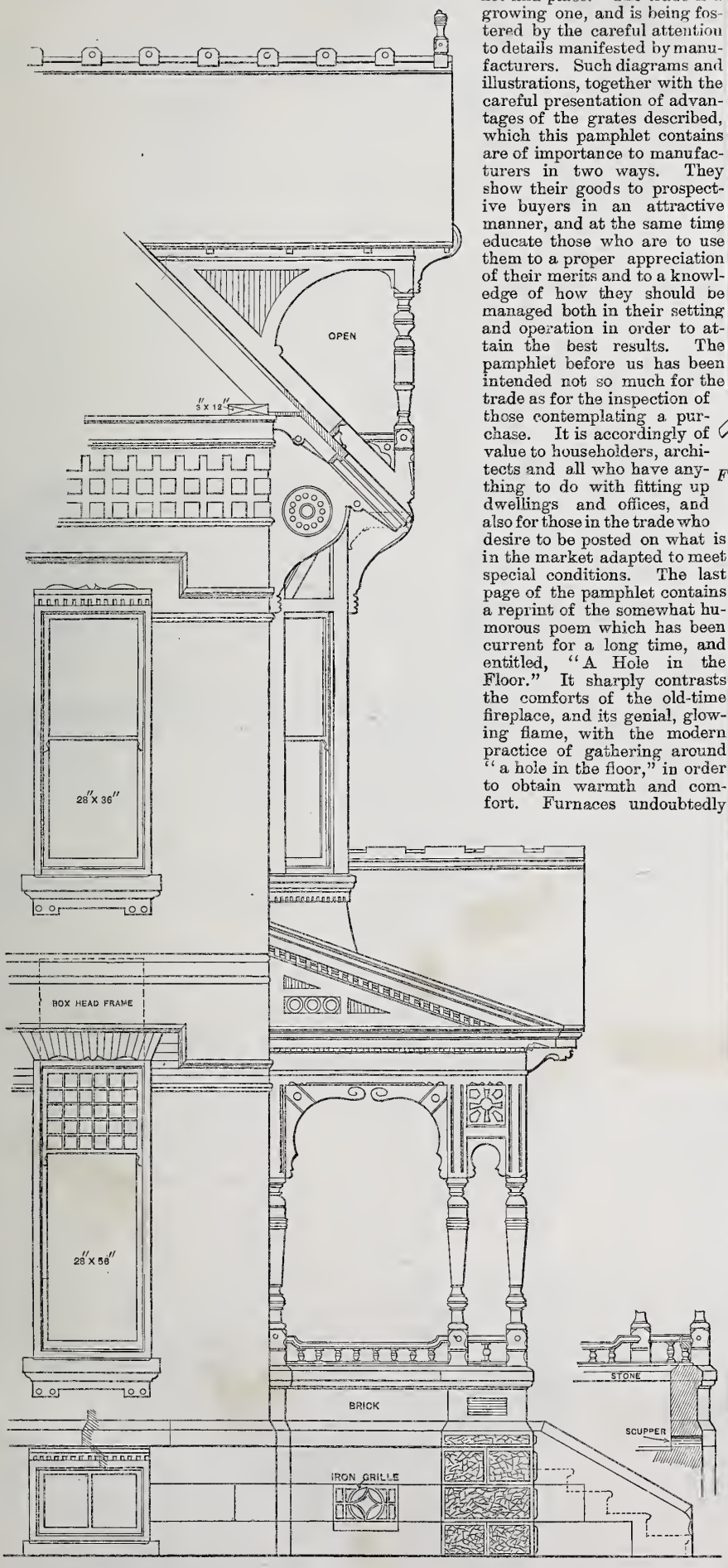


Fig. 4.—Elevation and Section of Gable in Piazza.—Scale, ¼ Inch to the Foot.

Open Fires.

Messrs. William H. Jackson & Co., Union Square, New York City, have sent us an oblong pamphlet of some 20 pages, devoted to a description of the ventilating grate which they make, and which is known as the "Sanitary" grate, manufactured under G. L. Morrison's patent. The pamphlet is attractive in appearance, having handsome letter-press and engravings of fair quality, all inclosed in a cover which is in imitation of alligator skin. The "Sanitary" grate is presented by elevation views, perspective views with sections broken away, showing air chambers and interior construction, and by diagrams indicating the method of setting

the grate under different conditions, together with a diagram showing the theoretical action of the currents of air in a room heated by a grate of this kind. Grates and open stoves constructed upon principles similar to that incorporated in the "Sanitary" grate are becoming very popular, and comparatively few houses of any pretensions to comfort and elegance at the present time are erected in which one or more pieces of apparatus of this general description does not find place. The trade is a growing one, and is being fostered by the careful attention to details manifested by manufacturers. Such diagrams and illustrations, together with the careful presentation of advantages of the grates described, which this pamphlet contains are of importance to manufacturers in two ways. They show their goods to prospective buyers in an attractive manner, and at the same time educate those who are to use them to a proper appreciation of their merits and to a knowledge of how they should be managed both in their setting and operation in order to attain the best results. The pamphlet before us has been intended not so much for the trade as for the inspection of those contemplating a purchase. It is accordingly of value to householders, architects and all who have anything to do with fitting up dwellings and offices, and also for those in the trade who desire to be posted on what is in the market adapted to meet special conditions. The last page of the pamphlet contains a reprint of the somewhat humorous poem which has been current for a long time, and entitled, "A Hole in the Floor." It sharply contrasts the comforts of the old-time fireplace, and its genial, glowing flame, with the modern practice of gathering around "a hole in the floor," in order to obtain warmth and comfort. Furnaces undoubtedly have their proper place, and so have fireplaces and open grates, and it is for the intelligent householder to decide between them.



Ninth Competition.—Fig. 5.—Partial Elevation of the Left Side, Front.—Scale, ¼ Inch to the Foot.

Hitchings & Co.,

233 Mercer street, New York City, send us a copy of their catalogue devoted to green-

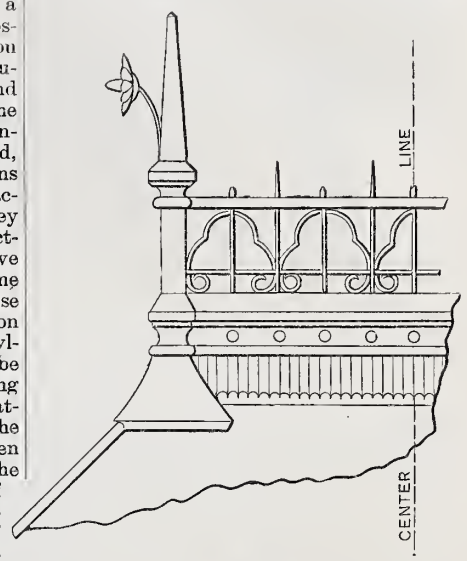


Fig. 6.—Elevation of Cresting and Finial.—Scale, ⅜ Inch to the Foot.

house heating and ventilating apparatus. The pamphlet is a handsome specimen of typographical art, contains 64 pages, bound in a dark olive-green cover, with bronze side

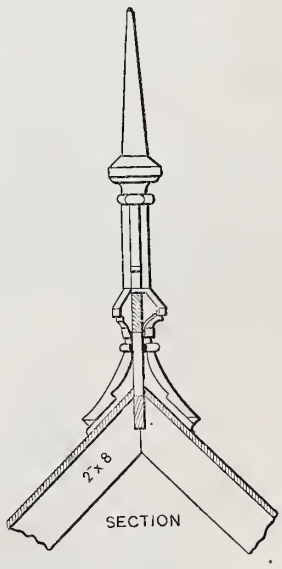


Fig. 7.—Section Through Cresting.—Scale, ⅜ Inch to the Foot.

title and fourth page. The preliminary chapter in the book discusses the subject of heating greenhouses and describes apparatus desirable for use for that purpose, entering into such details as the construction

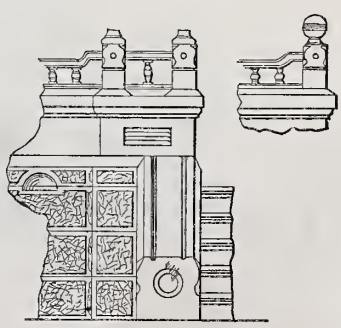
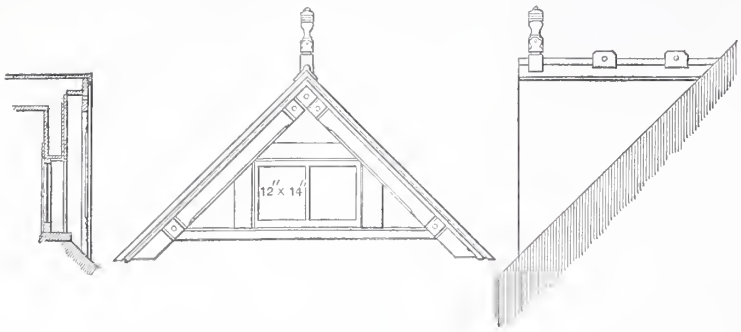


Fig. 8.—Front of Buttress and Balustrade of Dining-Room Piazza.

of flues, hight of chimney, &c. Hot-water heating apparatus is next considered, and is described at some length. Following this

are lists of the special goods made by this company, with tables of capacity; also, illustrations consisting of general views and sectional diagrams, and full particulars with regard to their operation. Those of our readers who have given the subject of hot-water heating any attention will find much in this catalogue to interest them. Hot-water heating as practiced in this country is restricted, for the most part, to greenhouses and similar purposes. Accordingly, the most approved apparatus for the purpose is found in catalogues of manufacturers making a specialty of such work. We occasionally receive inquiries as to where hot-water heating apparatus can be obtained, the questions, of course, referring to apparatus for use in heating dwellings. We see no reason why much that is shown in this work could not be adapted to the purpose desired in case such a plan of heating is expedient to employ. In addition to the heating apparatus already referred to, in the latter part of the work improved means for raising and for fastening ventilating sashes on the roofs or sides of greenhouses and graperies are shown. A domestic water-heater designed for use in first-class dwellings or small hotels as an auxiliary water-heater, and also a stand for the kitchen boiler, is described in the latter part of the work. This apparatus is constructed to be used separately or in connection with a kitchen range. It occupies no additional room and affords a means for effectively and economically heating water for bathing, laundry or other domestic purposes. The pamphlet concludes with a long list of references, including the names of leading floral and nursery establishments throughout the country, also a list of private establishments employing the apparatus described.



Ninth Competition.—Fig. 9.—Section Front and Side of Dormer on Main Part.—Scale, ¼ Inch to the Foot.

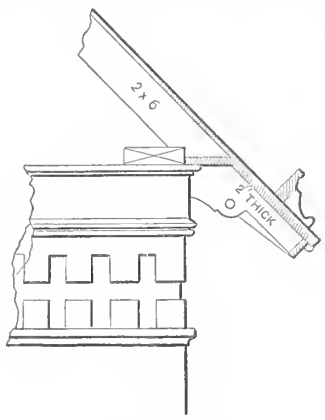
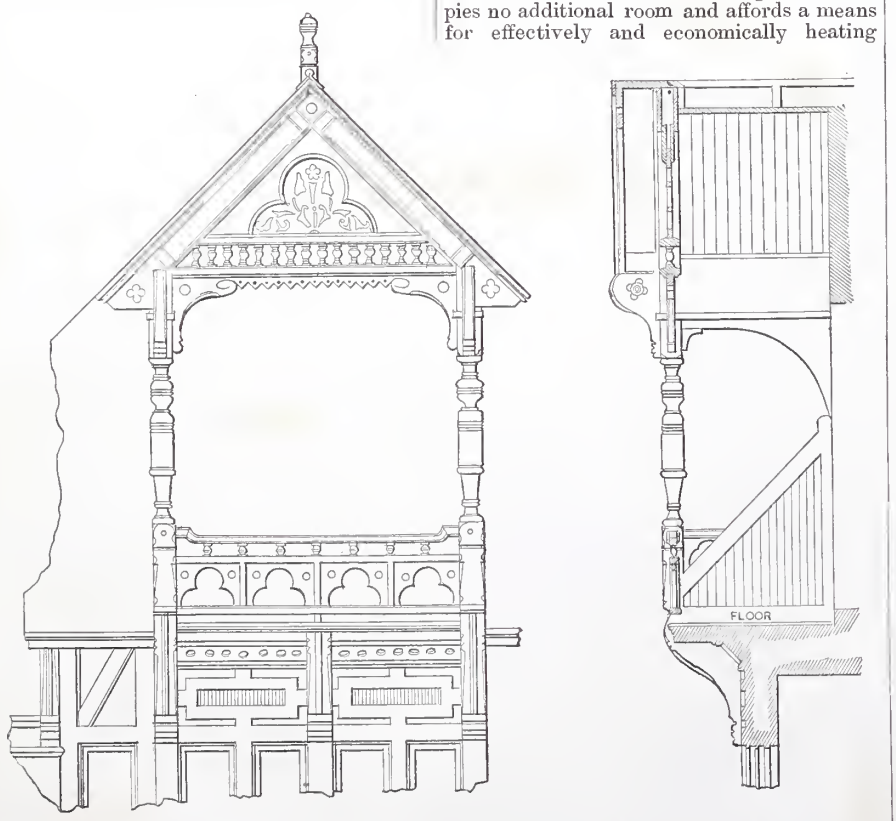


Fig 10.—Section of Gutter and Cornice on Wing.—Scale, ⅜ Inch to the Foot.



Figs. 11. and 12.—Elevation and Section of Balcony Dormer on Principal Front.—Scale ¼ Inch to the Foot.

Memoranda of Invention.

Mr. George M. Hopkins, of this city, solicitor of American and foreign patents, recently issued a convenient little publication containing hints on patents, and giving a general idea as to the method to be pursued in making applications. The whole subject, we do not doubt, is shrouded in some mystery to very many, and, in view of this, we think that Mr. Hopkins's little work will meet with a great deal of favor, containing as it does practical illustrations of the method of making memoranda relating to inventions, &c. In general, the value of an accurate record of an invention throughout its entire history is of great value, even after a patent has been granted. It fixes

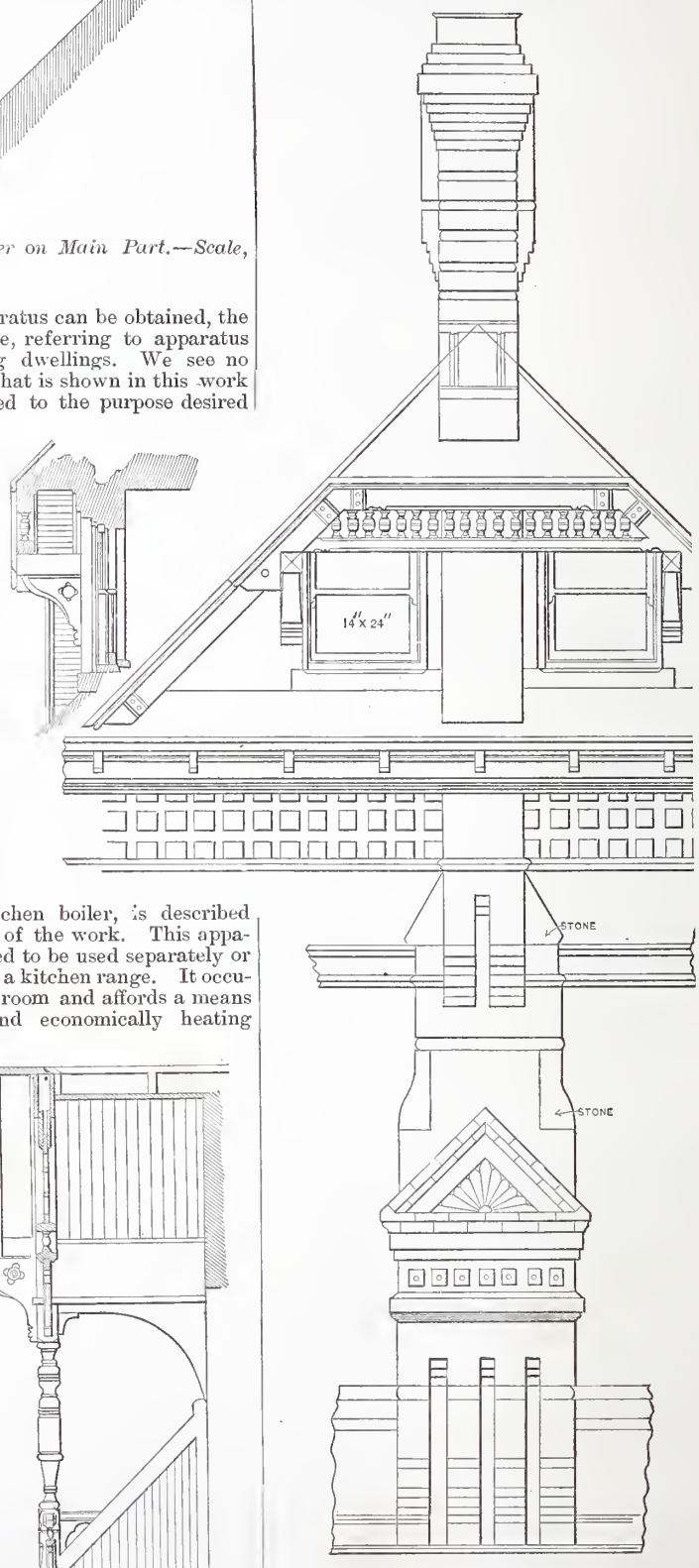
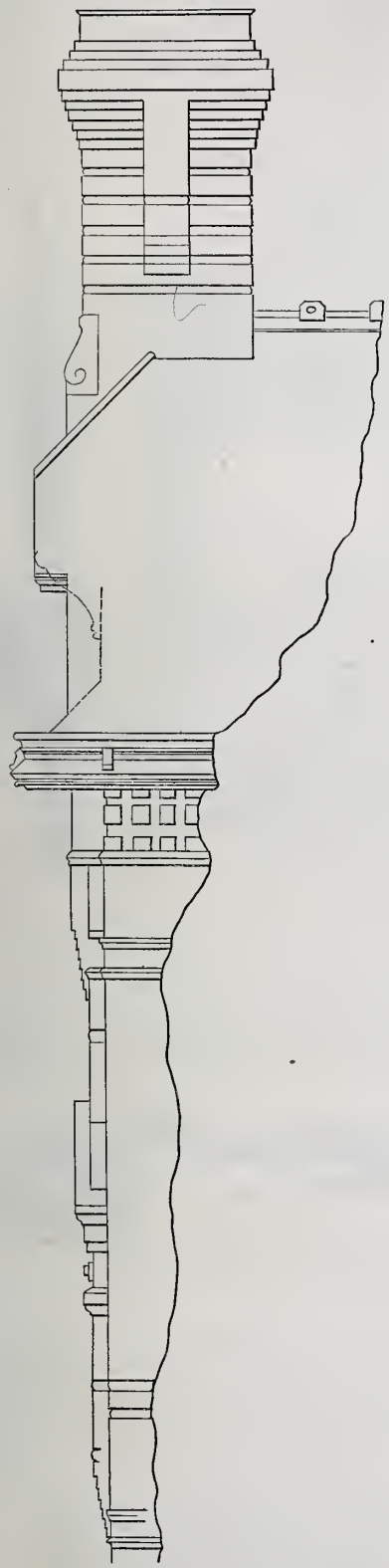


Fig. 13.—Front Elevation of South Gable and Chimney.—Scale, ¼ Inch to the Foot.

the date of the invention, shows whether the inventor has exercised due diligence in perfecting it, and is a witness in cases of interference or any other litigation that may



Ninth Competition.—Fig. 14.—Side Elevation of South Gable and Chimney.—Scale, ¼ Inch to the Foot.

arise. Considering these facts, the importance of the matter may be readily estimated. The author has had an experience of some 16 years in the patent business, and may well be regarded as an authority in matters pertaining to the subject.

Wood knots are now in in great demand, being used in exceptionally fine veneering, after they have been subjected to a steaming process which softens them and develops their color. Persons who are experts in judging what knots are of value make considerable money by going about looking for them. Some 26,000 pounds of knots were recently sent to New York in one shipment.

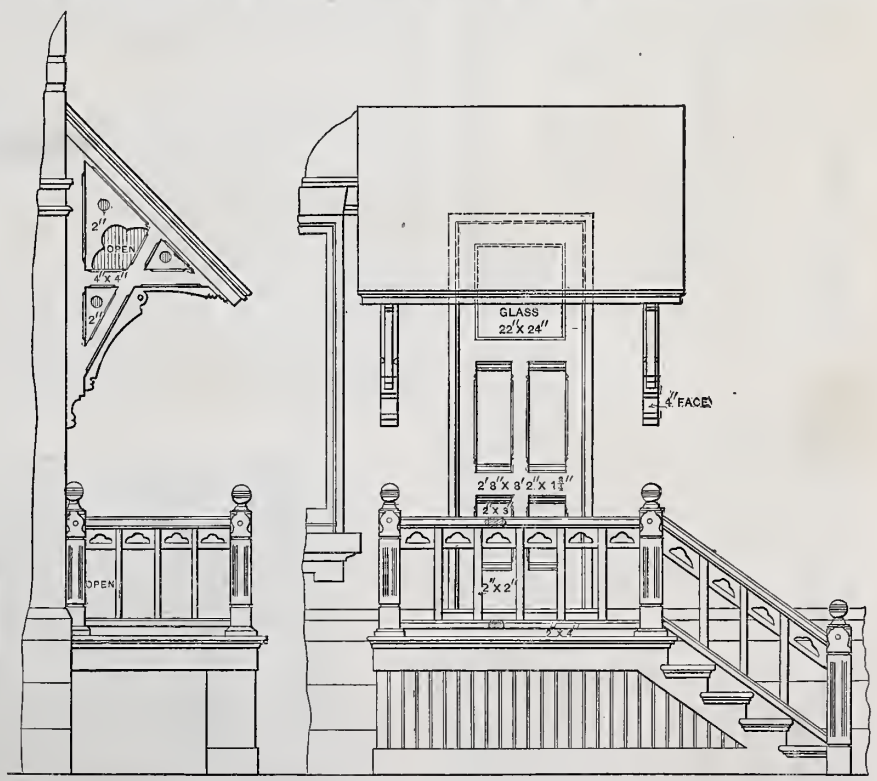
A Remarkable Number.

The discussion which has taken place in our columns with respect to the remarkable properties of the figure 9 gives interest to the following communication, published in one of the daily papers:

Attention was drawn in the newspapers, two or three years ago, to some of the singular qualities of the number 142,857. It was then pointed out that this number, when multiplied by any figure up to 6, reproduces its own digits, the results being successively (2) 285,714, (3) 428,571, (4) 571,428, (5) 714,285 and (6) 857,142. When 7 is the multiplier the result is 999,999. This, I think, is as far as the investigation went at the time. It has since occurred to me to experiment further, and I multiplied by all the numbers up to 45, and then by various higher numbers. This led to the following observation: If the digits of any multiple of 142,857 be separated into sets of six, measured from the right hand, and these sets of six be added together, the final result will always reproduce the original digits unless 7 be a factor, in which case the final result will always be 999,999. An example will illustrate this: Let us multiply 142,857 by 1,373,625. The result is 196,231,946,625. Separating into sets of six, and adding 196,231 to 946,625, we have 1,142,856, which by the same operation becomes 142,857. But if w multiply by 1,373,624, which has 7 as a factor, the result is 196,231,803,768, and the addition of the two sets of six digits produces 999,999. I have raised the original number as high as the twelfth power, producing a row of 62 figures. The observation is uniformly true up to this point, and presumably so *ad infinitum*.

The factors of the number 142,857 are 3 x 3 x 3 x 11 x 13 x 37. They may be rearranged, for convenience of multiplying, as 11 x 111 x 117. The six digits themselves can be placed at the points of a hexagon, and it will be found that the "results" already spoken of always preserve the hexagonal order, though one or other digit may take the lead. There is probably a number of eight digits which can be arranged at the points of an octagon with similar or more surprising phenomena. Has such a number been discovered? Perhaps some of our mathematicians can pursue the inquiry.

Figs. 15 and 16.—Front and Side Elevation of Rear Dormer in Wing.—Scale, ¼ Inch to the Foot.

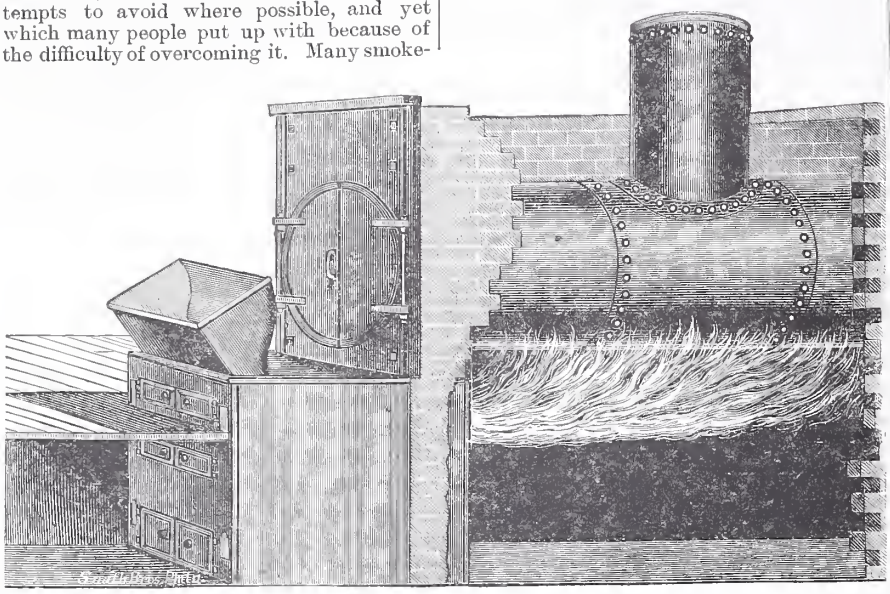


Figs. 17 and 18.—Front and Side Elevation of Porch and Hood to North Side Entrance.—Scale, ¼ Inch to the Foot.

NOVELTIES.

Smokeless Combustion.

The annoyance of smoke from a manufacturing establishment, whether from a coal or wood fire, is something that every one attempts to avoid where possible, and yet which many people put up with because of the difficulty of overcoming it. Many smoke-burning furnaces are before the public, and numerous inventions are chronicled in the daily papers from time to time having for their object a lessening of the annoyance from smoke, as well as economizing fuel. In Figs. 1 and 2 we show a device belonging to this general class which is of special interest to all who employ wood-working machinery, since it is intended to facilitate the burning of shavings. It is now being introduced by Messrs. F. Lawrence & Co., No. 206 Walnut place, Philadelphia. The general appearance of the device as applied to a steam boiler is shown in Fig. 1, while a sectional view through the front part of the apparatus is shown in Fig. 2. By examination of the latter it will be seen that in its essential features the device consists of a hopper discharging the fuel upon an inclined grate at the front of the furnace, and upon grate bars placed in the usual manner at the bottom. Sufficient air is admitted to this furnace in the usual way to maintain combustion, and the flames and gases draw through the aperture at the back of this chamber and against the boiler, as shown in Fig. 1. At the narrowest point in the opening at the back of the furnace air is admitted, both above and below, as shown by the flues in the section. These flues are so arranged that the air, in passing from the front into them, becomes highly heated. The air is admitted at the exact point, and in the best condition, to facilitate combustion and to ignite those gases which otherwise would pass up the chimney in the form of smoke. By this means the fuel is made to do the greatest amount of heating, while the appearance of smoke is almost entirely overcome. Great care has been taken to proportion the quantity of air to the purpose for which it is admitted. We understand that several prominent wood-working establishments in Philadelphia, notably that of Hall & Garrison, Eleventh street and Washington avenue, and the Franklin Planing Mills, Girard avenue and Vienna street, have furnaces of this kind in use.



Novelties.—Fig. 1.—F. Lawrence & Co's Furnace for Burning Shavings Without Smoke.

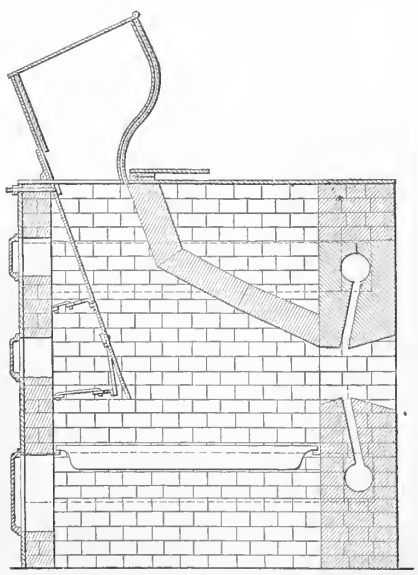


Fig. 2.—Section Through Front of Furnace.

Self-Adjusting Wrench.

A new self-adjusting wrench has been brought out by P. Lowentraut, of No. 278 Halsey street, Newark, N. J., and is shown in Figs. 3 and 4. The general appearance of the wrench may be gained from Fig. 3, while the arrangement of the working parts is shown in Fig. 4. It will be seen that the handle is pivoted to one of the jaws, and that its end is formed with cogs in such a manner as to engage with corresponding depressions in the sliding jaw. The effect of this is to cause the two jaws to approach each other and grasp the nut or other object to which they may be applied very tightly whenever the handle is moved for the purpose of turning them. The greater the resistance of the nut against turning, the tighter the wrench grasps it. From this it will be seen that the wrench is self-adjusting. The range of the 12-inch size is from $\frac{3}{8}$ inch to $1\frac{3}{4}$ inches. Several sizes of the wrench are made, adapting it to use for almost all purposes that may be required.

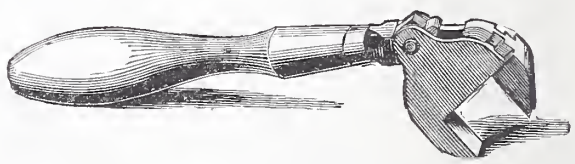


Fig. 3.—New Self-Adjusting Wrench.

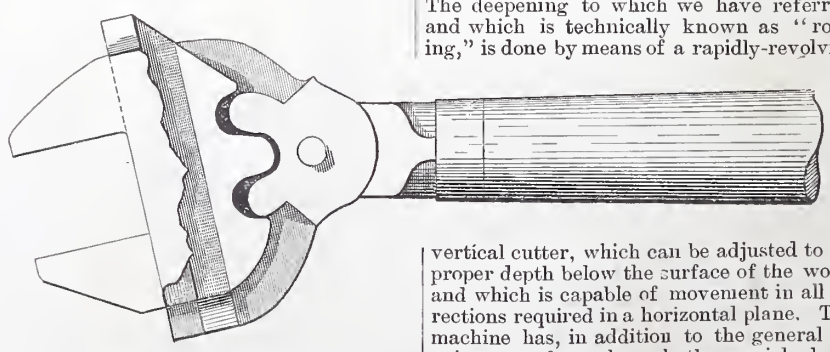


Fig. 4.—The Working Parts of the Wrench Shown in Fig. 3.

A Universal Countersink.

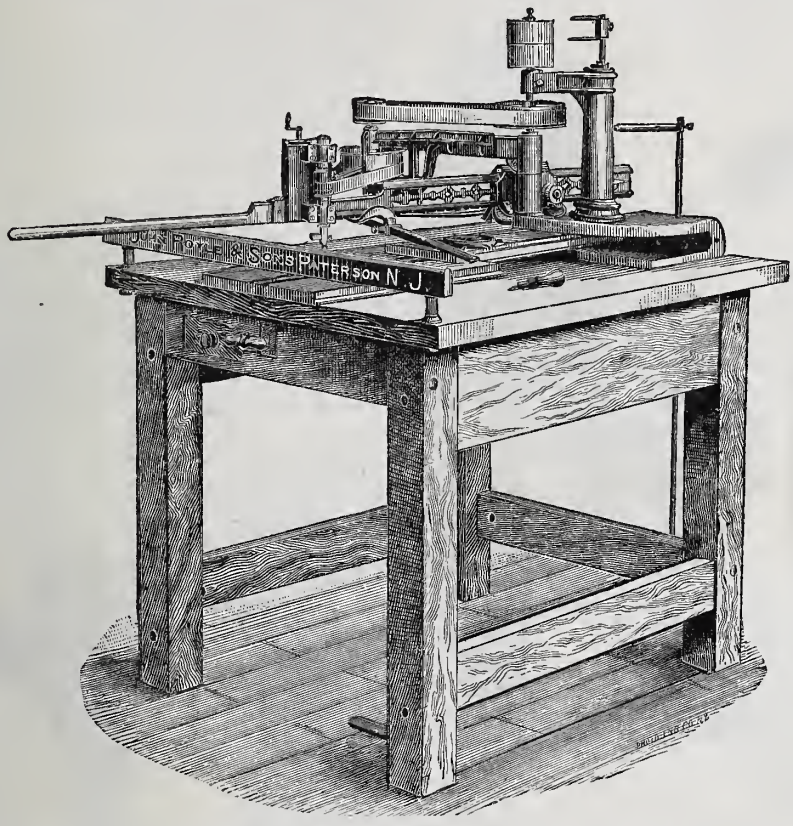
The Cleveland Twist Drill Company, of Cleveland, Ohio, are now making what may be termed a "Universal" countersink, illustrated in the annexed cut, and which will fit holes any size from $\frac{3}{16}$ inch down to the smallest size made. The two sides are alike, but one edge of each side is longer than the other, thus giving the cutting lip a lead. The blades when put on a twist drill should be so adjusted that the cutting lip will come up close to the cutting edge of the drill. If this precaution be disregarded the chips will curl up on top of the drill and between it and the countersink and gradually choke up, whereas, if put on properly, the chips will follow the drill and give rise to no trouble. The countersink not only prepares the place for the screw-head, but at the same time guages the depth of the hole—an advantage that all will appreciate. One of the best points of the tool is that any one can remove it, sharpen it on a grindstone, emery-wheel or oilstone, and put it on again with very little loss of time. The manufacturers are now making only one size, fitting $\frac{3}{16}$-inch drills, but will shortly furnish them up to $\frac{5}{16}$ inch.

Fig. 5.—Universal Countersink.

Routing Machine.

In Fig. 6 we show a straight-line routing machine, manufactured by John Royle & Sons, of 62 Railroad avenue, Paterson, N. J. This machine was exhibited at the fair of the American Institute, last fall, and it not only attracted marked attention upon the part of mechanical visitors generally, but was also awarded the medal of superiority. The purpose of the machine is to deepen with facility the depressed or white portions of woodcuts, electrotypes, stereotypes and the like. It is also used for making coarse wood engravings and for the manufacture of blocks for printing fine paper hangings. The same principle is capable of extension in the form of machines to be used in stair-building and other departments of carpentry and joinery. The deepening to which we have referred, and which is technically known as "routing," is done by means of a rapidly-revolving vertical cutter, which can be adjusted to the proper depth below the surface of the work, and which is capable of movement in all directions required in a horizontal plane. This machine has, in addition to the general requirements for such work, the special advantage of cutting straight and parallel lines. Accordingly, it is found useful in various processes of finishing and decorating work, as lines can be cut with facility and accuracy by it which otherwise could only be performed in a much more expensive manner. The construction of the machine and the means by which its several motions are obtained are very clearly shown in the engrav-

ing. A very high rate of speed is obtained upon a spindle which is made of hardened cast steel with carefully ground bearings. It may be safely run as high as 15,000 revolutions per minute. The rate at which it is operated depends, of course, upon the character of the work being done. The machine has the advantage of being very steady when in motion. The cutter-bearing arm is supported upon friction rollers, and is controlled by both hands. A light handle is properly arranged for each hand, the routing one of which is made extensible. The arrangement of this handle with a gutter above is such that it may be changed to the most convenient point at the will of the operator, without interfering with his position while routing or with the progress of the work. This enables the operator to rout very closely to the lines and into the most delicate spaces with ease, confidence, precision and rapidity. By changing the gutters metal or wood is routed equally well. The machine is designed for routing zinc, stereotype plates, either blocked or unblocked, letter blocks, wood engravings and show-bill cuts. The table top is entirely free from obstruction, and has a capacity for blocks 36 inches wide and of indefinite length. An iron bed-plate is used, in which is arranged a very convenient device for gripping or holding the work. The gripping-dog has a forward and downward movement, which in securing the work tends to press it firmly to the surface of the bed-plate. No special attachment or change is required for equally and firmly securing the thinnest plate or the most irregularly shaped block. The machine has been carefully designed, and thorough construction characterizes all its parts. Another form of routing machine is also manufactured by Messrs. Royle & Sons, which, in contradistinction to the one we have already described, is known as the radial-arm machine. It is somewhat simpler in its parts than the straight-line machine, but it is also very effective for use.



Novelties.—Fig. 6.—Straight-Line Routing Machine, Built by John Royle & Sons, Paterson, N. J.

Interchangeable Screw-Driver Set.

Messrs. Gay & Parsons, of Augusta, Me., whose ratchet screw-driver we described some time since, have recently brought out an interchangeable screw-driver set arranged in a case in the general manner shown in Fig. 7, which is likely to be of interest to all who admire a good tool neatly put up. In appearance the screw-driver handle provided with this set is very much like that of the ratchet screw-driver just referred to. The handle is mortised at the place covered by the plate shown in the engraving and a solid casting inserted, which is held by the three screws shown. The shanks of the bits are long enough to pass through the ferrule of the handle and slip into a square socket made in the casting referred to. The bits become very firmly fixed when inserted, and yet are very easily removed. As shown in the engraving, the bits belonging to this set vary in length; they also vary in width at the point, thus adapting them for various kinds of work.

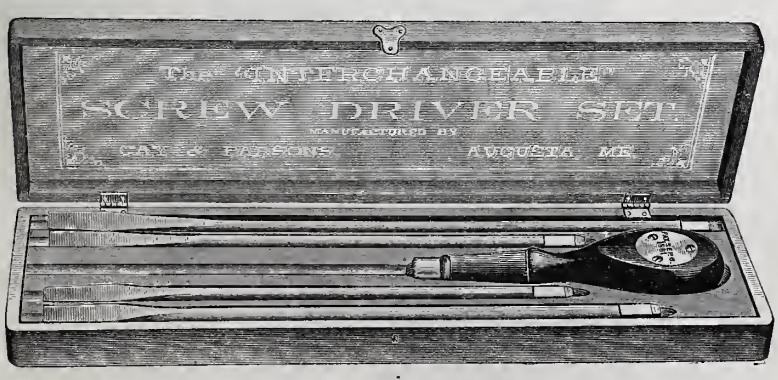


Fig. 7.—Interchangeable Screw-Driver Set.

Hunt's Blind Slat Stop.

One of the neatest devices which we have seen for preventing the rattling of window blinds, and also for fastening the slats in any desirable position, is known as Hunt's blind slat stop, and is shown in two positions in Figs. 8 and 9 of the engravings. The device consists of a metallic tip adjusted on the rod of the slats by a socket, and working in a clamp on the lower cross-piece of the blind, where it is regulated by friction or tension. The nature of these parts will be understood by reference to the engravings. The clamp is attached by three screws, two of which are designed for holding it in position, and the third of which regulates the tension of the clamp which holds the end of the tip. This clamp consists of a slitted piece of metal in such a form that by driving the middle screw into the wood the two fingers are brought into close relationship, thus holding the tip firmly. In the first figure the rod is shown thrown up into its highest position, in which place the slats are closed and the rod firmly locked. In order to release the tip it is pulled forward from resting against the clamp, and in opening the slats it passes between the fingers above referred to. Their friction is such as to hold the rod in any desired position. Messrs. Butler & Constant, No. 18 Warren street, New York, are the general agents.

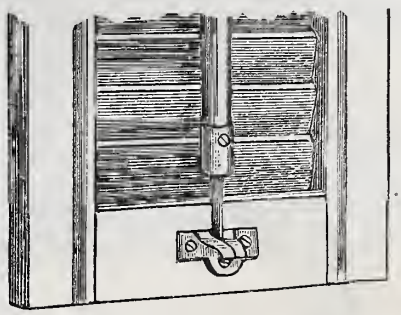


Fig. 8.—Hunt's Blind Slat Stop.—A Blind Shown Closed and Locked.

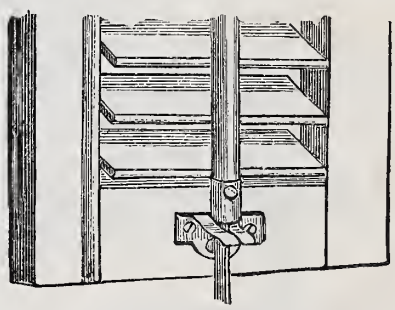
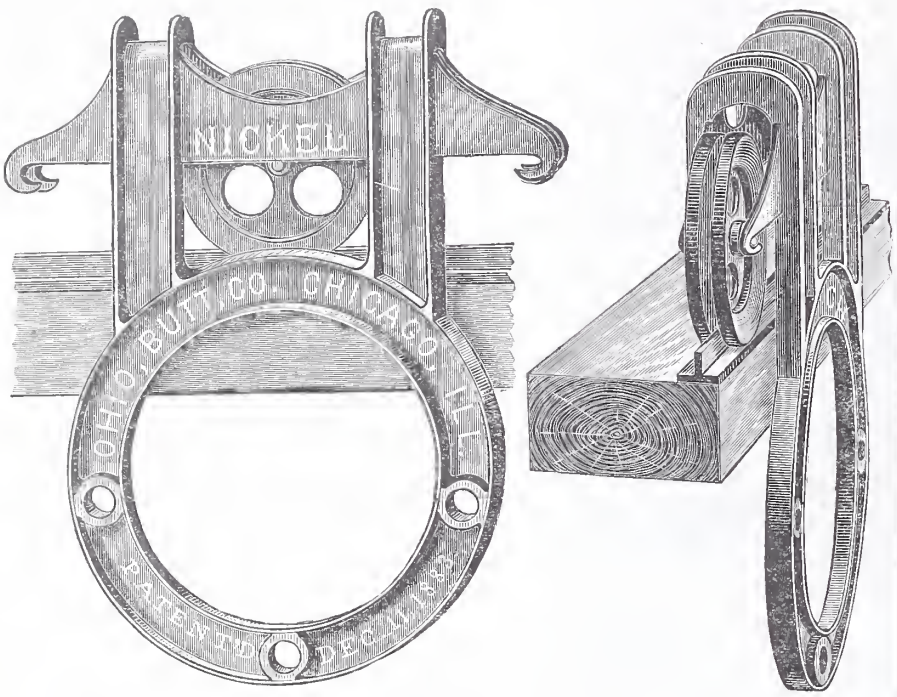


Fig. 9.—A Blind with the Slats Opened and Fastened in a Given Position.

The Nickel Barn-Door Hanger.

The common use of the word "nickel," referring to plated work, will lead many of our readers, no doubt, to imagine at the outset that the "Nickel" door hanger must be a hanger carefully finished and plated. However well finished the device may be, the term "nickel" in this case refers to the inventor, Mr. D. Nickel, rather than to the finished goods. The hanger bearing this name, two views of which are afforded in Fig. 10, is made by the Ohio Butt Company, No. 51 Dearborn street, Chicago. The special advantages to which the makers direct attention are the strength of the device and the small amount of friction encountered in using it. The principal parts are made of cast iron, while the axles of the wheels are of Bessemer steel. The manner in which the parts are arranged is such as to reduce friction to a minimum. In the first view presented the wheel is shown in the center, while in the second view, or perspective, at

the right, the wheel is shown to one end, thus indicating the travel of the hanger as the door is being run from side to side, which greatly reduces friction. The makers state that doors weighing 1000 pounds, properly hung with this device, can be started and run with a pressure of from 2 to 4 pounds. The general style of track employed with this hanger is shown in the perspective view. It is of a shape to be strong, and, the manufacturers state, is made unusually heavy. The design of the hanger is such as to make it cover a considerable space on the surface of the door to which it is to be applied, thus making it possible to bolt or screw it into position without bringing the bolts or screws too close together for strength.



Novelties.—Fig. 10.—Elevation and Perspective View of the Nickel Barn-Door Hanger.

A New Clamp.

Messrs. E. C. Stearns & Co., Syracuse, N. Y., have recently brought out a new iron clamp, the general appearance of which is shown in Fig. 11 of the engravings. This clamp has the special merits of good design, great strength, proper distribution of metal and convenient shape for use to recommend it to the favorable attention of the building trades. It is well made, of good material, and is likely to give satisfaction to all who employ it.

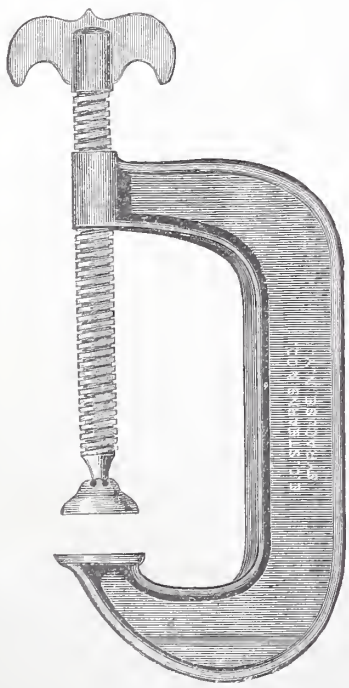


Fig. 11.—New Iron Clamp.

The Bodine Roof.

A form of roof which in one sense might be described as an artificial wood, and which is, in fact, a prepared board from pulp, is being introduced by the Bodine Roofing Company, of Mansfield, Ohio. The material put out by this company, when cut with a knife, resembles a close-grained pine shingle in some respects, although it is very evident, by looking at the sides of the material, that it is altogether different in character. The material is a wood-pulp board, manufactured under the patents of the Androscoggin Pulp Company. In its production white silver-leaf poplar, which is non-resinous, and spruce lumber, which is resinous, are combined in such a way as to make a wood board very compact. It is far more compact than the natural wood. The fiber extends in every direction, so that the board neither cracks nor splits. It is also lighter and more pliable than ordinary wood. The wood board manufactured in this manner is then treated at the factories of the company in Mansfield under various patented processes, and is finished by painting on both sides. The company are now offering this material as the best for roofing that is to be had. This form of roofing has been in use for upward of three years, we are informed, and has been submitted to various tests, which warrant the company in the high claims they make for it. In general appearance the roofing, as sent out, somewhat resembles bookbinders' boards. The sheets are 26½ x 38½ inches, so that, allowing 2½ inches for the lap, each sheet will lay 6 square feet. A roof to be covered with this material is first sheeted with surfaced lumber laid close, in the same general manner as would be provided for a tin or slate roof. After the surface has been provided in this manner, the roof is put on in the same general way as shingle or slate would be applied, in courses running across the roof, with the long way of the sheet running up and down the pitch of the roof from eave to comb. The sheets are fastened in place with threepenny common nails, driven through washers. As the roof is laid it is painted, thus insuring a coat of paint where the sheets lap. After it is finished a final coat of paint is applied over the entire surface. In the pamphlet describing this roof, which the company have recently issued, certificates are presented from various insurance managers indicating their approval of the Bodine roof on large manufacturing establishments, notably that of the Altman & Taylor Company, of Mansfield. While the company do not pretend that this roof is absolutely fire-proof, they do maintain that it will successfully resist burning where sparks are dropped upon it. With reference to the cost, the Bodine Roofing Company inform us that this material is cheaper than slate, tin or iron, and costs about the same as the best quality of shingles.

Wilber's Door Hanger.

In Fig. 13 we show a perspective view of a new barn-door hanger introduced to the trade by J. D. Wilber, No. 150 Dearborn street, Chicago. The entire hanging strap and wheels are made of malleable iron. The wheels are straight grooved, fitting the square edge of the track both above and below, thus keeping a door perfectly aligned, and not allowing it to slide in or out until stopped by rubbing against the rail, which is often the case with flat wheels on a wooden track. The track, as will be seen by reference to the engraving, is an ordinary bar of iron, such as may be purchased at any store, fastened to the face of the beam provided for the purpose. The fact that no special track is required, but that material sold in every hardware store can be utilized, is one of the special advantages to which the manufacturer directs attention.

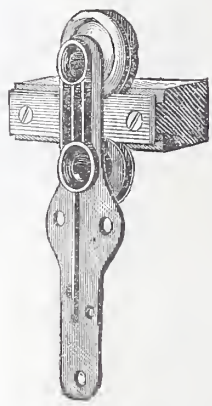


Fig. 13.—Wilber's Barn-Door Hanger.

Combined Sidewalk Light and Ventilator.

Messrs. A. W. Herr & Co., of 248 E. Randolph street, Chicago, are introducing some novelties in sidewalk lights, coal-hole covers and sidewalk registers. Fig. 12 of the engravings shows a vault cover 2 feet square which has the merit of admitting either light or air, as demanded by circumstances. It has two heavy wing bull's-eye doors, hinged so that one or both can be opened from below by turning a heavy thumb-screw, thus affording all the ventilation and air through the spaces occupied by the bull's-eyes in the cover. The hinged doors can be readily closed to exclude rain or dust without obstructing the light in either case, thus leaving the sidewalk free and unobstructed to the public, and giving the desired light and ventilation at all times. This register or ventilator may also be adapted for use in private dwellings, floors in attics, gables and mansard roofs, may be placed over partitions, and, indeed, in all places where light and ventilation are ne-

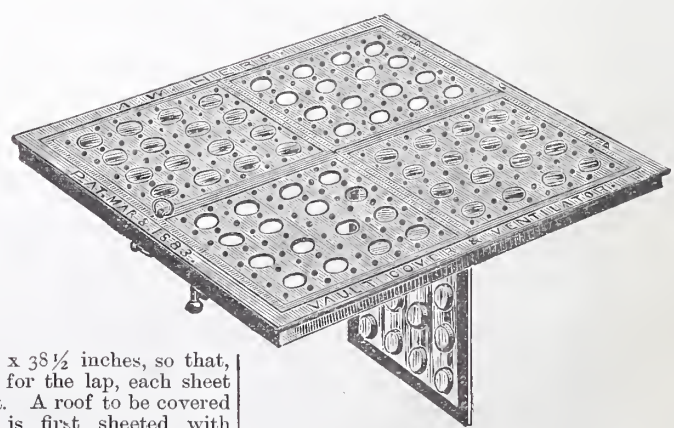


Fig. 12.—Combined Sidewalk Light and Ventilator.

cessary. Used in the form shown in the engraving as a sidewalk light, the cover is securely fastened to the iron frame, and the handle to raise the cover to receive fuel is let in so as to completely avoid any obstruction whatever.

Overhung Traversing Gainer and Cut-off Saw.

Messrs. C. B. Rogers & Co., Norwich, Conn., and 109 Liberty street, New York, are offering the overhung traversing gainer and cut-off saw shown in Fig. 14 of the engravings. This machine is constructed on the principles common to what is known as a railway saw, except that the saw passes over the lumber instead of under. A swing with an elbow-joint is used and connects with the driving-shaft so that the saw-mandrel will slide lengthways on the projecting arm, over the table, the belt retaining equal tension at all points. The depth of the cut and also the adjustment for different sizes of saws are made by raising and lowering the table. In place of the saw a gaining or dado head may be used, and thus gains of different widths and depths may be cut, the depth being regulated by raising or lowering the table, as already mentioned. In the use of this machine the lumber remains stationary; the saw, or gaining-head, is brought forward and kept in entire control by means of the handle shown in the engraving, and which is attached to the gateway. One advantage of this arrangement is that it enables the operator to work with his lines always exposed to sight, instead of having them turned underneath the lumber, as in the ordinary way. On account of the great variety of work which may be performed upon this machine it is likely to prove useful in carpenter shops, furniture factories, carriage manufacturing establishments, and, in fact, in all shops where lumber is used. The machine and table are firmly bolted to the base, which keeps all parts in proper relationship. The weight of the machine is about 1000 pounds.

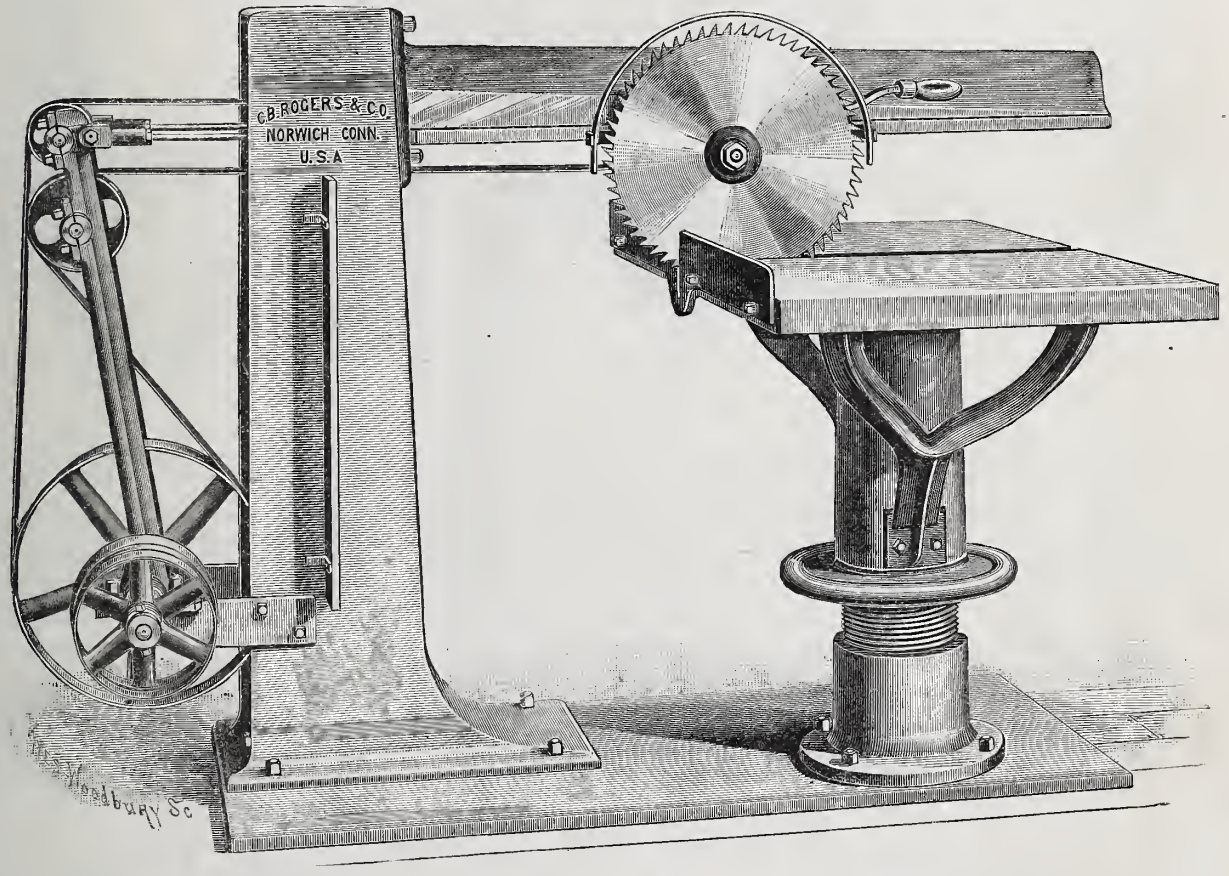
A lacquer, said to be of great elasticity, perfectly supple and not liable to peel off, is made in the following manner: About 120 pounds of oil varnish are heated in one vessel, and 33 pounds of quicklime are put into 22 pounds of water in another. As soon as the lime causes an effervescence, 55 pounds of melted india-rubber are added. This mixture is stirred and then poured into the vessel of hot varnish. The whole is then stirred so as to be thoroughly mixed, then strained and allowed to cool, when it has the appearance of lead. When required for use, it is thinned with the necessary quantity of varnish and applied with a brush, hot or cold, preferably the former. This lacquer is useful for wood or iron and for walls; it will also render waterproof cloth, paper, &c.

French Polishing.

This is a method of varnishing by rubbing the varnish upon the surface of the wood instead of applying it with brushes. When varnish is applied simply with a brush, a comparatively uneven surface results, rendering necessary the subsequent processes of rubbing and polishing, but by the method of French polishing a smooth and continuous surface, hard and not easily scratched, is secured. All the polishes are applied very much in the same way, and a general description will therefore be sufficient. To obtain a good polish with lac varnish on wood, the quantity applied must be very small, and must be rubbed continuously until dry. If the work be porous or coarse-grained, it will be necessary to give it a coat of thin, clear size previous to commencing with the polish; when dry, the surface must be smoothed with fine glass or sandpaper. The size fills up the pores and saves the polish, and also saves considerable time in the operation. Make a wad of cotton-batting, covered with several folds of very fine, soft linen cloth; put the wad or cushion to the mouth of the bottle containing the preparation (or polish) and shake it sufficiently to damp the cloth; then proceed to lightly rub the work with circular motion; as the rubber becomes drier, the pressure may be increased, but care should be taken not to press too heavily when the rubber contains much polish, as streakiness will result. The circular motion should be continued until the rubber becomes quite dry, when more polish may be taken upon it and the rubbing renewed. It should be borne in mind that the rubber should never be raised directly from the work, but should be raised with a sweeping motion; also that it should never for a moment remain quiet upon the surface, and that its motion should be as even as possible. Neglect of these precautions will produce a rough surface wherever the rubber remains quiet or is improperly removed. The circular rubbing must be continued until the surface appears perfectly smooth and the pores are no longer visible. Be very particular to keep the cloth covering the wad clean and soft. It is desirable to use a clean portion each time it is dipped in the polish. It is quite likely that in about 12 hours after the above operation the surface of the work will be lusterless and the grain plainly visible. In that case, proceed over the work again until the grain is thoroughly filled. French polishing is a process requiring particular care and skill, and considerable experience is necessary to produce good results.

A new process for preserving wood, employed in Belgium, consists in exhausting the air from the pores of the wood and filling them with gutta-percha solution. In pouring the solution into the pores, tho solid gutta-percha is liquefied by mixing with paraffine in proportion of about two-thirds of gutta-percha to one third of paraffine; the mixture is then submitted to the action of heat, and the gutta-percha becomes sufficiently liquid to be introduced into the pores of the wood. The gutta-percha liquefied by this process hardens in the pores of the wood when it becomes cold.

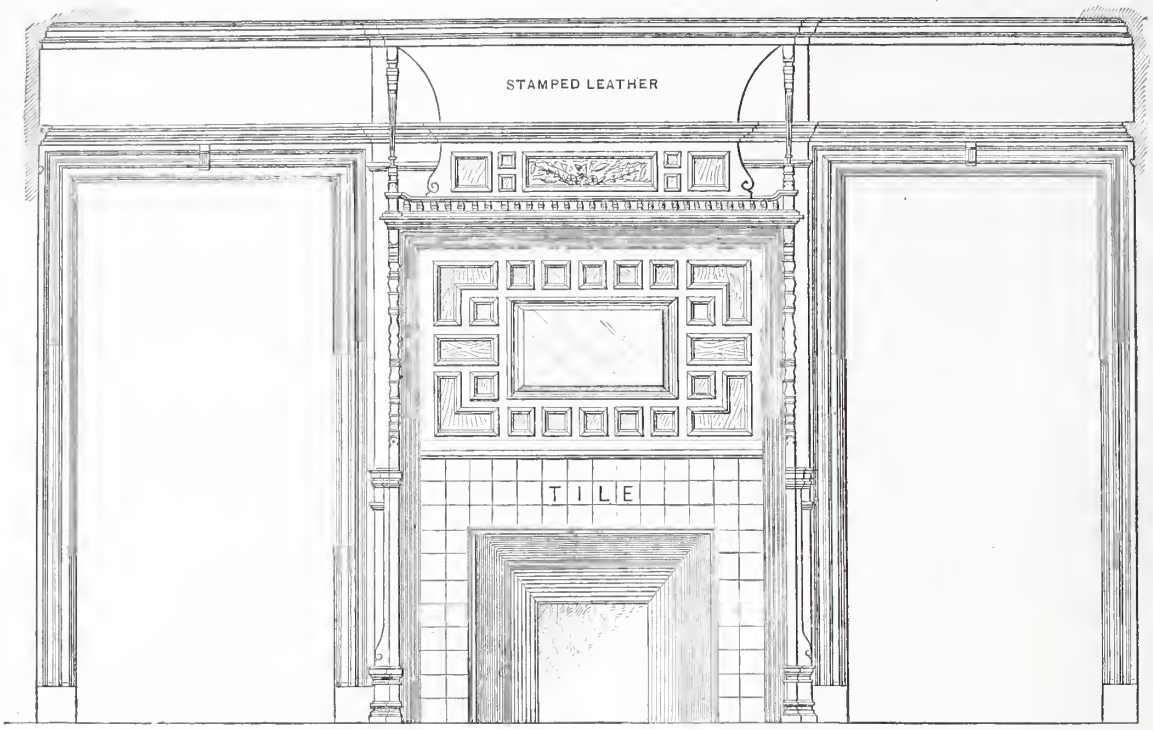
Glass staining may be done at home by the following process: Spread over the glass a strong gum water, and when dry lay it over the paper on which the design is sketched, and trace with a fine hair pencil all the outlines. Dip the tube-like pencils in the colors, and let them flow out upon the glass; have a care and not touch the pencil to the glass. The lights and shades are produced in a variety of ways; one of the easiest, and especially to beginners, is to take a goose quill cut in the shape of a pen, without the slit, and with it carefully take out the lights by lines and little dots. This part of glass staining is the most exacting and difficult, as much of the effect depends upon the shading. The glass is then ready for the kiln.



Novelties.—Fig. 14.—Overhung Traversing Gainer and Cut-Off Saw, Built by C. B. Rogers & Co., Norwich, Conn.

A Study in Suburban Architecture.

In our January number we presented the conclusion of a series of articles by "An Architect," bearing the above title, and which has been a conspicuous feature of this journal for over a year past. As explained to our readers in a foot-note, we were unable to publish in that issue all the details and designs which had been prepared for it. "Mrs. Archie's" letter to a friend referred to several matters which will be better understood by the designs and details of mantels, parts of which we give herewith. Lack of space still delays the publication of the others, and also the kitchen details. We shall lay them before our readers at another time, and have no doubt that they will be quite as valuable, notwithstanding the fact that their publication has been delayed.



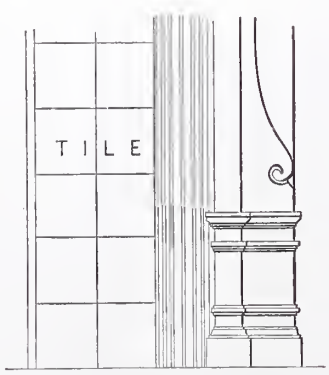
A Study in Suburban Architecture.—Front Elevation of Mantel in Hall.—Scale, ⅜ Inch to the Foot.

NOTES AND COMMENTS.

Every one who reads the English mechanical and architectural journals, or any of the papers devoted to the lumber trade published in England, or extracts from them which are frequently printed in American papers, often encounters the term "deal." This term is gradually creeping into use in American periodicals, on account of its frequent use abroad. Accordingly, a definition of its exact meaning is of interest. By reference to the dictionary the definition of this word will be found in the following language: "The division of pieces of timber made by sawing; hence, a pine board or plank, particularly a board or plank of fir or pine, above 7 inches in width and exceeding 6 feet in length." In a broad significance this term is sometimes used to indicate wood of pine or fir. The strict definition of the word, as understood by the English timber merchants, says the *Journal of Progress*, is soft wood timber imported and sawn to a section of 3 x 9 inches or 4 x 8 inches or 4 x 10 inches. In the same way the term "planks" is understood to indicate pieces 3 x 4 inches and 4 x 12 inches. Battens are 2½ x 7 inches or 3 x 7 inches. All of these are respectively of lengths which vary considerably, and none of them have reference to the country or port from which the supply is derived.

One of the art journals raises the question of color as applied to exterior architecture, and asks if it is not time to vary the horrible monotony of brick and stone fronts, of which there seems to be no end, and all of which presents the same stolid, uninteresting face. It goes on to say that there are many reasons for believing that a movement in this direction, looking toward the introduction of some more cheerful element than sandstone into city façades, would at present meet with favor. The question raised is an interesting one, and has been the subject of much speculation among those who delight in pretty things, but who have not the courage of their convictions or the originality to start a movement in the direction indicated. Such a suggestion looks well on paper, but its practical solution is altogether a different matter. It is undoubtedly true that the public generally are disposed to beautify their houses by the introduction of color and by other legitimate means. The tendency in this direction is evidenced by the employment of stained-glass windows and of rich upholstery, which is occasionally so displayed about the windows as to make it contribute in some measure to the adornment of the exterior of the house. The public are conservative, however, and until some artist has shown, by a practical example, the advisability of such a scheme as our esteemed contemporary suggests, it is probable that very little will be done.

The increasing use of asbestos, both as a non-conductor of heat and as a fire-proofing material, is frequently noted. While asbestos has been before the public for many years in substantially the same shape as at present offered by manufacturers, it is only within a comparatively recent period that its merits have been fully appreciated. The name in its literal significance "means unchanged by fire." The material is also practically indestructible by acids. It differs from other known mineral substances in possessing fibers resembling silk or flax, some varieties of which can be spun, woven and felted. The ordinary kinds of abestos can be reduced to a pulp or impalpable fiber. In all these forms it retains its peculiar interlacing or binding properties. Asbestos, by its nature, is peculiarly adapted for use for structural purposes wherever an incombustible material is required, and in all places where a serviceable non-conductor is needed.



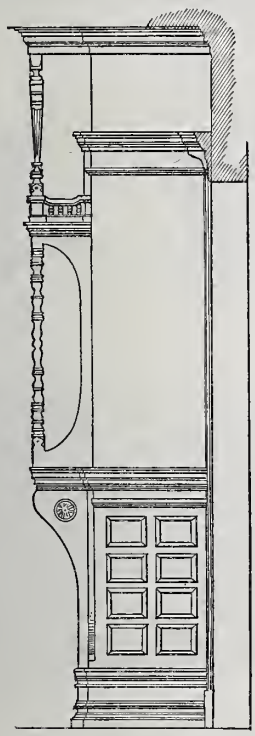
Elevation of Base of Fireplace —Scale, 1 Inch to the Foot.

Used with a proper spreading medium it becomes a desirable paint or cement for roofs, and when still more carefully prepared it serves an excellent purpose as a preservative of wood, and forms the basis of very desirable paints for both interior and exterior finish. When manufactured in the form of felting it is very useful as a covering for steam, hot-water and hot-air pipes. As a building felt it is no less serviceable in the construction of fire-proof buildings.

One of our exchanges directs attention to the extensive use of this material in fire-proofing work. An immense warehouse being erected in Chicago for the National Tubes Works Company has all its floors laid with asbestos building felt prepared by the H. W. Johns Manufacturing Company, of this city. We are also informed that the new depot for the Western Indiana Railway Company in Chicago is lined with the same material. For purposes of this kind asbestos properly prepared is very desirable, and the good results attending its use are likely to bring it into still greater demand. We recently experimented with it upon a small scale for covering the hot-air pipes from a furnace to their entrance into the flues in the walls of the house, the object being to avoid heating the basement in which the furnace is located. Our investigations have shown that the material is desirable for uses such as we have described, as well as in connection with boilers and steam pipes.

A house built to withstand tornadoes is one of the novelties in architecture which has attracted the attention of various journals during the last few months. According to the *Minnesota Tribune*, the building in question is being erected by one of the wealthiest men of Osakis, Minn. The peculiarities of this house, it is said, have been inspired by the wife of the owner, who lives in constant dread of storms. All the corners of the building are acute angles, and the sides sink back, giving the plan of the house the contour of a star. From the highest point of the roof the gutters sink suddenly, making great depressions. The theory is that the sharp corners will split the tor-

nadoes to which that section of the country is exposed occasionally. The cellar walls are of unusual thickness, and the timbers of the structure have been anchored to them so that the house may not be blown down without taking up the foundations. All the weather-boarding has been put on in oblique lines. From this description one is left in uncertainty as to the convenience of the internal arrangement of the building. We can imagine that there is no end of delightful

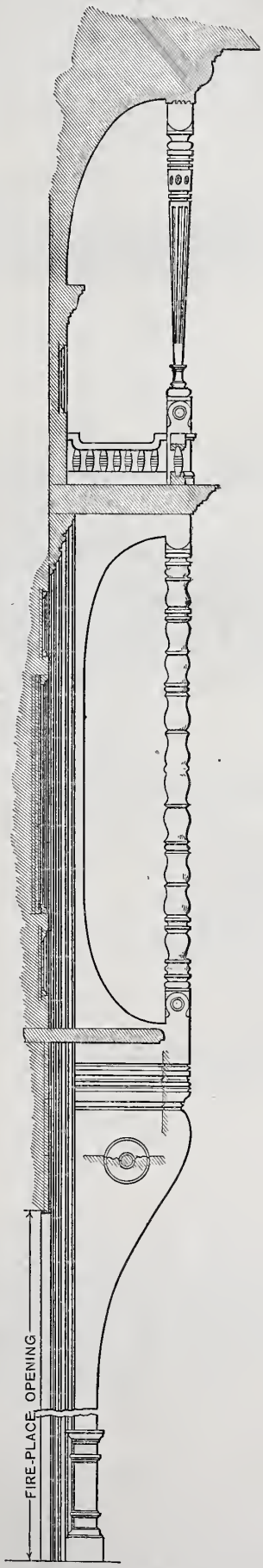


A Study in Suburban Architecture.—Side Elevation.—Scale, ⅜ Inch to the Foot.

corners and nooks which would please some of those who like novelties in decoration and arrangement, but the convenience of living, it would seem, must be sacrificed. It strikes us that the simple plan resorted to in a number of buildings on high points, notably the observatory on Mount Washington, which has successfully resisted the wind with a velocity of over 100 miles an hour, might have been applied in this case. It consists simply in binding the house to the ground by rods and chains. Perhaps the lady who is directing this construction has never visited the White Mountains.

Cypress timber is somewhat extensively used throughout the Eastern and some of the Middle States for making cisterns, tanks for various purposes, and vats for brewers and mills. As a material it seems to be growing in favor for dyeing and chemical vats. This is owing to the fact that the dye does not affect it so much as many other woods. In addition to this use it is being largely employed for shingles, gutters, doors and door-jambs, sash and blinds, and in some instances for fencing. It is also used for outside and inside finish. It has the quality of polishing up very handsomely. From the fact that it is not affected by dry-rot, it is invaluable as a foundation for buildings on filled land. Wood in this position is alternately wet and dry. Cypress seems to resist this action better than almost any other material. Builders of row-boats and yachts will always find cypress wood very desirable for their purposes. The principal source of supply at the present time is Alabama and along the Gulf coast. The wood most commonly used is of the yellow variety. The lumber generally runs large and clear, and is durable in almost every position in which it can be used. As its merits become better known, cypress is likely to become a very popular wood in the North.

Just what constitutes the successful management of a business is often a subject for debate among those employed in the mechanical departments as well as among those who are engaged in the office, and the two classes of men seldom agree in their conclusions. While a knowledge of all the operations incident to a manufacturing concern is of undoubted advantage to those who



Elevation at Side of Fireplace.—Scale, 1 Inch to the Foot.

direct affairs in the office, it does not by any means follow that a practical familiarity with the mechanical part of the business is of special importance to the financial and managing men. Many men who are invaluable as mechanics, or as foremen and superintendents, would be of no force whatever in the general management, and, on the other hand, many excellent general managers would be entirely lost if called upon to do a simple piece of work at the bench or to manage a gang of workmen. A business must be managed as certainly as the work must be done, and it requires an unusually versatile man who can be one of his own workmen and their manager at the same time. Correspondence and the reception of customers, the overlooking of bills and the supervision of accounts as much demand the care and eye of a master as the direct guidance of the workmen. It is much easier to delegate the latter to a salaried foreman than to attempt to buy the talent for the former, and hence it is that many of the most successful business men, whatever their mechanical qualifications may be, are found directing affairs in the office.

The subject of concrete houses is one of perennial interest. It is continually coming to the fore, and the experience of one section of country or one community seems to be of no particular advantage to any other. While it is undoubtedly true that successful concrete houses can be built, it also remains that this style of building in many sections of the country is not necessarily cheap, but, on the other hand, is expensive in comparison with the usual building materials employed. Concrete work, from a certain standpoint, is as simple as anything to be done in building operations, and yet it requires an intimate knowledge of the properties of the materials employed to render it entirely successful. Hence it is that many failures occur in work of this kind when attempted by persons without experience in the art. A Western paper recently published an article advocating the construction of houses of concrete. A neighboring journal, published at Winona, Minn., replies that experiments of the kind referred to were thoroughly tried at that point several years since and the scheme abandoned. It then recounts that one of the buildings fell and that the walls of the others have since crumbled. It says that some of the cellar walls laid in this manner answer fairly well, but not well enough to justify any enthusiasm for concrete. This is a characteristic illustration in point, and shows that the absence of engineering skill will often serve to cause failure in cases where success is easily possible with proper technical knowledge.

A New Method of Finishing Woodwork.—Many processes have of late been applied to the finishing of woodwork, such as staining in various colors, fumigating and other methods. A new finish is now cultivated in the Continental market, and is known as the Rubenick process. It is used for giving a metallic surface to wood, and consists in first immersing the wood in a bath of caustic alkaline lye, in which it is allowed to remain for two or three days, according to the degree of permeability of the wood, at a temperature of 167° to 194° F. From this bath the wood passes to another of hydro-sulphate of calcium, to which is added, after 24 or 36 hours, a concentrated solution of sulphur. Here it remains for about 48 hours at a temperature of 95° to 122° F., and, lastly, for from 30 to 50 hours the wood is immersed in a solution of acetate of lead at the same temperature. The timber, thus pickled, is allowed to dry, when it is said to be susceptible, after burnishing, of a high polish and even metallic luster, which is more brilliant if the surfaces of the wood have been previously rubbed with lead, tin or zinc plates, and then polished with a glass or porcelain burnisher. Treated in this way the wood may assume the appearance of a metallic mirror, being also hard and very strong,

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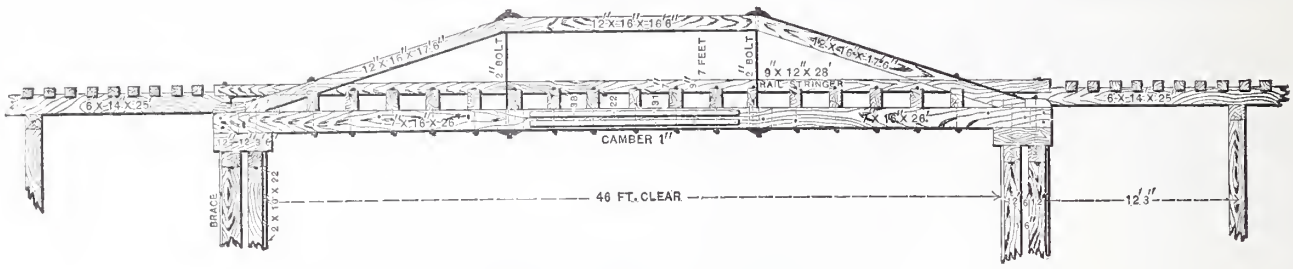
Messrs. F. E. Edbrooke & Co. are the architects for the brick dwelling and barn that is being erected on Sherman avenue, between Capitol and Olive streets, Denver, Col., for Adeline Ruth. The dwelling is 35 x 70 feet in size and 2½ stories in hight. The barn is 25 x 35 feet in dimensions and 1½ stories high. The estimated cost of the former is put at $15,000, and that of the latter at $2500.

CORRESPONDENCE.

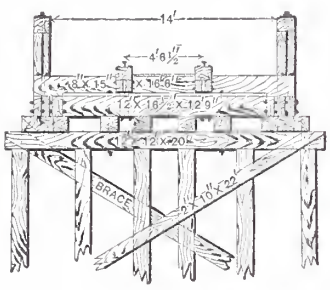
Short-Span Railroad Bridges.

From "ENGINEER."—I think it would be useful to many readers of *Carpentry and Building* if there should be published in its columns plans and specifications for the construction of a single-track, common-guage railroad timber bridge of, say, 50-foot span. The bridge should be supported by piled abutments, and should be of strength sufficient to support heavy traffic and great speed. The object of such a publication would be to ascertain the best form for such a bridge, the least amount of material compatible with good construction, and the least expensive plan of construction to give necessary strength and stability. In order to set the ball in motion and to provoke discussion, I send herewith drawings of a bridge erected some time since which is not in all particulars perfect, and which I consider a fair mark for criticism. I invite the most careful attention of the readers of the paper, and hope you will request other plans from such as are able to contribute to this question. The following is the specification to which this bridge was constructed:

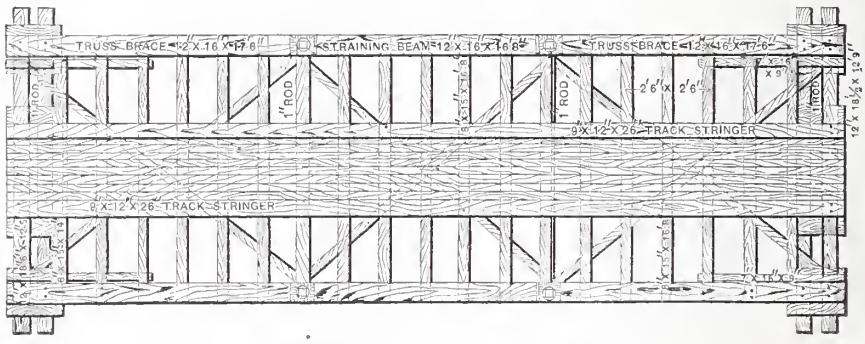
"The lumber used shall be sawn from the heart of white oak or yellow pine, and the pieces shall be free of sap, rot, shakes and all other defects. The dimensions given are the finished sizes, and must all be sawn full and the truss timbers large enough to allow for dressing, so that, after being dressed and shaped, the timbers of the chords, truss braces, straining beams and splice blocks shall be the full dimensions figured in the plan. The splice blocks and chords, where put together, shall be neatly cut and planed smoothly, and great care shall be used to make the recesses in the splice blocks and chords fit together closely. The holes for the rods and bolts shall be bored straight and true, barely large enough for a tight fit. The bevel washers shall be closely and evenly fitted. The framing, shaping and fitting of the braces, straining beams, chords and heel blocks shall be neatly and accurately done, so as to give a full bearing to the timbers. The trusses will be framed with a camber of 1″ in the center when finished. The cross-beams will be spaced 2′ 6″ between centers, and the rail stringers shall be scored in place, and saw-cut to fit closely to them, and brought to an even, regular surface to receive the rail. All abutting surfaces shall be painted two coats in pure white lead and linseed oil. No coal oil. The splice blocks and chords shall be bolted together immediately after the surface, bolts, &c., have been coated with pure white lead, and also the inner sides and the top of chord timbers, they being difficult of access after the bridge is put together. After completion and time for seasoning has passed, the finished trusses shall be given another coat or two coats of pure white lead and linseed oil, so that, when done, the entire surface of dressed timber shall have two coats fully covered and applied. The last coat colored brown and the ironwork varnished black."



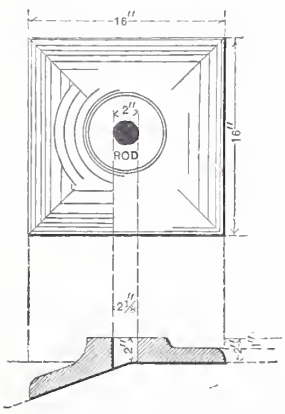
Side Elevation.—Scale, $\frac{1}{12}$ Inch to the Foot.

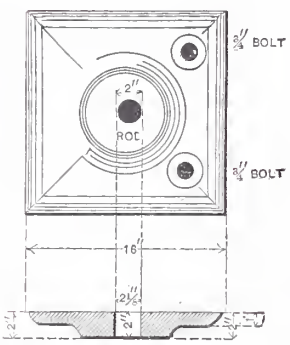


Cross-Section.—Scale, $\frac{1}{8}$ Inch to the Foot.

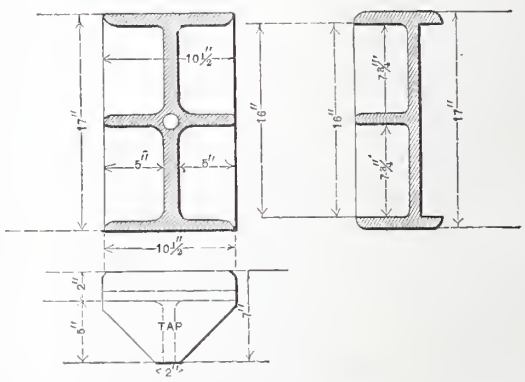


Plan View.—Scale, $\frac{1}{12}$ Inch to the Foot.

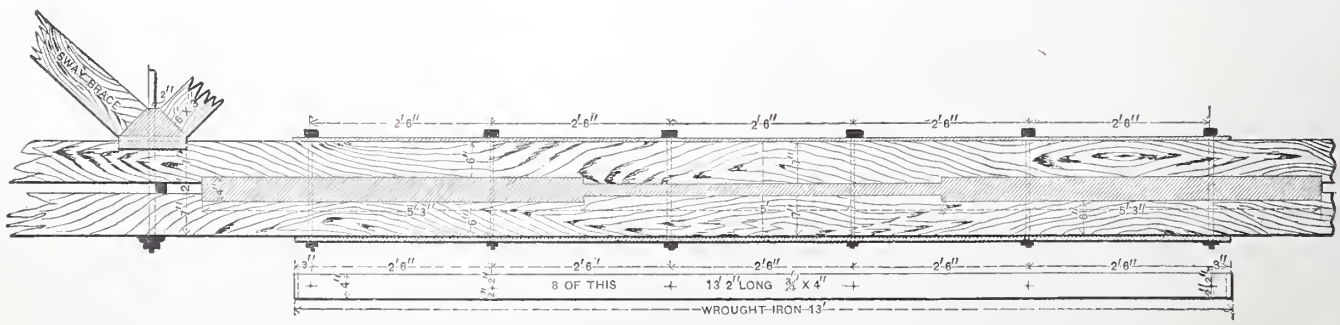




Workers for Queen Rods.



Sway Brace Angle Blocks.



Plan of Splice in Chord Timbers.—Scale, ⅜ Inch to the Foot.

SHORT-SPAN RAILROAD BRIDGES.—DESIGN SUBMITTED BY "ENGINEER."

plan. The splice blocks and chords, where put together, shall be neatly cut and planed smoothly, and great care shall be used to make the recesses in the splice blocks and chords fit together closely. The holes for the rods and bolts shall be bored straight and true, barely large enough for a tight fit. The bevel washers shall be closely and evenly fitted. The framing, shaping and fitting of the braces, straining beams, chords and heel blocks shall be neatly and accurately done, so as to give a full bearing to the timbers. The trusses will be framed with a camber of 1″ in the center when finished. The cross-beams will be spaced 2′ 6″ between centers, and the rail stringers shall be scored in place, and saw-cut to fit closely to them, and brought to an even, regular surface to receive the rail. All abutting surfaces shall be painted two coats in pure white lead and linseed oil. No coal oil. The splice blocks and chords shall be bolted together immediately after the surface, bolts, &c., have been coated with pure white lead, and also the inner sides and the top of chord timbers, they being difficult of access after the bridge is put together. After completion and time for seasoning has passed, the finished trusses shall be given another coat or two coats of pure white lead and linseed oil, so that, when done, the entire surface of dressed timber shall have two coats fully covered and applied. The last coat colored brown and the ironwork varnished black."

The following bill of materials will enable readers to make their own estimate upon this bridge in the light of the following price list: Pine on the spot, sawn to order, $20 per M; iron, 5 cents per pound; piles, 35

cents per lineal foot, completed and driven: common labor, $1 to $1.50 per day; skilled labor, $2.50 to $3 per day.

Bill of Materials.

24 piles, 12″ x 12″ x length given in bills.
4 caps, 12″ x 12″ x 20′.
20 cross blocks, 12″ x 12″ x 3′ 6″.
2 end bearers, 12″ x 18½″ x 12′ 9″.
8 chord timbers, 7″ x 16″ x 26′.
4 track stringers, 9″ x 12″ x 26′.
17 cross beams, 8″ x 15″ x 16′ 8″.
2 cross beams, 8″ x 15″ x 14′.
4 truss braces, 12″ x 16″ x 17′ 6″.
2 strain beams, 12″ x 16″ x 16′ 8″.
6 sway braces, 6″ x 8″ x 21′.
4 end beams, 7″ x 16″ x 11′.
4 sway braces, for piling, 2″ x 10″ x 22′.

Iron Bolts, Rods, &c.

4 truss rods, best refined iron, 2″ diameter, 7′ 8″ long under head to point, 2 special-pattern cast-iron washers, jamb nuts, &c.

16 ¾″ packing bolts, in chords, 26′ long, with 2 face washers, 1 packing washer, 2″, and 1 ditto, ¾″.

32 ¾″ packing bolts, in chords, 18½″ long, with 16 face washers and 8 2″ packing washers.

4 1″ sway-brace tie-rods 16′ 11½″ long, and 2 face washers.

8 cast-iron angle blocks for sway braces (special pattern).

34 ¾″ bolts in cross beams, 33½″ long, with 2 washers.

72 8″ spikes in track stringers.

100 $\frac{9}{16}$″ x 5½″ rail spikes, reverse pointed for stringers.

Bolt Lengths Under Head to Point.

8 ¾″ bolts, 40½″, with two washers in end track stringers.
4 ¾″ bolts, 45″, with two washers in end bolsters.
40 ¾ □″ rag bolts, 23″ long in cross blocks.
24 ¾ □″ rag bolts, 23″ long in caps.
8 ¾″ bolts, 49½″ long, with two washers in brace blocks.
8 ¾″ bolts, 52″ long, with one flat and one bevel washer in braces.
4 ¾″ bolts, in track stringers, 21½″ long, two washers.
8 ¾″ bolts, in chords, braces, beams, 41½″ long, one bevel and one flat washer.
8 wrought-iron splice bars shaped as shown.

Note.—After receiving the above letter, and without waiting to first publish it, we communicated with one or two engineers who have had experience in work of this kind, laying the suggestion of this correspondent before them and requesting contributions on the subject mentioned. From one of them we have the following, which serves also to get the question proposed for discussion before our readers:

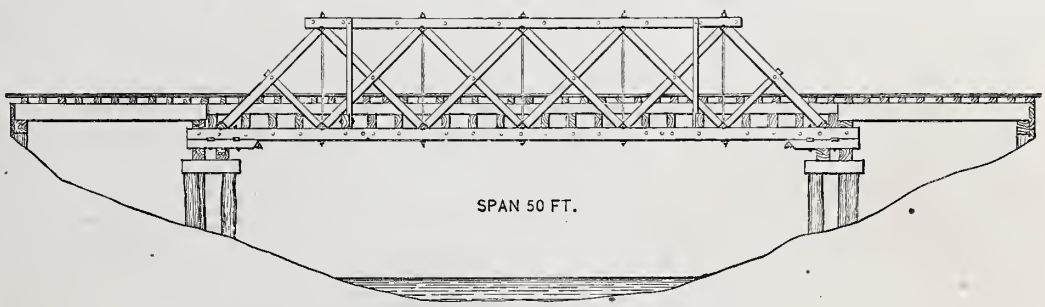
From BRIDGE.—The accompanying plan for a 50-foot span "pony" Howe truss railroad bridge is submitted to such of your readers as may be interested, for criticism, with the explanation that it is not presented as a "gossamer" bridge, where the least possible amount of material is to be used and have barely enough material in it to swear by, but as a good, honest, serviceable bridge for actual use—one that will stand the racket under an ordinarily heavy freight traffic and high-speed passenger trains.

The weight of bridge is assumed at 720 pounds per lineal foot, uniform load at 3000 pounds per lineal foot, and web members proportioned for a load of 3000 pounds per lineal foot shoved across the bridge a panel length at a time until the whole bridge is covered; wrought iron, as ordinary merchant iron, and rated at 10,000 pounds per square inch for safe load; timber in compression at a proportion of about 250 pounds per square inch for 30 diameters and increased in proportion as the ratio of diameter to length is decreased; splitting shear of pine at 80 pounds per square inch; safe bearing strain between supports at 1200 pounds per square inch fiber strain.

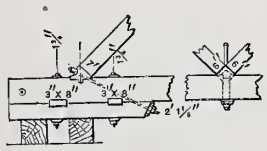
The following is the bill of timber and iron, the approaches and cross-ties not being included:

			Feet.
2 pieces	8 x 12 x 42	feet, lower chord	756
4 "	8 x 12 x 8	" "	288
4 "	5 x 12 x 41	" "	984
4 "	5 x 12 x 16	" "	384
2 "	8 x 10 x 40	" upper chords	533
4 "	5 x 10 x 40	" "	667
8 "	7 x 9 x 12	" main braces	504
8 "	6 x 8 x 12	" "	384
8 "	6 x 6 x 12	" "	288
4 "	6 x 8 x 12	" counter braces	192
4 "	4 x 6 x 12	" "	96
4 "	4 x 6 x 6	" "	48
18 "	8 x 14 x 18	" floor beams	3,024
2 "	8 x 14 x 32	" "	607
4 "	4 x 6 x 12	" side braces	96
12 "	6 x 10 x 26	" track stringers	1,560
4 "	8 x 10 x 6	" corbels	160
8 "	6 x 6 x 20	" laterals	480
2 "	3 x 10 x 16	" hard pine for keys	80
5 "	3 x 12 x 16	" "	220
4 "	12 x 12 x 24	" well plate	1,152
8 "	12 x 12 x 5	" caps for piles	480
			12,983

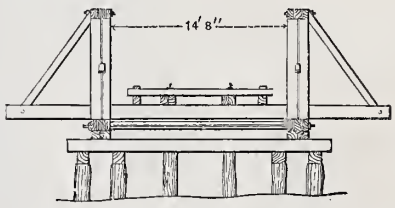
20 piles for piers, length required.



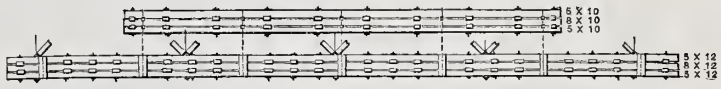
Side Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.



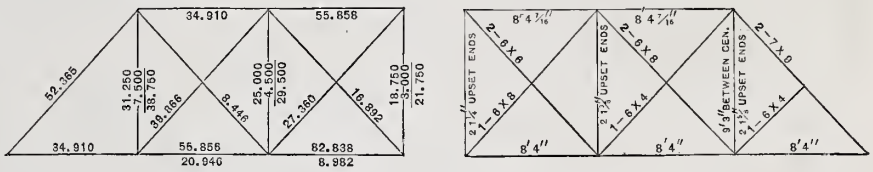
Details.—⅛ Inch to the Foot.



Cross-Section.



Plan of Top and Bottom Chords.—Scale, $\frac{1}{16}$ Inch to the Foot.



Strain Sheet. *Dimensions.*

SHORT-SPAN RAILROAD BRIDGES.—DESIGN SUBMITTED BY "BRIDGE."

		Pounds.
8 rods,	1⅝ x 10′ 9″, upset ends	594
8 "	1⅜ x 10′ 9″ "	446
4 "	1¼ x 10′ 9″ "	192
8 "	1⅛ x 4′	106
5 "	1″ x 18′ 6″	194
8 bolts,	¾ x 2′	28
50 chord bolts,	⅝ x 2′	118
28 stringer bolts,	⅝ x 1′ 2″	42
12 brace bolts,	⅝ x 2′	28
4 side brace bolts,	⅝ x 2′	11
4 " "	⅝ x 1′	6
Add for nuts		190
Total pivot iron		1,955
Cast iron in angle blocks and washers estimated at		pounds, 1,680

Note.—In a letter to the Editor, "Bridge" makes the following comments: "In regard to the bridge, I will say that I have built several of 57′ 4″ foot span, with a chord 2 inches wider, but with lighter proportional web members and same hight of truss, which have stood up under heavy traffic and engines of 35 to 40 tons. Nearly all of that class of bridges are across streams, with the line crossing the valley at right angles, and the train-men come down one hill and across the bridges with the engines going as fast as they can turn their wheels, taking a run for the opposite hill."

We trust practical men among our readers will enter upon a discussion of this question in the spirit of "Engineer's" suggestion. The best way to start the ball rolling will be to find all the fault possible with the designs submitted herewith for criticism, and then follow with improvements upon them. Both of our contributors whose letters appear above invite close and searching criticism.

Raking and Level Moldings.

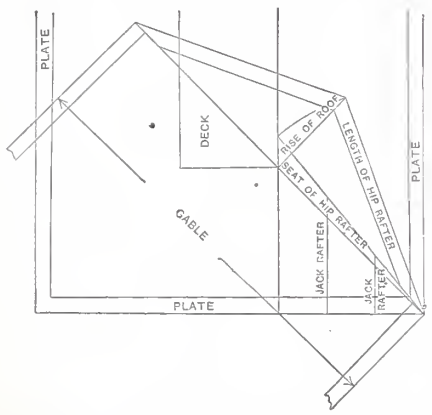
From S. R. K., *Grand Rapids, Mich.*—Referring to the inquiry of A. M. F., of Texas, who asked about joining raking and level moldings, some time since, I would say he failed to state in what particular he found trouble in making his miter—whether it was because the rake molding was too narrow for the level molding, or whether it was in making the several members of the molding meet properly. He has undoubtedly noticed that the rake frieze is narrower than the level frieze, while the rake molding on the same cornice is generally wider than the level molding, and has wondered why it is so. A little knowledge of geometry would easily explain the whole matter. The tipping of the top of the crown-molding forward is, in common joiner phraseology, called the "pitch" of the molding—*i. e.*, when the molding tips forward one-quarter of its width, it is said to be at one-quarter pitch; when it tips one-third of its width, it is said to be at one-third pitch, &c. It must be borne in mind that the pitch of the molding is not the same as the pitch of the roof, for the reason that in the molding it relates to the width of the molding, which is the hypothenuse of a right-angled triangle, while in the roof it relates to the width of the building, which is the base of a right-angled triangle; hence the angles are not the same.

When the pitch of the molding is less than that of the roof the rake molding will be narrower than the level molding; so, also, when the pitch of the molding is greater than that of the roof the rake molding will be wider than the level molding. When

moldings are made by machinery it is difficult to make them miter properly unless they are set to the same pitch as the roof. This, however, is not always advisable, as machine-made moldings are made to a given pitch, and look bad when set to another pitch. To properly miter moldings, whether made by hand or machinery, it is necessary to cut the level molding with a square miter the same as would be done in putting the same molding around a post or column, and the rake molding is cut with the same miter, but on the slant or pitch of the roof. Did space permit I would give drawings illustrating each, but must refer the correspondent to page 219 of the volume for 1880, and page 96 of the volume for 1881, where the subject was partly illustrated.

Hip Roofs.

From B. C., *Rockford, Ill.*—I have noticed a number of plans and rules for obtaining the cuts of hip and jack rafters published in *Carpentry and Building*. I think I have an interpretation of the principles underlying this work which is superior to anything that has so far been published. It is especially desirable in making beginners acquainted



Hip Roofs.—Sketch Accompanying Letter from B. C.

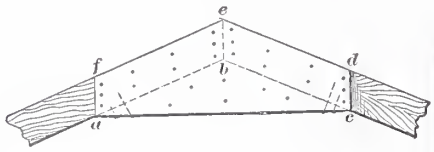
with the principles of this work. My method transforms a hip roof into a gable roof in its manner of presentation so that any one who can cut a common gable rafter can as well cut a hip rafter with the assurance of getting it right every time. The accompanying sketch shows exactly what I mean. First find the seat of hip rafter; then extend the seat an equal distance beyond the center. Let fall two lines from the end of the seat thus drawn. These lines should be square from the seat, and their object is to reduce the diagram to the form of a gable rafter, as before mentioned, which I deem desirable in presenting principles to the young student. After the drawing has been thus arranged, it is a simple matter to get the center of the gable. From it take the rise of the roof and proceed as with simple rafters. The result is the length of the hip required.

Hand and Foot Power Machinery.

From W. P. W., *Arkansas City, Ark.*—In the June issue of *Carpentry and Building* for 1882, F. S. W., of Cleveland, Ohio, gave us some account of hand and foot power machinery. Other correspondents in the volume for 1879 and 1880 treated upon the same subject. The general effect of these letters is to recommend the devices described as working satisfactorily. I desire to say, for the benefit of all who have never tried the experiment of using machinery of this kind, never to make an attempt in this direction. The result will be disappointment, especially if the makers of foot-power machinery anticipate easy-working tools. I speak from experience. I first built a circular rip saw, which proved to be a failure; accordingly, I threw it to one side and next made a wooden turning-lathe. This did not give any better satisfaction than its predecessor, so I threw it to one side also. I took great pains in the construction of these machines, so that they should work easily, but they were positive failures in that sense. Why were they failures? Simply because a journal will not work in a wooden box as it will in iron or Babbitt metal, nor can it be constructed by carpenters of wood as accurately as it can be fitted by a machinist in iron; therefore, any machine made by an ironworker of proper materials is the cheapest for use in the long run.

Rafters for Hip Roofs.

From F. A. R., *Farmer Village, N. Y.*—Thinking it will be of interest to some of the readers of *Carpentry and Building*, I send herewith some sketches of rafters for use in



Rafters for Hip Roofs.—Fig. 1.—Plan for Mitering Rafters on the Hip, Known as Covert & Gould's Patent.

hip roofs. Fig. 1 represents an excellent plan for mitering the rafters at the hip. Two pieces of inch board are cut to the shape shown by *a c d e f*. One piece of 2-inch plank to the shape of *a b c* is firmly spiked on to the under side of the rafters. The inch pieces are well nailed in place at the sides. This form of construction is known

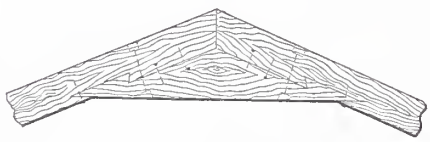


Fig. 2.—Form of Construction, Using a Piece of 2-Inch Plank.

as the Covert & Gould's patent. Fig. 2 represents a method of construction in which a piece of 2-inch stuff is employed, cut, nailed and bolted, as clearly shown in the drawing. Fig. 3 shows a construction in which the two parts are simply halved together and pinned and nailed. A patent upon this construction is claimed by a person named Dean. Fig. 4

Fig. 3—The Rafters are Halved Together, Primed and Nailed.—Dean's Patent.

represents my favorite way. The work is composed entirely of inch boards 3 inches wide. A circle—or, rather, an arc—is drawn, striking eave, hip and peak. The curved rafter has the advantage of giving a little the most room. The object of this construction is to do away with all the purline timbers. I should like to have the opinion of

Fig. 4.—Construction of a Curved Rafter.

my brother chips as to the relative value of the four methods of construction shown. Three of them originated within a few miles of this place.

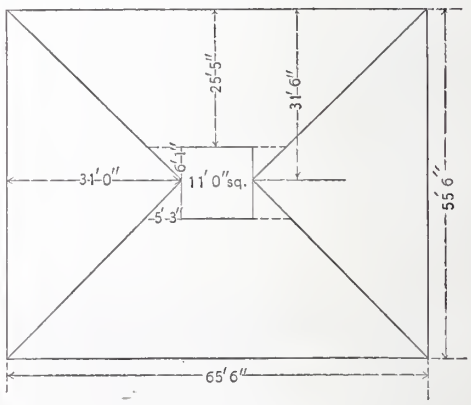
Hanging Cathedral Glass.

From J. S. B., *Winstead, Conn.*—I desire to learn, through *Carpentry and Building*, the correct way of hanging front doors fitted with cathedral glass. The design in question consists of small squares at the top of the doors, with a large ornamental light in the center. I want to know whether the putty side should be in the hall or on the outside, as window sashes are commonly hung. In the case in question the frame for the glass is a regular sash frame set in the doors. I hung the doors with the putty side out. One builder declares that I am wrong, the owner says wrong also, and I write to *Carpentry and Building* for an expression of opinion.

Note.—We think it difficult in matters of this kind to lay down any general rule to which exceptions would not be taken by somebody. Custom regulates such matters entirely, and what is custom in one section of the country is not always custom in another. In the matter of glass doors and sash work we have the impression that it is the custom in some places to put the putty side out, as with ordinary windows, and yet there are exceptions to this rule. In many cases where windows are hung in this manner, glass doors will be hung with the putty side in. From this, it would seem that the only way in which our correspondent is likely to settle the question in dispute is by deferring entirely to the wishes of the owner. If we mistake not, this general question was up for discussion in some of our earlier volumns—not, however, with direct application to cathedral glass. Arguments were brought forward supporting both methods, and we presume a similar course will be followed if our readers see fit to discuss the question at the present time. In our own house we find that the glass doors are hung with the putty side in, while the windows, of course, are hung with the putty side out. Other houses with which we are acquainted, many of them built under the supervision of eminent architects, show the same features of construction.

Measurement of Roof Surfaces.

From H. L. C. ,*Buffalo, N. Y.*—I notice in the November number a communication from A. P. S. in regard to the measurement of roof surfaces. Aside from the fact that some of the measurements are incorrect, there is nothing wrong about A. P. S.'s method, but it involves a great deal of unnecessary work to arrive at a very simple result. It does not seem to be generally known



Measurement of Roof Surfaces.—Letter from H. L. C.

that with a given pitch the area of a roof will be the same in all cases, whether it has two gables or four, or hipped, as in our illustration. It follows, then, that in order to obtain the number of square feet in a roof, all we have to do is to multiply the length of the side rafter by the length of the building, and multiply this product by 2. This will give us the exact area of the roof, no matter how many dormers, gables, hips or cupolas it may have, always provided, however, that they are all the same pitch. In the case under consideration, according to the method of A. P. S., the combined area of the rectangles, calculated from the corrected measurements, including cupola, is $4129\frac{5}{12}$ square feet. Now, the length of the rafters on front and rear will be 31′ 6″, and 31′ 6″ × 65′ 6″ × 2 = $4126\frac{6}{12}$ square feet. This shows a discrepancy of 3 square feet, which is partly due to inaccurate scaling, and partly to the fact of the ends being a steeper pitch than the sides, the end rafters being 31 feet long only. Both calculations include the cupola roof, which is supposed to be the same pitch as the front and rear. The error

is on the side of the rectangles, as my method must be mathematically correct. If the roof was the same pitch throughout, the rosults would exactly coincide.

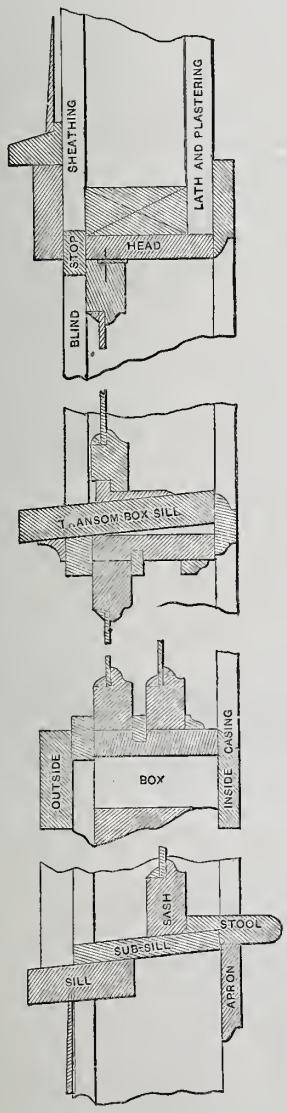
Coloring Cement Sidewalks.

From H. R. E., *Philadelphia, Pa.*—I would like to learn, through *Carpentry and Building*, how Portland cement sidewalks are colored. I wish to know specially how to produce a light blue and also a red. Information on these points will greatly oblige.

Answer.—The blue tint is given to work made of Portland cement by using a small amount of lampblack. The exact quantity has to be determined somewhat by experiment, as different grades of cement require more or less of the coloring matter, as the case may be, to produce the same effect. In this connection it may be mentioned that the cement will look darker from the coloring matter when it is wet than after it has become set. Red is obtained in a similar manner by the use of oxide of iron.

Window Frames with Transom.

From J. I. D., *Des Moines, Iowa.*—I inclose a drawing illustrating the construction of a window frame with transom, which may be of use to C. P. K., of Bigler, Pa., who



Window Frame with Transom.—From J. I. D.

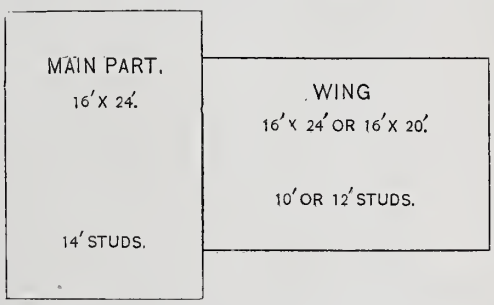
inquired for something of this kind some time since. The parts are so clearly shown in the sketch that I think a detailed explanation is unneccessary.

Coal Tar on Roofs.

From J. P. S., *Pittsburgh.*—I have had experience in this direction, an account of which may be of interest to the readers of the paper. Some time since I lined the gutters of a house, a portion of the roof of which was tar or gravel, and another portion of which was slate. I used the best I X terne plate in both conductors and gutters, and the same tin in the gutters below both portions of the roof referred to. The gutters and conductors connected with the gravel or tar roof were completely destroyed in 18 months, while the tin used below the slate roof is as good as new to the present day, and from present indications will wear for years. These circumstances show for themselves that tar is very injurious to tin.

Arrangement of Rooms.

From A. J. R., *Bluffton, Minn.*—Not being competent to instruct, I suppose I may be excused if I try to learn from the correspondence department of *Carpentry and Building*, which has become a most welcome visitor to my shop. I have every number from the first, and can therefore refer to anything which has been published in it. I have derived great benefit from it, and expect to be under renewed obligations for every paper sent me. A large number of house plans have been placed before builders to choose from, and it seems as though all might be suited from such a collection as your columns offer to us. Still, in this new country, where most of us are beginners and rather poor, very few of your plans have been copied. And now I come to the purpose of my letter: Probably one-quarter of all the dwellings erected in this country consist of a 16 x 24 foot building with 14 foot studs, and a wing of 16 x 20, or 16 x 24, with 10 or 12 foot studs. I have built many such, both East and West, but I have never been able to divide such a house satisfactorily, and have never found any one who could. I would like to see how some of your architectural correspondents would divide such a house, with the wing connected on the side of the main part by the end. I have seen people puzzle over the problem till disgusted a great many times, and I have exhausted my own ingenuity to very little purpose. I know that architects seldom trouble themselves with such cheap affairs, preferring some deep geometrical problem which they could not make the ordinary Western carpenter understand in a month, and, if he understood it, would not have use for it more than once in his life. Now, if they can present us with any new combinations in the size of house I have mentioned, and in houses to cost from $400 to $600, they will confer a favor on a large number of carpenters in the West. It is easy to build a fine house when

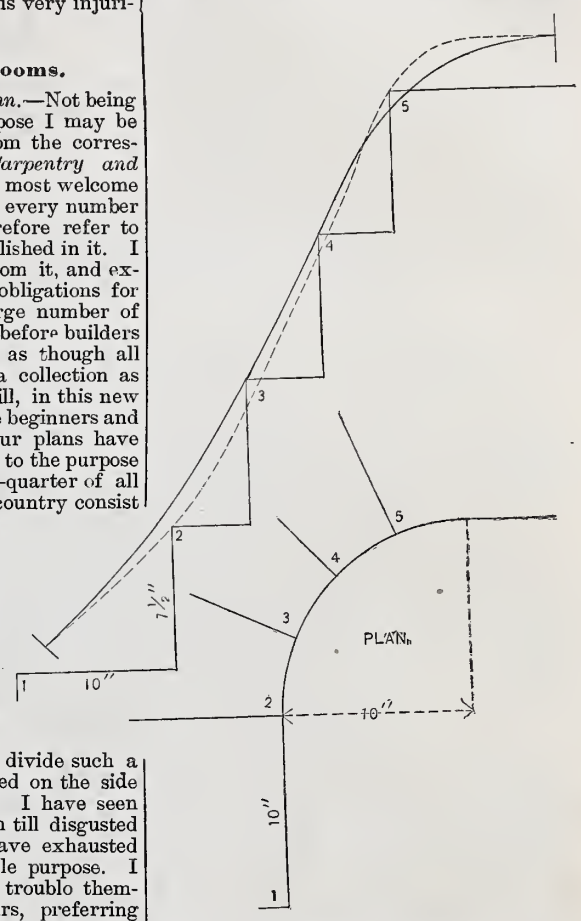


Arrangement of Rooms.—Sketch Accompanying Letter from A. J. R.

we can have the wherewith to do so, but these new settlers cannot afford such houses. Many good and costly buildings are built in this country, but with them we have no trouble.

The Tangent System in Handrailing.

From W. H. C., *Orillia, Ont.*—The query of J. W. H., and your answer to the same, in the January number, 1883, affords me an opportunity of saying a word on handrailing. The case your correspondent presents is one that does not lend itself very kindly to a system having tangents for its governing principle, and while your solution by the two wreath-pieces, each covering half of the quarter-circle, solves the difficulty, it does not give that easy contour to the rail that is possible under the circumstances. I may say that whenever there is a change of pitch from straight rail to wreath, and the tangent connecting has the same pitch, there is always an undue wandering from the course the rail should take. This comes from having to always arrange the tangents so that the joints shall be square to the plank's surface. This necessitates the tangents being always of the same pitch or direction as the tangent or straight rail meeting, which operates to limit the curve of the rail—in other words, it produces a plane subservient to the tangents, and not to any predetermined curve of course of rail. This being the case, we have to put up with such course of rail as this arbitrary plane will allow, for, theoretically, the central line of rail is always in the said plane and the plane in the center of plank. Laboring under these restrictions, we have to put up in a general way with the kind of curve the plane will afford; for, if we try to regain the wreath to its normal course, we should find ourselves short of thickness of stuff. I present a sketch of a development elevation of the plan you gave (double size), calling the radius of plan 10 inches, riser 7½ inches, tread 10 inches, in which is shown the normal course of the rail by the solid curved line, and the resulting course of the rail or developments of planes of your method by the dotted curve, from which it will be seen that the rail gets to have a steeper pitch than that of winders, which is surely against reason. The easements, too, are less easy—especally the top one—than they should be.



The Tangent System in Handrailing.—Sketch with W. H. C.'s Letter.

I have for a long time been at war with the inflexibility and limitations of the tangent system of handrailing, because of its inability to meet the requirements of special cases. Another evidence of the lameness of the tangent system to meet special needs is seen in F. S. W.'s answer to S. N W. in the December number for 1882. In this case, theoretically, there should be a level tangent meeting newel-cap; but as that was out of question, F. S. W. got over the difficulty by

a very neat expedient, even if he had to first form a surface of operation as a preliminary to the solution of the true joint-plane; yet his method falls short of what could be done in the premises, not from lack of intelligence, but from the limitations and false principles of the tangent system.

Now, a word about "systems." All systems having tangents for their bases can be said to be one, so far as the arrangements of tangents are concerned; they only differ in the geometrical methods adopted in solving the "face mold," so that a disciple of Riddell, a *Carpentry and Building* student, and as many more tangent disciples as you like, would each, under given conditions, bring you a face mold that would fit his neighbor's; that is what the various tangent "systems" amount to. With them it is not what can be done for the improvement of the character of finished rail, but the "tangent," the "face mold," the "bevel;" the solution of these (but merely secondary ingredients in true haudrailing) is made to coustitute the very essence of the art.

REFERRED TO OUR READERS.

Cistern Filter.

From J. F. D., *Granville, Ohio.*—Will some experienced reader of the paper furnish a plan for a filter in a cistern that is effective in its working, and satisfactory.

Grinding Tools.

From W. A. B., *Gallatin, Mo.*—I desire to ask directious from practical men for grinding tools. Should the stone be revolved against the edge or from it? My own preference is to revolve the stone against the edge, but I would like to hear from good, experienced men on this subject.

Drying Kiln.

From W. G. M., *Warrensburgh, Mo.*—Will some practical reader of the paper contribute a plan for the construction of a drying kiln for lumber, having a capacity of 300 or 400 feet? It should be long enough to take in 10 and 12 foot lengths. I want something that is suitable for use by joiners and cabinet makers—one that is not costly, but convenient, and that will dry lumber in a thorough manner.

Wetting Brick.

From W. G. M., *Warrensburgh, Mo.*—Will some practical reader of *Carpentry and Building* give me information concerning the wetting of brick before being laid in the walls? I would like to know why they are wet, and what degree of moisture is the best, all things considered.

House Painting

From S. W. F., *Webster, Mass.*—I shall be pleased to learn the ideas of practical men on the subject of how houses should be painted. At the same time, suggestions about what colors harmonize, why paints peel off, and what colors are most durable, will be a favor.

Planning an Amphitheater.

From M. B., *North Vernon, Ind.*—Will some of the readers of *Carpentry and Building* kindly give me some advice in planning the construction of an amphitheater to seat 800 to 1200 people? It is desirable to provide booths below the seats.

Face Mold.

From J. B., *Omaha, Neb.*—I desire to inquire where, when and by whom was the first method of finding the face mold without the ordinate discovered? I shall be glad to have opinions from the readers of *Carpentry and Building.*

Hanging Outside Blinds.

From C. D. H., *Hamilton, Ont.*—My attention has been called to the design of a hanging scaffold by E. C. N., of Ste. Catherine's, published in the November issue of *Carpentry and Building* for last year. As I am interested in the kind of work described, I would be glad to have the correspondent explain a little more in detail the work he describes. In hanging outside blinds he says the use of a scaffold does away with the employment of a ladder. Now, by the drawing, I cannot see but that the pieces marked B must be in the way while fitting the blinds, and also while hanging them. Probably E. C. N. will explain for the benefit of myself and of others who may be similarly interested.

NEW PUBLICATIONS.

How to Become a Good Mechanic. By an Old Apprentice. Pamphlet, 5 x 7 inches, 45 pages. Published by the Industrial Publication Company. Price, 15 cents.

This little pamphlet, the author states, has been prepared in response to numerous inquiries relating to the subject matter of which it treats. It is intended to be a practical guide to self-taught men, telling what to study, what books to use, how to begin, and what difficulties will be encountered. It tells them how to overcome the difficulties, and, in a word, how to carry on such a course of self-instruction as will enable the young mechanic to rise. There are very few books in the English language that resemble this little work in scope or purpose. Hence it is entitled to more attention than its extreme cheapness and modest appearance would seem to demand. Stuart's "How to Become a Successful Engineer," and Todd's "Student's Manual," approach it in some respects. The latter, however, is intended for students taking a higher course, and is of comparatively small importance to apprentices and mechanics. Another little work, "Gregory's Hints," is of a similar character, but, as it is addressed to mathematicians in particular, only a small portion of the information in it is adapted to the class for which this little pamphlet has been expressly prepared. Some of the works to which we have alluded are out of print, so that the author of this work, who addresses the public anonymously, has a fair field before him. The book has been prepared expressly for those who are endeavoring to pursue a course of study without a teacher. It recommends books and methods that are specially adapted to these requirements. Were we disposed to be severely critical we might point out some obvious inaccuracies of statement in the work, and take the author to task for using a few terms at least for which simpler words—and those more generally understood among mechanics—could easily have been found. The term *brochure* for pamphlet, in the preface is in illustration of the latter. The author seems to be somewhat confused in defining mechanics, and also in telling what Newton did, and did not, discover in relation to gravitation. We are disposed to pass such things by, however, in view of the good intent of the book, and its real value to the class for which it has been specially written. The work is comprised in three general parts. The first treats of the training required and the general methods of study best adapted to self-taught students. Some chapter heads in this department of the book will serve to indicate its scope. Among them may be mentioned a general introduction of the subject: "Learning a Trade;" "What Shall I Study" and "How Shall I Study." The second division of the work gives a detailed course of study, with practical hints and instructions. Some chapter headings in this are as follows: "Plane Geometry," "Algebra," "Trigonometry," and "Logarithms," "Practical Mathematics," "Natural Philosophy," "Physics," "Drawing," "Chemistry" and "Applied Sciences."

The last division in the work suggests a shorter course for those whose opportunities are very limited. In the various chapters describing a detailed course of study enough particulars are given under each of the several branches of the science mentioned to enable the intelligent student to judge in advance of the results to be accomplished by applying himself in the direction indicated. Thus, in plane geometry a careful definition is given at the outset of both theoretical geometry and practical geometry showing at once what the practical results are to be from pursuing the course advised. Special directions are given as to mastering definitions and axioms, with copious illustrations, even to the precise method of study to be pursued, showing how a proposition and its demonstration may be successfully mastered. Algebra is similarly treated with illustrations that are likely to prove of great interest to those who have never studied this useful branch, but who desire to become acquainted with it. The work is one that is to be commended for careful reading upon the part of all who desire to improve their leisure time to the best advantage. It is evident from the very name that the author has chosen that his idea of what constitutes a good mechanic is a very high one. A great many who are following mechanical pursuits would esteem their education entirely sufficient long before they had mastered a tenth of what this author shows it is desirable for a mechanic to know. However, he starts out with the declaration that what is given is to be of benefit to the mechanic, from the fact that it will enable him to rise in his position. Such an ambition is commendable in the highest degree, and it should nerve the apprentice and the young mechanic to their best exertions in study.

STRAY CHIPS.

The Swedish Methodist Episcopal Church Society, at Quinsigamond Village, Mass., are putting up a frame church building, to cost about $5000. Mr. C. A. Vaughn has the contract for the structure. The plans were prepared by Mr. Stephen C. Earle, of Worcester.

A Reformen Presbyterian Church building, 35 x 72 feet in plan, is in progress of erection on West Market street, Mansfield, Ohio. Mr. M. Rumbaugh is the architect and Mr. C. Hershiser the contractor for the woodwork. The cost is estimated at $9000. Mr. D. Smith and Judge McCoy, of the same place, have lately completed a brick structure on East Third street, which is occupied by the Richland Fire Insurance Company. The building is 22 x 44 feet in size and two stories in hight, with a front of Mansfield variegated sandstone. Mr. M. Rumbaugh was the architect. The contractors for the woodwork were the Messrs. McCoy. The cost was $8000.

The Crawfordsville Building Association are putting up, at Crawfordsville, Ind., an opera house 86 x 165 feet in size. Messrs. Reid Brothers, of Evansville, Ind., prepared the plans.

Mr. J. McGregor Adams is about putting up on Ontario street, near Market, in Chicago, Ill., a factory building that will be occupied by the Adams & Westlake Manufacturing Company. The structure is to be 75 x 100 feet in plan, and six stories and basement in hight. The cost is placed at $50,000. Messrs. Furst & Rudolph are the architects. These gentlemen will also erect for the Adams & Westlake Company an addition to their present building five stories in hight, and costing $15,000.

The set of plans for a new City Hall, to be erected at Richmond, Va., submitted by Mr. E. E. Meyers, of Detroit, Mich., were accepted by the Common Council as first choice. The structure will cost, according to the architect's estimate, $300,000.

A hotel building is rapidly approaching completion in Minneapolis, Minn., that will probably be ranked among the finest in the country The structure is 196 x 174 feet in plan and eight stories and basement in hight From the sidewalk to the top of the tower is 200 feet. Nearly 12,000,000 common brick and over 500,000 red pressed brick have been laid and about 2,250,000 feet of lumber used. The dining-hall is 50 x 125 feet in size. It is estimated that $1,500,000 will have been expended when the building is finished. It will be known as the West Hotel.

The advance of business westward on Washington avenue, St. Louis, Mo., has made it necessary for the Jesuit Society to remove their college, now on the corner of Ninth street, and accordingly they have begun the erection of new buildings on Grand avenue. They will occupy the entire block between Lindell and Baker avenues, and will constitute a very prominent feature in this aristocratic part of the city. The excavations are completed, and a considerable part of the foundation walls are already erected. Mr. Thomas Walsh, of St. Louis, is the architect in charge of the work.

Among the new buildings to be erected in St. Louis, Mo., is that of the laboratory of Dr. J. H. McLean. The main structure will have a frontage of 125 feet, and will be five stories in hight, fireproof throughout. One of the wings of the building will be fitted up as a Mechanics' Institute, with reading-rooms, library, &c., for the purpose of affording free tecbuical instruction to those who desire to become mechanics. The cost of the building is estimated at $70,000.

The plans prepared by Messrs. N. & C. S. Ellis, of Rochester, N. Y., for the new Government building in that city, have been accepted, and work will soon be commenced. The structure will have a frontage of 133 feet on Church street and 109 feet on Fitzhugh street, and will be three stories in hight. The materials used will be gray sandstone, with greenstone finish and red-tile roof. The first floor will be occupied by the post-office department, the second floor as custom house and internal revenue office, while the third floor will be fitted up for court rooms. The estimated cost of the edifice is placed at $450,000.

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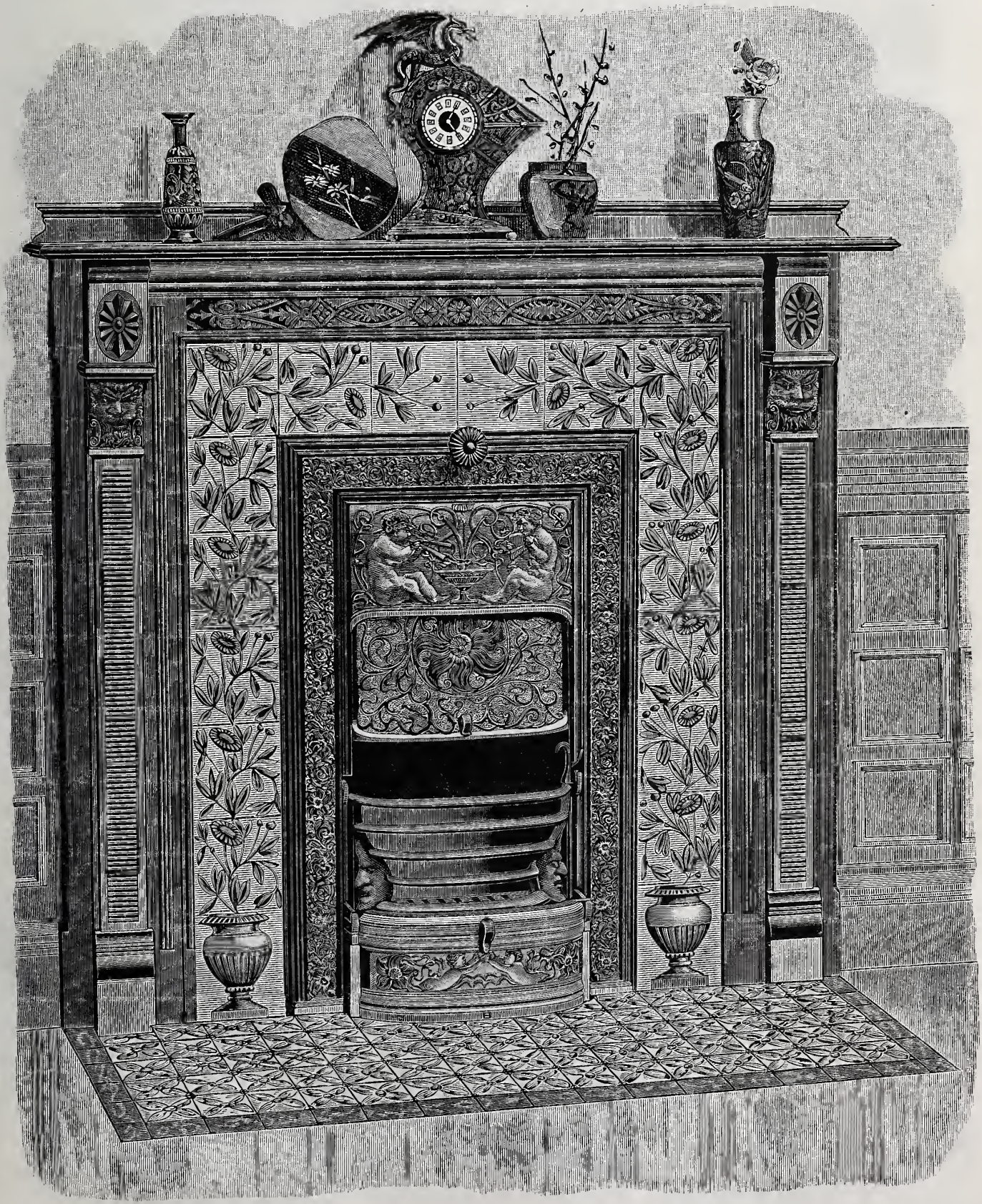
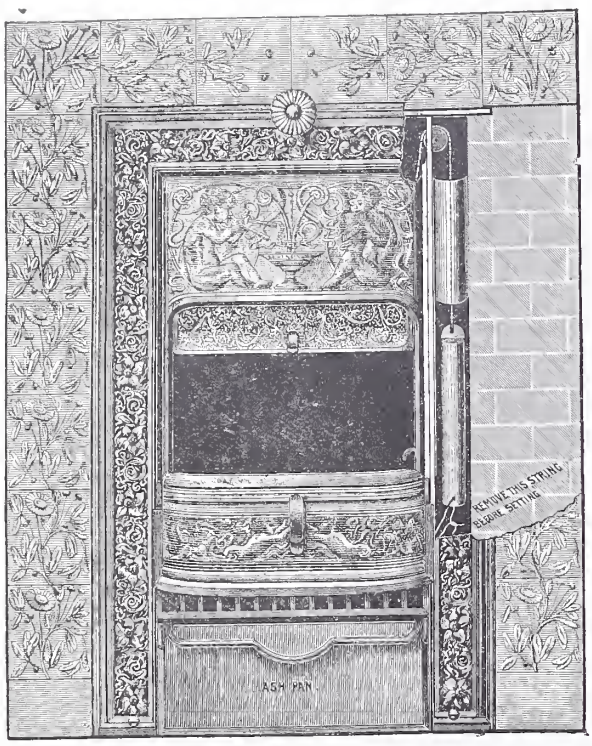


WELLINGTON'S RIDEAU GRATE, MADE BY THE SMITH & ANTHONY STOVE COMPANY, BOSTON, MASS.

Rideau Grates.

We surrender our first page this month to a very fine representation of Wellington's Rideau grate, manufactured by the Smith & Authony Stove Company, 52 and 54 Union street, Boston, Mass. The Rideau stove or grate is of French origin, and is largely used in Parisian houses, where economy of supplies and fuel are important considerations. Its coustruction is based upon principles established by Count Rumford and M. Thomond, whose practical researches in this direction have been so applicable to domestic science. The American designer has improved on the foreign article, and has produced an open stove that is exceedingly ornamental in design, cheerful in effect, and at the same time a satisfactory heater. The term "rideau" means curtain or screen, and its application in this sense will be better understood by inspection of our second engraving, which shows some details of construction. The blower in this stove is balanced at any point, and when the fire is burning satisfactorily may be thrown up out of the way. The coustruction is similar to that of windows hung with weights. The weights run in upright pipes placed just behind the ornamental border of the frame. This construction is clearly shown in the cut.



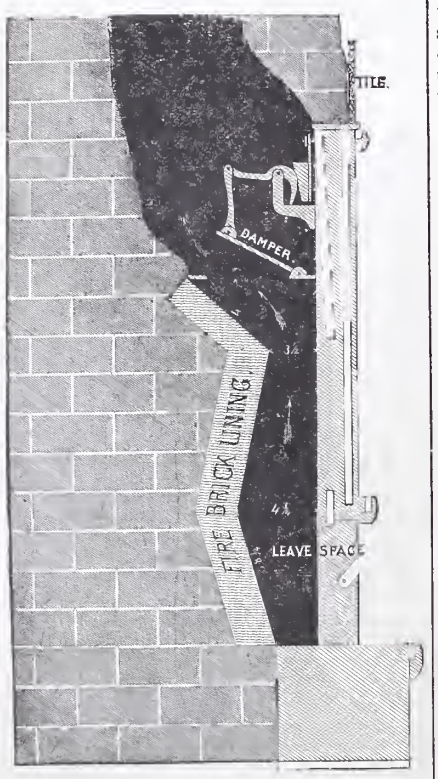
The Rideau Grate, Showing the Frame Broken Away, Revealing the Balancing Weight.

The lower blower, which conceals the ash-pan, is also adjustable, and can be placed in front of the grate so that its top just meets the bottom of the sliding blower, thus making an air-tight stove of the grate. This feature is unique in set grates. The grate is supported by a shank at either end. This shank is in the middle, so that the grate can be readily dumped by lifting a little latch which holds it in place while the fire is in it. The ash-pan is of such a shape and is so large as to catch all the ashes, thus insuring cleanliness. This apparatus has the advantage of being strictly compact, taking up even less room than the ordinary fireplace. It is adapted to burn either hard coal, soft coal or wood.

Almost every house has one or more chimneys that can be made available for an opeu grate like this, and the space occupied being comparatively small, brings it within the reach of all. In addition to its use in dwellings, it is also adapted for hotel apartments, business offices and the like. Two styles of these stoves or grates are made, differing from each other only in the ornamentation. In both patterns the blower and frame are decorated with rich art castings. It is hardly necessary to point out to our readers that the open fireplace, in addition to its cheerfulness aud beauty, has a sanitary mission. Whether used as an independent heater or simply to supplement the power of the furnace, its ventilating qualities are always in operation. It imparts a movement to the cold stratum of air found in every room, driving it up the chimney and replacing it by an equal quantity of warm air. The frequent renewals of air in this manner relieve the room from air made foul by respiration and other causes.

NOTES AND COMMENTS.

It is only at rare iutervals that the pages of mechanical journals are graced by contributions from women, but whenever they do take up the pen there is pretty certain to follow good advice and practical suggestions. Very frequently points are made that the men have entirely overlooked, and occasioually those who are discussing problems of arrangement and decorations, for example, are set right about by the superior acumen of some gifted woman, who, perceiving the dullness of the so-called lords of creation, enters the arena and ends the controversy forever by having her say about it. The readers of this journal in the past have had occasion to acknowledge their indebtedness to suggestions from women. A "Woman's House Plans," which a gallant architect in the West made still more interesting by furnishing a perspective view of a house constructed to them, and a "Letter From a Farmer's Daughter," have not been forgotten. Not the least interesting nor the least practical among the articles which appear in this issue is that contributed by the sister of a carpenter, in which the question, "Is Carpentry a Desirable Calling?" is discussed. A woman necessarily approaches a topic of this kind from a very different standpoint from that occupied by a man, and hence her presentation of it possesses an interest derived alike from its novelty and force. We feel sure all will read this article with both profit and delight. Our new contributor, who may be known to some through her contributions to the columns of the magazines and literary weeklies by the *nom de plume* of "Shirley Dare," has presented some ideas which it is well for those in the trade, whether old or young, to consider, and which are especially valuable in their application to young men and apprentices who have the whole of life before them, and who, in the light of such suggestions, should be able to determine once for all the position they will occupy.



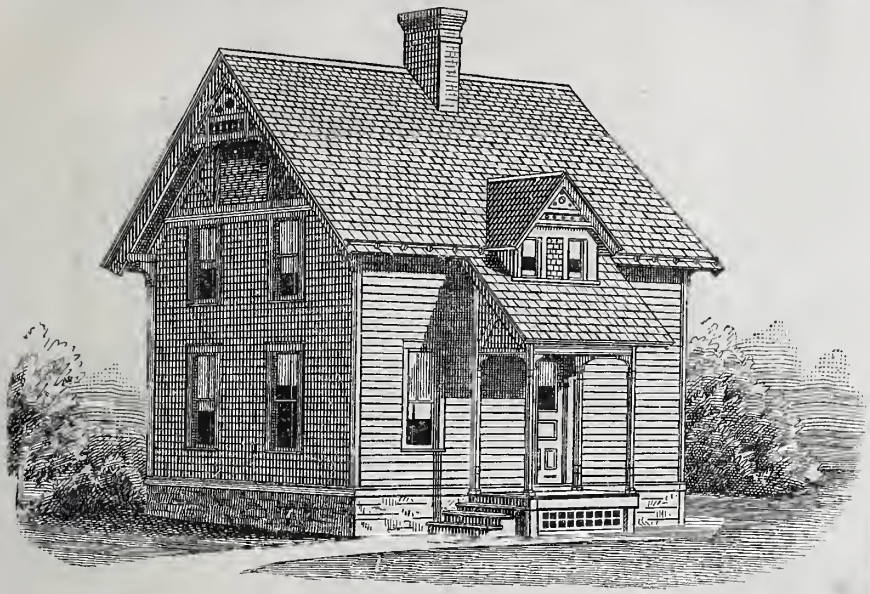
Section Through the Rideau Grate.

In another place in this issue we publish a letter from a painter and grainer, being a reply to an article which appeared in our columns some months since. The writer defends his craft against the aspersions commonly cast upon it, and claims for it a higher position than is ordinarily given it. He takes what we thiuk will be considered untenable ground, however, when he makes the point that an imitation of hardwood by mere surface application is better than the thing itself. This idea will not at all please the art education of the day, which in many respects is essentially opposed to shams. We presume our correspondent's argument, although unexpressed, is in effect that paint is necessary in any case for protecting the wood, for without it durability is impossible. Therefore, it had better be used as he suggests. There is a certain force to this, it must be admitted; but, on the other hand, he overlooks the fact that for interior finish, at least, sufficient protection to the wood surfaces for all practical purposes can be attained without the application of pigments that effectually disguise the real nature of the material. We are very glad to have this commuuication, and shall be pleased to have others in the same spirit. Above all things, we believe in fair play, and we like to see men of all trades and professions ready to defend their chosen occupation. Painting aud graining are among the most useful arts, and the only objection that can ever be raised against them is their employment injudiciously and out of place.

The course of lectures under the auspices of the Franklin Institute, Philadelphia, delivered during the past winter, was the most importaut and interesting to which the mechanical world has been treated in a long time. The selection of speakers and subjects was very carefully made, aud the course was sufficiently varied to meet the requirements of persons of widely differing tastes and interests. Not least in importance, whether viewed from the standpoint of actual information conveyed or from that of awakening a popular interest in mechanical topics, were the several efforts of Mr. Joshua Rose, who spoke on the "The File," "The Hammer," "The Chisel," "The Scraper" and "Boring Tools" A complete report of all of these lectures would be interesting, but lack of space, and the fact that they are somewhat out of the line of investigation of greatest practical usefulness to carpenters and builders must be our excuse for not presenting them. We give a portion of the last lecture in this issue, from which our readers will be able to judge of the thoroughness and ability with which the subjects have been handled. These five lectures have as their basis the broad proposition that much can be learned theoretically about the simpler tools employed in all the trades that will greatly facilitate a practical familiarity with their uses, to be acquired at a later date, or, in other words, that much of the work of learning a trade can be saved by a little intelligeut instruction at the outset

The subject of industrial education is one iu which every one is interested. It is of importance alike to the builder who must cousider the future supply of trained workmen; to the parent who, in the absence of an adequate apprentice system, looks to it for the means of enabling his boys to earn a respectable livelihood, and to the statesman who sees in it an important force the nature of which is to make the nation more independant, the people more prosperous, and to strengthen in various ways our most

cherished institutions. The common-school system has done a good work, and we owe much to it, but the times demand more than it at present affords. The severest criticism that can be made against it—that it does not instruct the youth of the land how to earn a living, even though years be spent in study and the full course be taken—is being very freely urged in various quarters. At the same time a number of well-directed efforts are being made to cut from it some of those branches of study which from a practical standpoint are deemed superfluous, and to engraft in their place manual training and practical discipline in some of the more common arts.



Thirteenth Competition.—Cheap Frame Houses.—Perspective of Design by Mr. F. J. Grodavent, Leavenworth, Kan.

What little apprentice system this country formerly had broke down and was abandoned before the question of what was to take its place was considered. It failed because it did not meet the requirements of the case. It came to us as a legacy from the older countries, and we used it until it proved to be out of accord with American ideas. It has left behind it in many directions, however, the feeling that nothing but its equivalent can ever teach a boy a trade, and hence we frequently hear arguments for a revival of the apprentice system. More careful investigation has begun to show that the old plan did not teach trades in the best sense of the word, but, instead, simply allowed its subjects to pick them up, if, perchance, they were able to do so, after performing the menial drudgery which was an inherent part of the system. Of late it is beginning to be understood that a bright boy can be taught a trade as well as an abstract science, and in a comparatively short time, provided he is properly directed and his ambition and enthusiasm are aroused. Hence the propriety of sending boys to school to learn trades, and the expediency of combining in the instruction of our youth what has heretofore been called an education with a proficiency in some calling which will serve as a means of livelihood in after life.

As bearing upon the general question of the feasibility of teaching trades, the following extracts from remarks made some time since by Mr. John Foley, the instructor of the class in blacksmithing of the Massachusetts Institute of Technology, will be interesting: "It appears like throwing away two or three years of one's life to attain a knowledge of any business that can be acquired in the space of 12 or 13 days by a proper course of instruction. The dexterity that comes from practice can be reached as quickly after the 12 days' instruction as after two or more years spent as an apprentice under the adverse circumstances under which the apprentice ordinarily works. The plan in this school (that above mentioned) is to give the student the fundamental principles in such lessons as will teach him most clearly, and at the same time give practice enough in the short time to acquire a knowledge of the different kinds of tools and the various ways of using them." These words have special significance, coming, as they do, from a successful instructor and a mechanic who acquired his trade by serving a seven-year apprenticeship, and should be studied carefully by parents and guardians and others interested in the welfare of youth. That there is much time wasted in the early years of a regular apprenticeship is an undoubted fact.

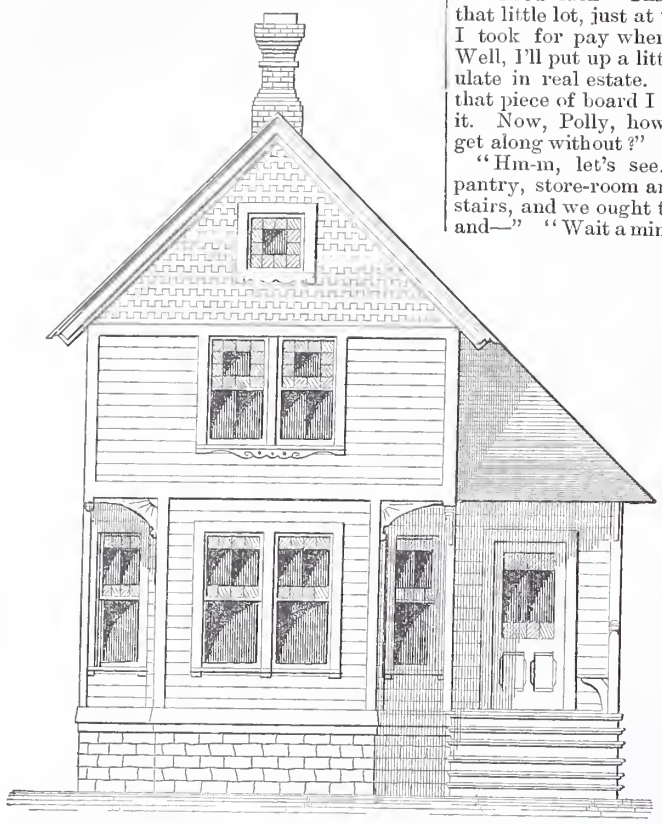
Perspective of Design by Mr. E. E. Benedict, Winstead, Conn.

Perspective of Design by Mr. S. A. Bishop, Smethport, Pa.

Cheap Frame Houses.

We take pleasure in announcing the result of our Thirteenth Competition, which had for its subject a frame house costing about $800. As mentioned in our last issue, the contest in this instance has been very spirited and an unusually large number of studies from competent designers was submitted. The labor imposed upon the Committee of Award has been more difficult in this case, perhaps, than in any other competition which we have conducted. It was not the intent of the original competition to hold designers to the fixed cost of $800, but rather to induce a number of studies of cheap houses the cost of which should be about this figure, and so nearly alike that they would be readily comparable one with another. The opinion of the committee, as expressed in their report, is that all of the better designs submitted would very likely run somewhat above the limit of cost suggested in the advertisement if built in this vicinity. They, however, recognize the fact that there are other sections of country in which it is probable the designs could be built for less than the sum named, and therefore all of the studies submitted have been considered fairly in the contest according to the original terms.

All of the better efforts, so far as can be ascertained by scrutiny of the plans and schedules, and by careful comparisons of items, run about the same in cost. No designs in this contest were thrown out because their cost seemed to be excessive in view of the conditions of the competition. All of this seems to indicate that the competitors have very carefully considered conditions and have worked in all respects as closely as possible in matters of this kind.



Cheap Frame Houses.—Front Elevation of Design by Mr. Benedict.—Scale, ⅛ Inch to the Foot.

By the terms of the competition three equal prizes of $50 each were offered to the three best designs received. The successful competitors are: E. E. Benedict, Winstead, Conn.; S. A. Bishop, Smethport, Pa., and F. J. Grodavent, formerly of Syracuse, N. Y., but now of Leavenworth, Kan. We present the perspectives of the three successful studies herewith, from which our readers will be able to judge of their comparative merits. We also present the elevations and details of Mr. Benedict's design, together with his description. One fact will scarcely escape the attention of our readers when they have had the opportunity of comparing all the studies. In each case, in some respects at least, a better grade of construction has been employed, according to the designers' specifications, than is usual in $800 houses as commonly constructed. The Committee of Award call attention to this fact as indicating in some measure where reductions in cost could be made in constructing these buildings if a minimum of cost is desired. Many of the designs to which no prizes are awarded are also very desirable for publication, and more or less of them will appear in our columns in the future. The continual demand for cheap houses warrants us in believing that the publication of these studies will be quite as valuable to our readers as anything which has appeared in our columns in a long time.

DESCRIPTION OF MR. BENEDICT'S DESIGN.

Our readers will recognize in Mr. Benedict a new contributor, so far as our competitions go, and, from the annexed narrative of the way in which his design was produced, we think they will agree with us that his introduction is likely to be an advantage and pleasure to all concerned. The humor displayed, combined with the practical features strikingly brought out in the account subjoined, we feel certain will interest and amuse all who peruse it:

"I say, Polly, I'm going to build a house next spring."

"Oh, Jack, I wish we could, but I don't see how we can afford to."

"Oh, it's *we*, is it? Well, I guess we can; any way, we'll see. How much money have we saved up?"

"About $800, I guess."

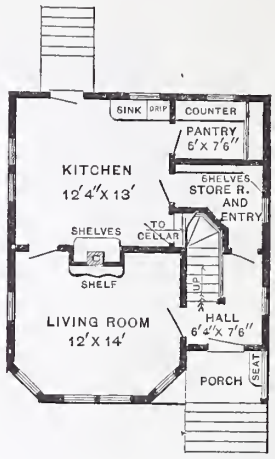
"Good luck That will do. You know that little lot, just at the foot of the hill, that I took for pay when my old boss failed? Well, I'll put up a little house on it and speculate in real estate. Here, Chip hand me that piece of board I brought home. That's it. Now, Polly, how much room can you get along without?"

"Hm-m, let's see. I want a kitchen, pantry, store-room and a living-room downstairs, and we ought to have three bedrooms and—" "Wait a minute, Polly, let me mark out something. There, how's that?"

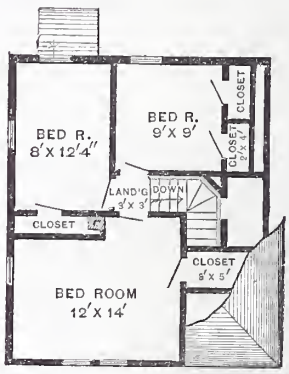
"That! I don't like it a bit. The stairs shut off all windows on one side and the pantry the other. Besides, I don't like to have the stairs landing in the kitchen, and I want windows on two sides, for the room I have to stay in most of the time must be as pleasant as any in the house. And there's the storeroom. Can't you fix it so that you can go through it from the front entrance, 'cause I don't want Chip and his friends running through the living-room. And I wish you could make the storeroom large enough to have some shelves in and a place for your tools and where Chip can keep his playthings, and I want—"

"Oh, hold on a minute; I should think, you would get tired. Hand me the smoothing plane, please, and I'll try again. The house faces the southeast. I'll put the pantry, &c., on the side next to the hill, as there isn't much to see that way. * * * There! how's that?"

"That is just what I wanted, and what I was going to tell you when you stopped me.



First Floor Plan.—Scale, 1-16th Inch to the Foot.



Second Floor Plan.—Scale, 1-16th Inch to the Foot.

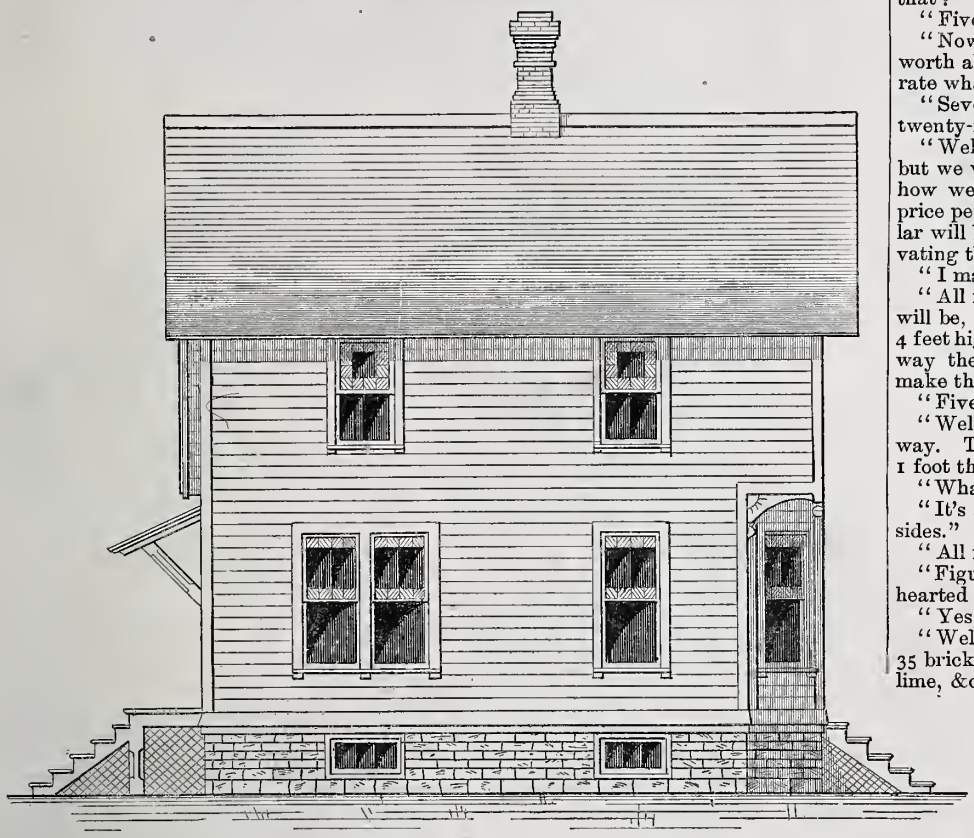
Now any one can go to the kitchen, living-room or up-stairs without having to go through other rooms, and it is pleasanter than having to use the living-room or kitchen for a hall. But what's that space around the chimney?"

"Oh, I put that so as to make it look

Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

better in the living-room, and I'll fill the space in the kitchen with shelves. I guess you'll find them handy, and I can put up a neat shelf with iron brackets in the living-room, and it will look ever so much better

"Pretty well, but they don't look like pictures of houses I have seen, nor as houses do on the street; but don't those windows look odd in the rear elevation? What made you put them up so high and such small ones?"



Cheap Frame Houses.—Side Elevation (Left).—Scale ⅛ Inch to the Foot.

than if the chimney stuck out in the room, won't it?"

"Lots. The sink will be handy to the pantry; but how are you going to get water?"

"Don't you remember that spring on the side hill? I was looking at it the other day, and I found that it is high enough to force water 'most to the second floor."

"That's nice; but what's that place that opens from the stairway where you turn?"

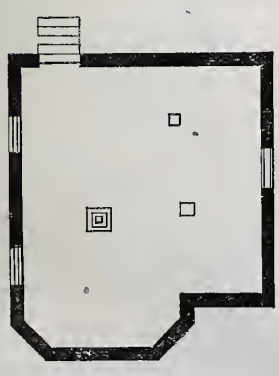
"That's a 'cubby' to stow away old paper and things in. Anything else you want to comment on?"

"N-n-n-o-o, but I wish you could build in a bay window; it would—"

"Bay window! Great spoons! Why—"

"Well, you needn't swear; I only said 'I wished,' and if you are going to—"

"There, there; I didn't mean to hurt your feelings, but it sort of took my breath away;



Cellar Plan.—Scale, 1-16th Inch to the Foot.

$800 don't—H-m-m! Eureka! I have it. I'll cut off the corner in the first story so, and put in windows, and, with brackets under the projections, it will look 'boss.'"

"Oh, that's just lovely, Jack. Can't you make what you call an elevation or something, so I can see how it will look when it's built?"

"Yes, I guess so, in a day or two."

* * * * * *

"Here, Polly, here's your elevations; how do you like the looks?"

"I put them up because the sink comes under one. It makes a place to catch dirt where a full window comes back of a sink, and as you will want some sort of an opening there in the summer time, at least, I thought it would be better and look better, too, and the one in the pantry for the same reason."

"I guess you're right. Oh, there's one thing I forgot the other day. How are you going to get into the attic?"

"How? I'll have a trap-door, and a light step-ladder to be kept in the attic which you can reach from a chair, for the attic isn't big enough to be of much use, any way. I'll fix it so that you can pull it up and let it down with a small rope."

"That'll do, may be; but, say, don't that long roof cut off some of that small bedroom and make those closets rather low?"

"Yes. But Chip can have that room and he is short enough to fit it, I guess. Any more objections?"

"No; but I can't see much how the house will look by these elevations. Can't you make a picture of it some way?"

"I guess you mean a perspective view. I'll see what I can do."

* * * *

"There, Polly Ann, there's your picture. See how you like that while I 'figger' up the cost."

"I say, pop, may I help? I want to learn how."

"All right, Chip, get your slate and pencil."

"I have them; what shall I do first? Isn't there some quick way to find the cost? I saw Mr. Jones the other day when he told Tom Jenkins what he would build him a little house for. He made only a few figures on a board, and I got it after he threw it away, but I couldn't make out much."

"I guess, Chip, he must have estimated it by the square foot, floor measure. We do that way sometimes. Suppose we try it. Here we have 25 feet 6 inches by 21 feet 10 inches; call it 25½ x 22 feet. How much is that?"

"Five hundred and sixty-one feet."

"Now, the house we will build will be worth about $1.25 per square foot; at that rate what will our house cost?"

"Seven hundred and one dollars and twenty-five cents.

"Well, I guess that's about the size of it, but we will estimate it another way and see how we will come out; but remember, the price per foot is above foundation. The cellar will be extra. Now, see how much excavating there is to be done."

"I make 93 cubic yards."

"All right; now for the foundation; that will be, on an average, 18 inches thick and 4 feet high. Get the cubic feet. That's the way the masons do. How much do you make that?"

"Five hundred and seventy cubic feet."

"Well, take the underpinning the same way. That will be 2 feet 6 inches high and 1 foot thick, two-faced wall."

"What is a two-faced wall?"

"It's a wall of flattish stone, pointed both sides."

"All right. How about the openings?"

"Figure it solid; the masons are a hard-hearted set. Got that?"

"Yes, 228 cubic feet."

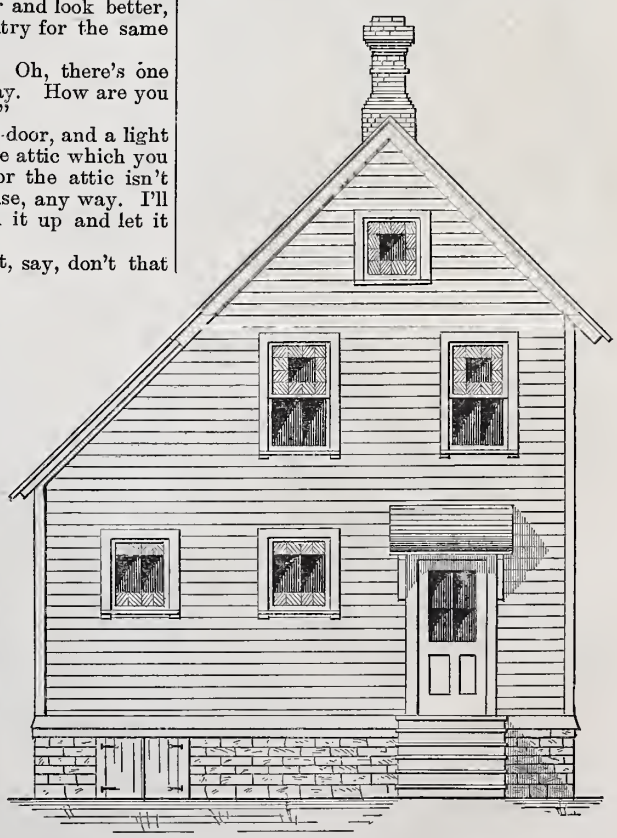
"Well, take the chimneys next. Figure 35 brick to the foot, and the cost to include lime, &c." "I have it; 1260 brick." "Good! Now for the mason's or plasterer's work."

"How shall I figure that?"

"Figure the plastering by the square yard, and take out half the openings."

* * * * *

"Well, Polly, how do you like the picture?" "First rate; why didn't you make one like this first. The carpenter could see a great deal better how the house would look." "That's so; but could you build a dress from a 'picture' of one. Don't you have to use patterns?"



Rear Elevation.—Scale, ⅛ Inch to the Foot.

"Yes." "Well, elevations are a sort of patterns."

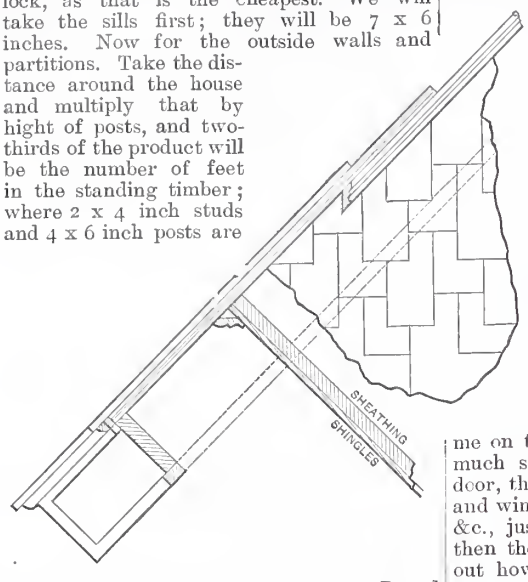
* * * * * * * *

"Now, Chip, how about the plastering?"

"I make it 331 square yards."

"All right; we will have a two-coat job, brown wall, whitewash finish for ceilings." "Now for the carpenter work."

"Take the frame first. We will use hemlock, as that is the cheapest. We will take the sills first; they will be 7 x 6 inches. Now for the outside walls and partitions. Take the distance around the house and multiply that by hight of posts, and two-thirds of the product will be the number of feet in the standing timber; where 2 x 4 inch studs and 4 x 6 inch posts are



Cheap Frame Houses.—Detail of Verge Board and Shingled Gable.—Scale, ¾ Inch to the Foot.

used, which we will do, the partitions are the same. Now for the joist. For the first and second floors, we will have 2 x 8 inches by 16 inches to centers (studs the same). To get the number of feet, get the surface measure of the floors (in board measure), and that will be the number of feet in the joist. The attic joist will be 2 x 6 inches; now take one-half of the floor measure for them—that fills out the joist. Now for the rafters. Get the surface measure of the whole roof (square feet, of course), and where the rafters are 2 x 5 inches and 2 feet to centers (as in the present case), take two-fifths of that, and you will have the rafters. How much do you make the whole amount to?"

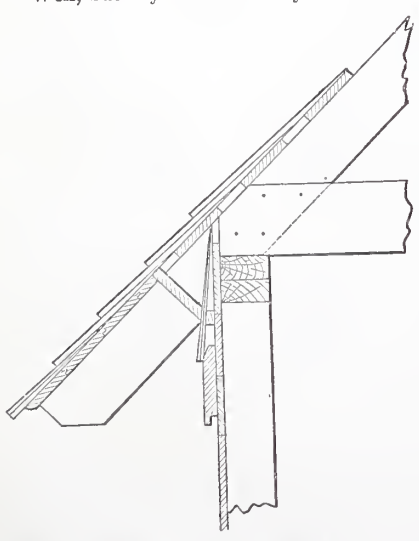
"It amounts to 4336 feet of timber."

"Well, now take the sheathing; get the square feet of outside walls and take two-thirds the surface of roof, for we will use narrow boards there, and add the floor to attic. Well, how much for boards?"

"Two thousand four hundred and eighteen feet, sir."

"Well, now for shingles. Get the number of square feet covered and multiply that by seven, and that will give you the amount of shingles."

"Well, but my arithmetic says—"



Section Through Eaves.—Scale ¾ Inch to the Foot.

"Never mind your ''rithmetic.' This is a house and we will use 'clear butts,' sawed pine. How much is it?"

"It is 7553."

"Now for the floor; you have that somewhere. Found it? All right, add one-quarter and you may find out how much we may want in the cornice. Here is a detail of cornice at eaves to show how it is put up. Nail on the floor boards and nail the frieze to them before shingling. Then we can push the shingles under it to form shingle frieze, and then nail through into studs. When we run up the gable we break joints on a second rafter once in a while. The ceiling to front porch will be spruce. Got it? Well, how much?"

"One thousand six hundred and nineteen feet spruce boards."

"For the clapboards take surface measure of walls outside; the openings will make up for the lap. No. 2 clapboards will do for this job. How many, Chip?"

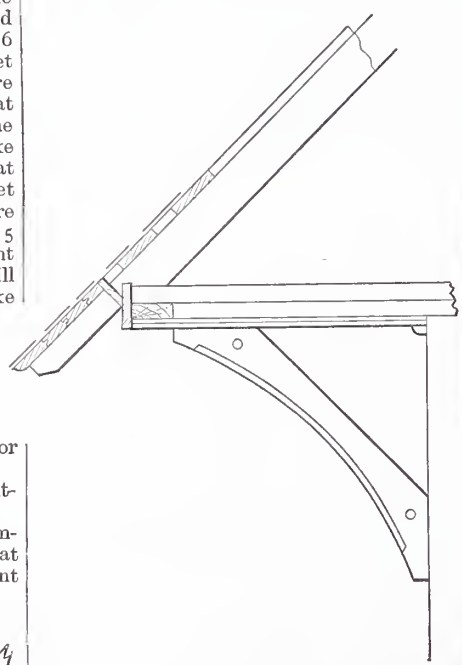
"Only 1400 feet of those."

"Now we will take the pine lumber."

"Eh! What! Got to study your lesson for to-morrow? Well, help me on this first. You want to find out how much stuff it takes to one window and door, then multiply by the number of doors and windows; as to corner boards, cornice, &c., just see how much there is in a foot, then the rest you know how to do. Find out how many feet in length there are, then multiply, and you have the amount. How much do you make?"

"Twelve hundred and fifty feet, sir."

"It will take about 95 feet of matched and beaded pine for the porch 'fence' and cup-



Roof Over Rear Stoop.—Scale, ¾ Inch to the Foot.

board door. What? No, I shan't wainscot the kitchen; costs more than plaster, and we are going for 'cheap.' You may study now, Chip, and I will make a list of what we have done and of the rest.

"How shall I trim the doors? Well, I think we will have common loose-joint butts for all doors, brown mineral knobs, black enamel furniture and mortise latchets for down stairs, with locks for front and back doors; Berlin-bronze trimming for cupboards and window locks, and upstairs use these common thumb latchets, and—

"What? I thought you had to study. Oh, it takes 4½ pounds of 3d. nails for a thousand shingles, and we use 6d. box nails for clapboards. Is that all?"

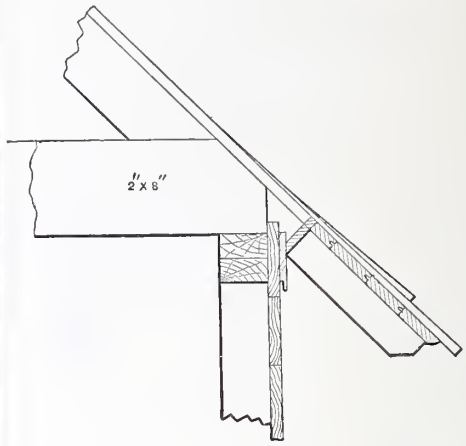
"Yes, for now."

"Windows? No, we won't have colored glass. I took the plans around to Boss S., and asked what he thought such a house would cost. He looked at it a spell and said about $800, and I guess I'll have him help me build it. I saw the painter, too, and got his figures, and the plumber's.

"Eh! How do I figure the work? That is the hardest part of estimating. If I could pick my men I could get the work done in less time than if I have to take what I can get. When I was a boy they used to figure $8 per thousand for framing and raising, but this frame will be a balloon, and it isn't worth more than one-fourth as much. A man ought to lay 2000 shingles per day, straight work, and about 5 squares of flooring."

"How much is a square?"

"A square is a space 10 feet square, or 100 square feet, and a man ought to case 10



Cornice of Extension.—Scale, ¾ Inch to the Foot.

doors a day, or 15 windows, when they are cased flat."

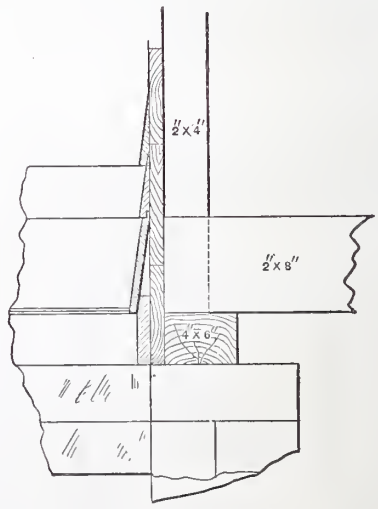
"What's cased flat?"

"It's where the casings are nailed to the studs and the plastering comes even with the face of the casing, just as I have drawn it there.

"Rough boarding with hemlock, about 8 squares per day; clapboarding, I should say about 3 squares per day, though that depends on how much the surface to be covered is broken up. I guess, Chip, if we go on that basis we will put the labor down and foot up and see how we stand.

The cellar walls will be	$119.60
Excavating	23.24
	142.84
House	648.42
Total	$791.26

"Let's see; at $1.25 per square foot the house would be $701.25, and with the cellar would bring it up to $820.85, would'nt it?



Section at Sill.—Scale, ¾ Inch to the Foot.

Well, we do not vary much. I guess we are safe in going to work."

"But, Jack, doesn't it cost more to shingle a gable that way?"

"That depends; you see, when the men are shingling I shall have them, when they pick up a shingle about 4 inches wide, drop it through the roof, and in that way it won't cost so very much."

"What are you going to have the newel and rail made of?"

"White wood, and stain them; anything else?"

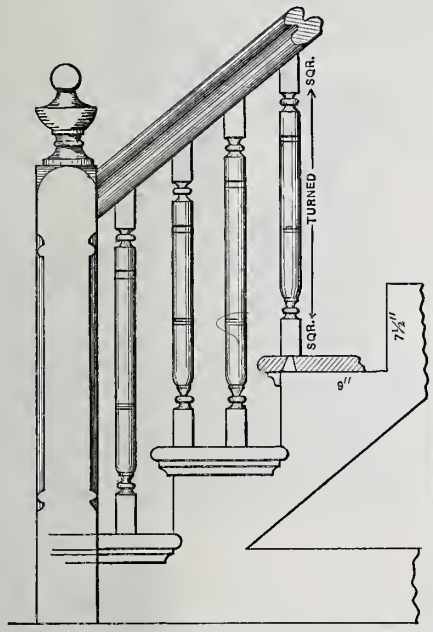
"No-n-no, not now."

"All right, we will put the thing through as soon as we can in the spring."

NEW PUBLICATIONS.

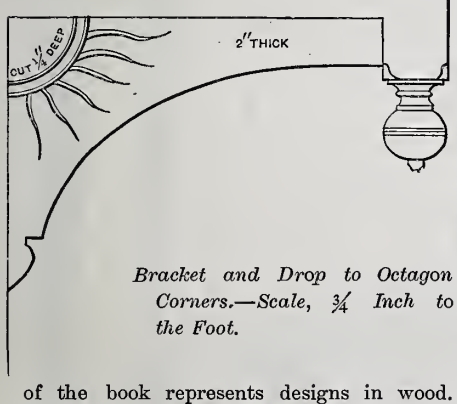
ALBUM OF MANTELS IN WOOD, STONE, SLATE AND BRICK. Sixty plates of original design. By C. C. Buck, architect. Portfolio form. Published by J. O'Kane. Price, $7.50.

This work, which has been very carefully prepared by the lithographic process, contains a number of designs likely to be of service to all who are engaged in building mantels or in designing interior finish. The severest criticism that can be made upon it



Cheap Frame Houses.—Detail of Stairs.—Scale, ¾ Inch to the Foot.

is the fact that it is the work of one artist rather than a collection of efforts of a number of artists. Many of the designs exhibit strong individual peculiarities of taste and form, and to one who is quick at perceiving points of this kind there is a general vein of similarity running through all the designs. Notwithstanding this, there is much, as we have already said, that is useful to all who have occasion to employ a work of this kind. The 60 plates contained in this album are divided among wood, stone, slate and brick mantels, and a few cabinets and hanging shelves. Of the latter, five designs are shown; some 20 stone, slate and terra-cotta mantels are presented, while the remainder

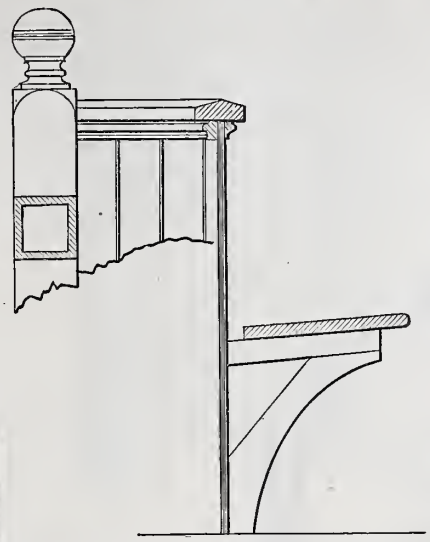


Bracket and Drop to Octagon Corners.—Scale, ¾ Inch to the Foot.

of the book represents designs in wood. One mantel in terra-cotta, brass and tile is shown.

AMATEUR WORK ILLUSTRATED. By Paul N. Hasluck. Size, 7 x 9½ inches, 534 pages, profusely illustrated, bound in cloth. Published by Ward, Lock & Co. Price, $4.

Although published under the title given above, this book is really the first annual volume of an English magazine, edited by Mr. Hasluck, and called "Amateur Mechanics." Its title indicates its scope very acurately. The material is good, and no small portion of it has been derived from the columns of *Carpentry and Building*, *The Metal Worker* and *Mechanics*. Several of the leading articles are from these sources, among which may be mentioned "Modeling in Clay," a series that our readers generally will recall; "Household Clocks," "Amateur Lathe Making," "Electro-Plating," "Building a Small Organ," "Violin Making" and "Boat

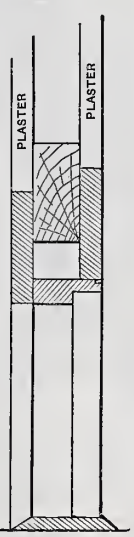


Balustrade and Seat on Porch.—Scale, ¾ Inch to the Foot.

Building" are other illustrated articles in the book. Letters to the editor and replies form a series of very interesting chapters. Taken altogether, the book is one which the mechanically-inclined amateur will find a very useful companion in his workshop. The practical character of many of the articles, owing to the fact that they have been written by persons who are familiar with the trades which they describe, makes the work specially valuable. To this, add the fact that very many of the workmen-authors are amateurs, and it is easy to see that from the amateur standpoint the value of the instruction afforded is very high.

MONCKTON'S PRACTICAL GEOMETRY. By James H. Monckton. Size, 4½ x 7¼ inches; illustrated by 42 full-page plates. Published by William T. Comstock. Price, $1.

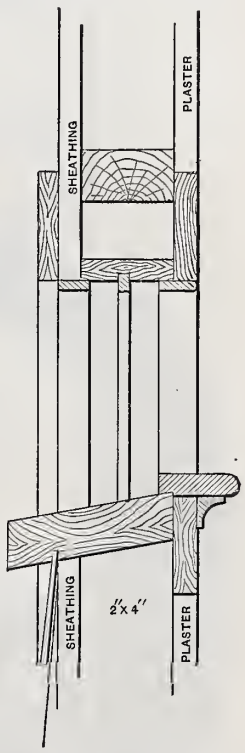
Mr. Monckton is the author of various works on stair-building and other kindred topics, and for several years has been the instructor of the mechanical classes in the General Society of Mechanics' and Tradesmen's Free Drawing School of the City of New York. The present work has been designed by the author to be more convenient for use in schools and in classes than anything on the subject of practical geometry that has heretofore appeared. The arrangement of the problems is on one page, while the explanatory text is on the page facing, thus rendering reference from one to the other a matter of convenience. The introductory chapters discuss drawing tools, and give the student a fair idea of what he should have in order to be prepared for the practical work to be done in following the course of instruction outlined by the book. The remainder of the work contains a selection of geometrical problems well chosen for the particular objects the author has in view. Those which are too abstruse to be of any practical benefit to ordinary mechanics are judiciously omitted, while particular prominence is given to such as come up in everyday life of the mechanic. Arches are briefly considered, and what appears with relation to them has direct application to their construction in the materials usually employed in the erection of buildings. The covering of solids of various shapes, sections of solids, including the developement of what tinners would call elbow patterns, and other similar problems, are treated in a very careful manner. The cone and its sections also receive careful attention. The last two plates in the book are devoted to scales, and a number of these instruments for special uses are illustrated and explained.



Door Jambs and Casings.—Scale, 1½ Inches to the Foot.

THE ELASTICTY AND RESISTANCE OF THE MATERIALS OF ENGINEERING. By William H. Burr, C. E. Published by John Wiley & Sons. Size, 6 x 9 inches, 753 pages; numerous illustrations; bound in cloth. Price, $5.

This book is an outgrowth of the Professor's lectures on elasticity and resistance of materials, given to the students of the Civil Engineering Department at the Rensselaer Polytechnic Institute. Very naturally, they have been elaborated and extended, and made to cover the details of the subject not included in any technical course of study. The work is divided into two parts. The first includes the theory of elasticity in solid bodies, hollow cylinders, thick hollow cylinders and spheres, and torsion, theory of flexure, &c. The theory or technical part is developed in Part 2. The first part of the work is designed for technical students, especially for those whose tastes and circumstances require investigation in connection with the elasticity and resistance of materials. In Part 2 the author says the mathematical results obtained in the first portion are subjected to the tests of experiment. These, of course, are compilations, but have been taken in all cases, so far as the author knows, from sources the most trustworthy. In every case, so far as we have looked, the author has with the utmost care given creditwhere credit has been due. In the production of this part of the work the author has evidently reduced to shape a vast amount of experimental material, changing the crude record of tests to a useful form, and reducing from one unit to another in order to make the work harmonious throughout. Much of the matter, although credited to other authorities and to other authors, is substantially new, having been worked over and put into a shape to be practically useful to the engineer without the excessive labor which would be necessary in turning to the original authorities.



Section Through Window-Frame. — Scale, 1½ Inches to the Foot.

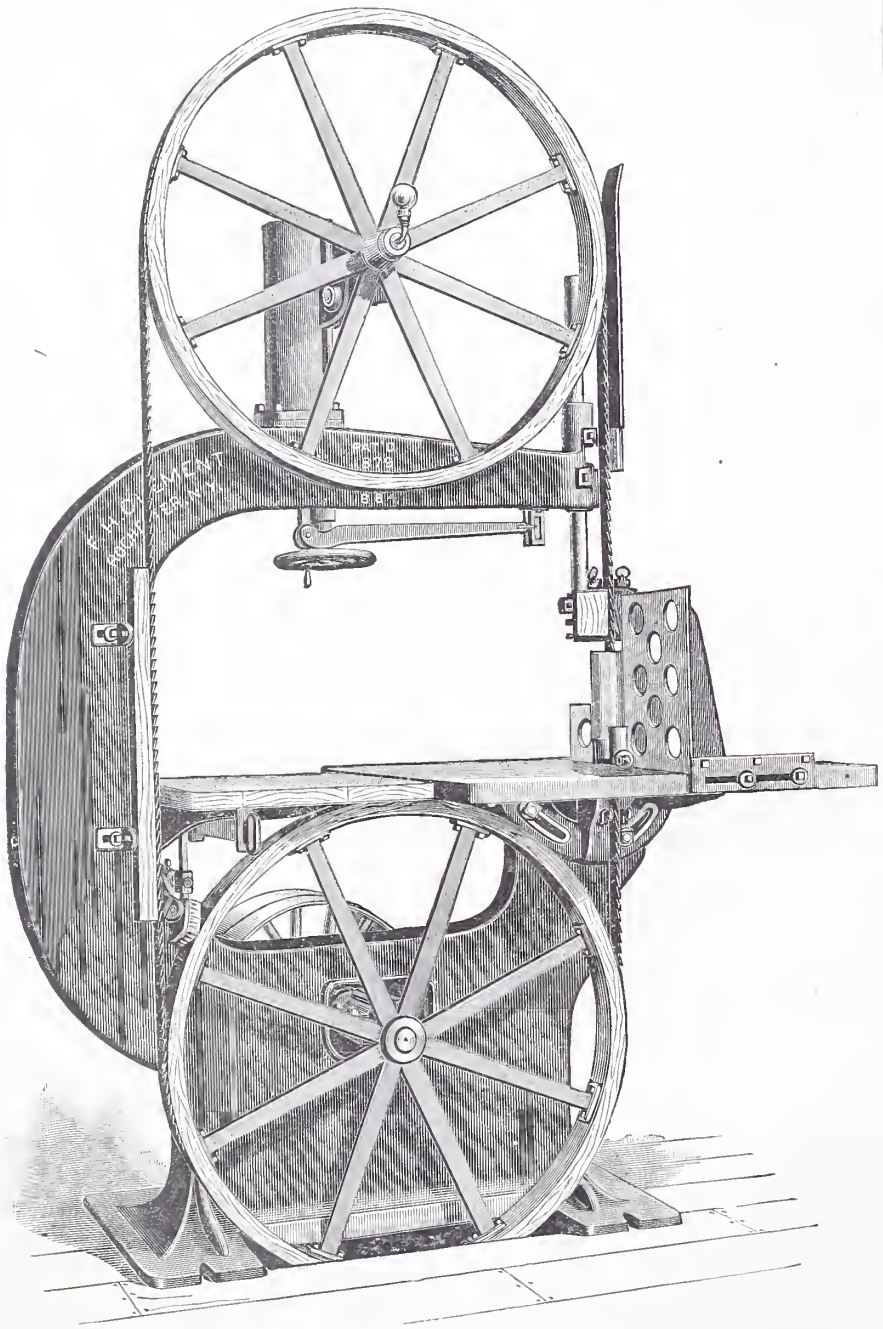
Clothes pins are made of white birch and beech. The logs are sawed by three operations into blocks 5 inches long and ¾ inch square. In this shape they are fed out of troughs into automatic lathes, each of which turns out 80 rounded pins per minute. With equal rapidity the knives of a slotting machine, set to work like a circular saw, bite out the sloping slot of each pin.

An engineer of New Orleans suggests the idea of constructing the framework of large exhibition buildings, which must be demolished after brief use, of wrought-iron steam pipes of standard length, put together with standard fittings in such a manner that they can be taken apart without injury and sold at a small loss when the building is no longer needed.

NOVELTIES.

Combined Scroll and Resawing Band-Saw Machine.

Frank H. Clement, of Rochester, N. Y., whose wood-working machinery is known to many of our readers, has recently designed and put upon the market a 42-inch band-saw machine, which is described as a combined scroll and resawing machine. It is illustrated in Fig. 1 of the engravings. It is a heavy, carefully designed, powerful machine, with cored frame cast in one piece. The extra-heavy shafts with which it is provided are steel, the bearings are long, the pulleys are large and the



Novelties.—Fig. 1.—Combined Scroll and Resawing Band-Saw Machine, Built by F. H. Clement, Rochester, N. Y.

necessary adjustment gives a capacity for splitting stuff up to and including 20 inches in width. The wheels, which are 42 inches in diameter and 3¼ inches face, are made of seasoned-wood rims glued up in segments. They are covered with rubber, ground true and kept perfectly balanced. The main guide has a combination adjustment by means of which blades from $\frac{3}{16}$ inch up to 2½ inches in width may be used with safety. The wheels have concave arms and are very light and strong. The table has a removable block, which is changed for different sizes. It is also provided with a splitting gauge for hand-feed, with a pressure roller to keep the stock against the gauge. The upper wheel runs on a steel stud with arrangements for self-oiling. The blade is strained with a patent balanced lever and index, heretofore illustrated in these columns, which is always elastic and which permits the expansion and contraction of the blade. The blade may be shifted on its face by a hand-wheel conveniently arranged. Every adjustment about the machine is within easy reach of the operator at his post and without the use of wrenches. Mr. Clement in his circular asserts that every part of this machine is made on honor, and that it is fully guaranteed on fair trial to be as represented. When ordered, a power-feed adjustment is provided with this machine which will receive stock 6 inches thick and 20 inches wide, and saw in the center or at any point out of the center, and cut beveling for weather-boarding, &c. The feed motion is capable of instantaneous adjustment from slow to fast, and may be stopped altogether by a single lever. The driving belt and all connections are under the operator's hand. The feed adjustment can be removed from the table with little trouble and in a very short space of time, leaving the table clear for scroll work.

The Attwell Sash Lock and Ventilator.

A new sash lock, quite different in its construction from those in general use with which the trade is familiar, is made by the Attwell Manufacturing Company, 162 Main street, Cincinnati, and is now being put on the market. It has apparently novel features and advantages as a window fastening, and is called the "Attwell burglar-proof sash lock and ventilator." Figs. 2 to 6 will make plain its construction and parts, and the

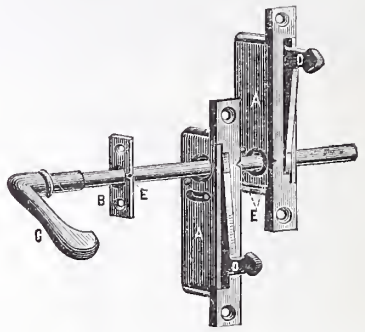


Fig. 2.—The Attwell Sash Lock, Adapted for Use on Sash.

manner of applying it to windows. It is made in two styles, according as it is to be used in windows which are hung with weights or in those with which weights are not used. The latter style, which is illustrated in Fig. 2, may be described as follows: A A, are two locks (one controlling each sash) working in combination and operated by one key, which is removable at pleasure. B is the escutcheon. C, the removable key (made of malleable iron), and D D, bolts of locks (made of malleable iron) with flanged head, which, in conjunction with the "strike," gives a "detent" to the bolt when engaged—preventing the accidental falling of the sash. E E are center marks on locks and escutcheon, given to facilitate the carpenter in his work of applying. The variety illustrated in Fig. 3 is especially adapted to windows where weights are used. In this figure, A A, B, C and E E are the same as in Fig. 2. D D, the bolts of locks, are made of malleable iron, without flanged heads, and are so shaped as to avoid the "detent" employed in the other style. L is a pin cast as part of key, which, in conjunction with escutcheon, is used in operating the "shut off" feature of the locks, holding the bolt of either lock, when desired, out of engagement. G, Fig. 4, is a continuous metal piece (7 inches long) giving four "strikes," or locking points, to each sash, to be employed when ventilating, and all within a radius of safety, so as not to permit the window being opened sufficiently to admit a person. H, Fig. 4, is a single or extra metal "strike," used, when desired, in giving a locking point at increased ventilation to upper sash, and where windows are without weights to hold lower sash at points of greater elevation. For this purpose

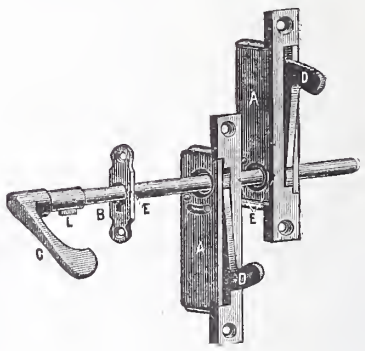


Fig. 3.—The Attwell Sash Lock for Use on Sash Hung with Weights.

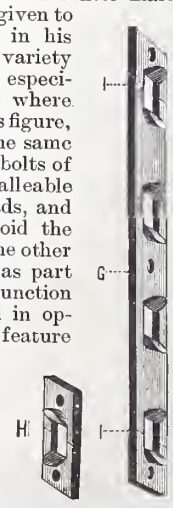
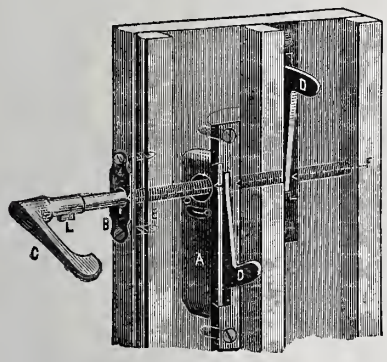


Fig. 4.—The Striking Plates.

these extra strikes are supplied for each window. Fig. 5 gives a sectional view, showing portion of window frame with locks A A inserted in mortises made in pulley stile, immediately to the left of meeting-rails of sash and on the right and left and next to parting bead. The escutcheon B is screwed on over hole which has been bored through the reveal for the admission of key, and the key C is partially inserted. In Fig. 6 is given a section showing a portion of sash, in which are inserted the strike G, and H, when employed, and illustrating their position in relation to the locks. Among the points in this device which commend it for practical use the following advantages are mentioned: The location of the locks in the window is at a point which renders their operation convenient to users, and, being mortised into the



Novelties.—Fig. 5.—Manner of Using the Attwell Sash Lock.

frame, they are not easily deranged, are inaccessible to a thief and difficult to force. These are features themselves well worthy of appreciation; but, aside from this, the lock affords additional security. The bolt being spring projected, the sash is automatically locked, and thus the necessity for the care

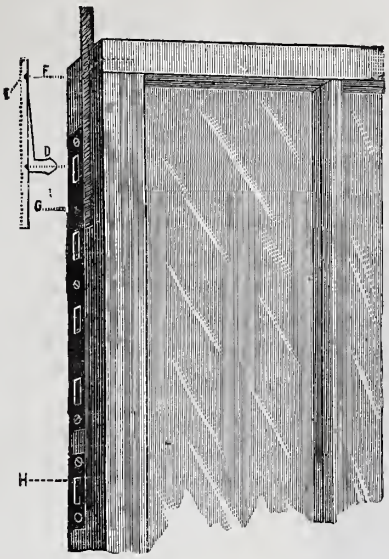


Fig. 6.—View of Sash, Showing Application of the Attwell Lock.

weights, or in case of breaking of sash cords, the operation of this lock serves to hold or control the sash.

The Smith Band-Saw Setting and Filing Machine.

Fig. 7 represents a general view of the Smith band-saw setting and filing machine, which embodies some new and interesting

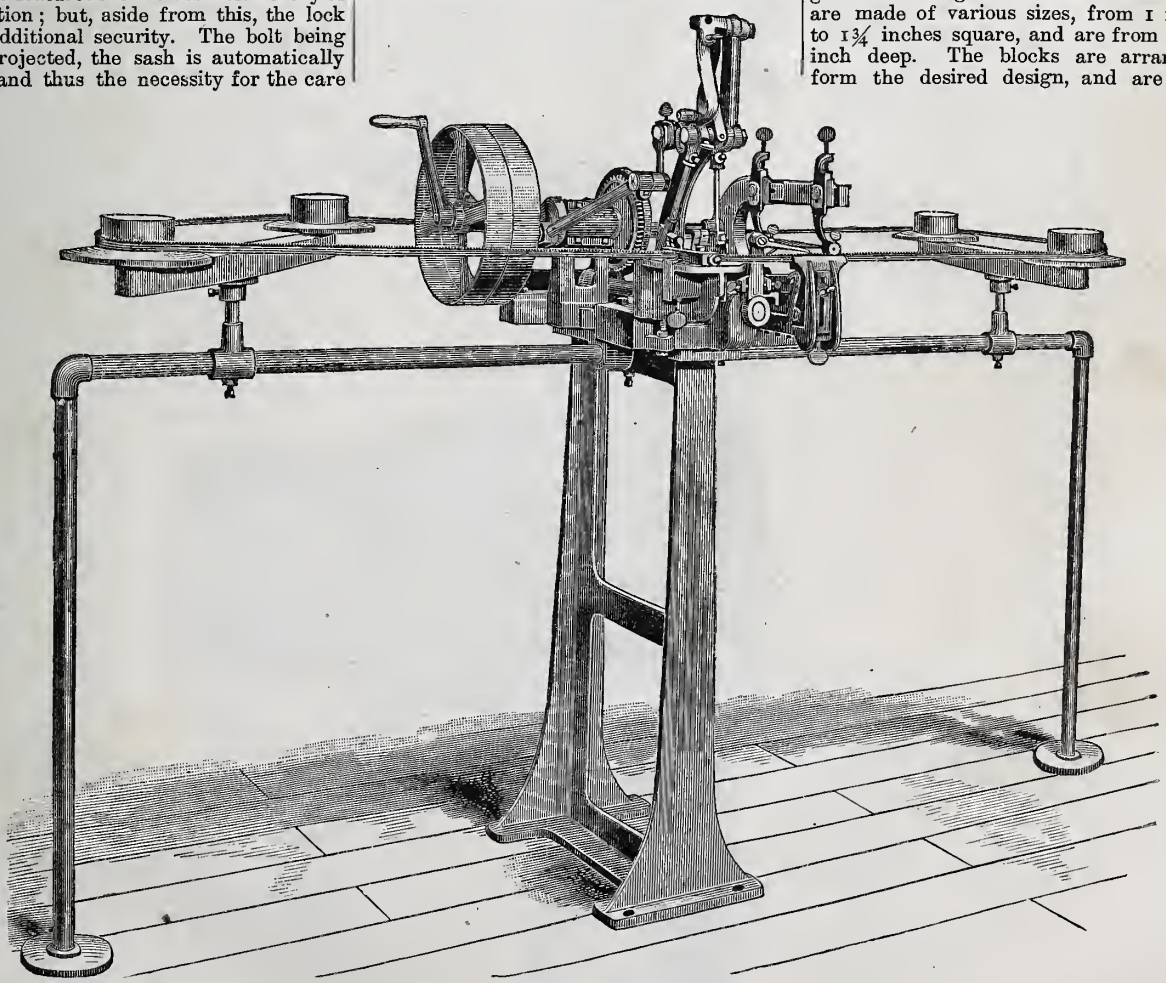


Fig. 7.—The Smith Band-Saw Setting and Filing Machine, Built by Detrick & Harvey, Baltimore, Md.

(which may not be given) and the labor of closing is dispensed with. With the many locking points supplied, if ventilation or air be desired in sleeping apartments at night, the sash may be locked at any desired elevation or depression, and by removal of key (if sufficient space be not left for the admission of a thief's body) the result is obtained without any relinquishment of security. Then, too, where windows are without

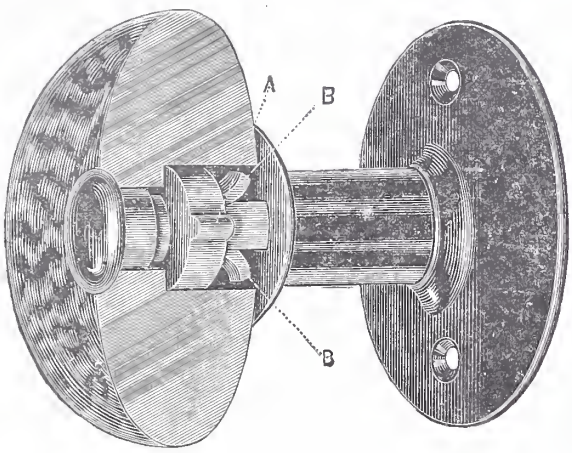
features. The machine employs the ordinary three-cornered file, and does away with the necessity of purchasing special files of some particular design. The setting attachment is perhaps the most novel feature. The setting is accomplished by means of hammers on anvils having the desired angle. By this means the teeth will stay at that angle, and do not spring back, as is often the case with teeth set by a cam motion. The amount of set required can be adjusted to the greatest nicety. The machine, constructed to work by hand or power, has been designed with the purpose of imitating, as near as possible, the movements made in filing and setting band saws by hand, but at the same time to overcome the irregularity of the same, as shown by the high and low teeth in a blade after being hand-filed.

A three-cornered file from 3 to 6 inches long can be used. Being arranged to work about 60 strokes per minute, it will set and file accurately an ordinary 21-foot band-saw in 20 minutes, while an expert workman would occupy 2½ hours to do the same amount of work. The head carrying the file has a reciprocating movement. In the forward movement the file is held down and the filing of the tooth takes place; in the return movement the file is lifted from the blade, and at the same time the self-feeding motion pushes forward another tooth in readiness for the return of the file. The feed can be instantaneously adjusted to suit the pitch of any saw, and is arranged to feed one or more teeth at a time. A device for holding the saw while being set or filed, as shown in the cut, is supplied. This machine lately received the medal of superiority at the American Institute, New York. It is manufactured by Messrs. Detrick & Harvey, Baltimore, Md.

Wood Mosaic Floors.

Messrs. W. C. Runyon & Co., of Rochester, N. Y., are introducing what they call wood mosaic floors and borders. The work may be described as lead-joined, end-up wood mosaic. It consists of small blocks of wood set on end and joined by leaden tongues. Each block has a square surface and a groove running around it. These blocks are made of various sizes, from 1 inch up to 1¾ inches square, and are from ⅝ to ⅞ inch deep. The blocks are arranged to form the desired design, and are closely held together while molten lead is forced into the grooves, which are thereby instantly filled. The blocks thus formed become a solid section and are the tiles or units out of which the flooring is finally composed. Corresponding grooves are cut in the edge of these blocks or tiles, of larger size, how-

ever, than is used for the lead, and in the laying of the floor a maple strip or tongue is inserted. The tiles, as above described, are in squares from 12 inches upward. When thus made, they are polished, jointed and grooved preparatory to laying. The woods from which floors are thus made are maple, beech, elm, cherry, walnut, oak and ash. The variety is still further increased by the use of ebonized maple. The introduction of this material is one of the special features of the floor, from the fact that the wood is used on and enables the manufacturers to color it through and through, thereby obtaining a better effect than is possible in ordinary parquetry floors. The foundation on which this flooring is laid does not differ from that prepared for other floors. After leveling up the rough floor with the jack-plane, it is simply a matter of arranging the tile above described so as to make the desired pattern and inserting the tongues in the grooves. Very little attachment to the lower floor is required. The special merits to which the manufacturers direct attention include, among others, durability. It is evident that for wooden floors and pavements it is especially desirable that the end of the grain should form the wearing surface. Accordingly, a floor of this kind resists hard blows much better than any other. Where marble or tile would be broken, and wood laid with the grain would show deep indentations, it is said that this material shows hardly any effect from the blow. Another feature of the durability of these floors is the fact that they do not as readily get out of order as other materials with which they come in competition. The process by which this flooring is constructed is obviously impracticable with any but perfectly seasoned lumber. The wood must be absolutely dry; hence there is no defect liable to imperfectly prepared material. Another advantage claimed for this material is its noiselessness, and in this respect it is said to lie midway between linoleum and carpet. This quality of noiselessness is explained by the fact that the small blocks of wood, although closely joined, are virtually separate, and the joint of lead is a poor conductor of sound. Another feature is elasticity and softness to the tread. Where greater elasticity is desired a single thickness of ordinary carpet paper is put under the mosaic. This, with the special method of joining the blocks, is said to give the floor a softness not obtained in any other tesselated material. The work, moreover, is water-tight; the lead fills the openings between the blocks, and, accordingly, a finished floor can be washed without detriment to the floor itself or risk to the apartment below. Ease of cleaning, variety of design and perfection of surface are other points to which the manufacturers direct attention. The catalogue of this work which has recently been issued by Messrs. Runyon & Co. contains a large number of designs, with a full description of the manner of preparing the blocks and the method of laying them. It contains matter of interest to all who have occasion to employ parquetry floors. We understand that the manufacturers send it to all applicants. The agents for New York and vicinity are Messrs. Runyon & Hallett, with office at 103 Chambers street.



Novelties.—Fig. 8.—The "Sensible" Door-Knob Fastening.

"Sensible" Door-Knob Fastening.

The Clark Manufacturing Company, of Buffalo, N. Y., have perfected what they call the "Sensible" door-knob fastening, a sectional view of which is presented in Fig 8. By this device door-knobs are fastened upon their shanks without the use of lead or other similar materials very commonly employed for the purpose. The button used in this case is of malleable iron, and is turned or bent in opposite directions from the center within the shank, as shown at B and B, by this means effectually securing the knob on the shank. The projections on the shank, one of which is indicated by A, prevent the knob from turning on the shank. The simplicity of this arrangement, and the evident durability of the parts, warrant the anticipation that trimmings made upon this principle will become popular.

Nail-Holding Hammer.

The Hartford Hammer Company, Hartford, Conn., are introducing a novelty in the way of hammers which will be understood by reference to Fig. 9 of the engravings. The improvement consists in a tapering slot projecting on the side of the hammer, by which a nail may be held in place so as to be stuck in position without the use of the fingers of the left hand holding it while it is being driven. After the nail has been stuck in this manner where it is wanted the hammer is withdrawn, freeing the tool for driving it home in the usual manner. The utility of a device of this kind in nailing siding and various other work where one hand is required to hold the piece in proper position will be appreciated by practical men everywhere. In order to introduce these goods to the trade, we understand that the Hartford Hammer Company are packing them in such shape as to send them by mail. From personal inspection and trial of one of these improved hammers, we think we are safe in recommending it to all in the trade who enjoy devices for facilitating work of this general character. The hammer is made of hardened cast steel and is finely finished.

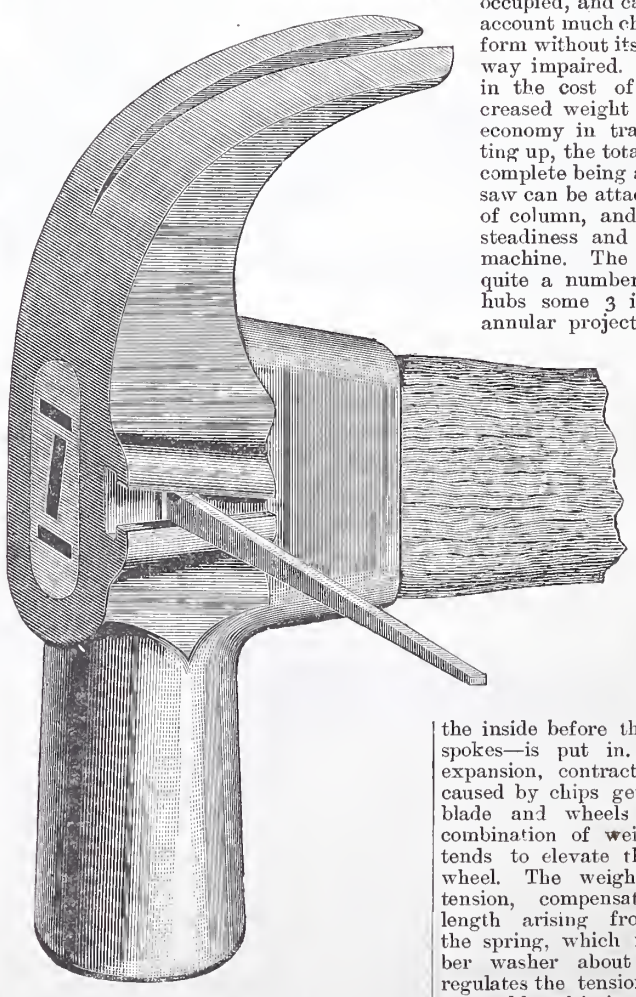


Fig. 9.—Nail-Holding Hammer.

An Improved Band-Saw.

The accompanying cut, Fig. 10, represents an improved form of band-saw made by Goodell & Waters, of Philadelphia, which

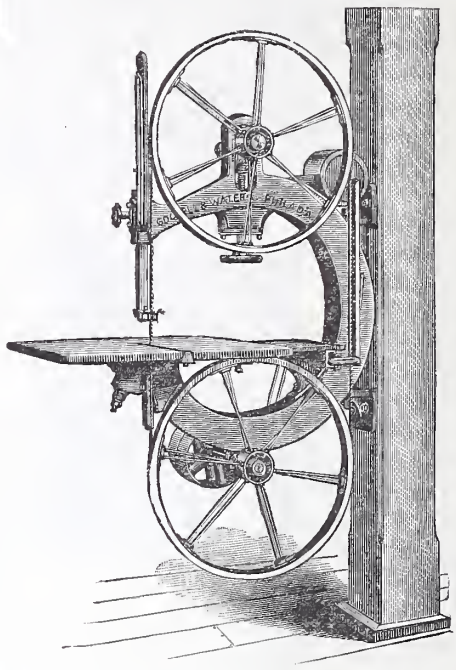


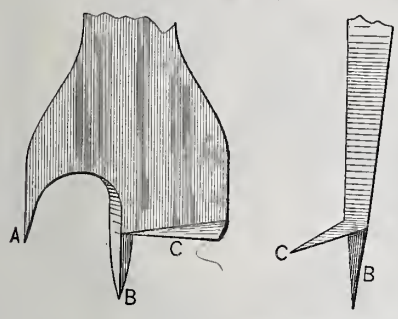
Fig. 10.—An Improved Band-Saw.

is especially adapted for pattern-making and cabinet work. It dispenses with the ordinary heavy iron base, and consequently with a large proportion of the weight and room occupied, and can also be made on this account much cheaper than the ordinary form without its efficiency being in any way impaired. Besides this reduction in the cost of the machine, the decreased weight also insures a greater economy in transportation and in setting up, the total weight of the machine complete being about 650 pounds. This saw can be attached to any size or shape of column, and will run with all the steadiness and accuracy of a heavier machine. The wheels, which embody quite a number of improvements, have hubs some 3 inches in length, with annular projections extending parallel to the axis on the periphery of the hub, through which a number of holes are drilled. The spokes, which are of $\frac{5}{16}$-inch round iron, and threaded on each end, are screwed in these holes, as may be seen by reference to the cut. The wheel rims are made of six thin strips of wood glued together and covered with an endless rubber band in the ordinary manner, and are trued up on the inside before the spider—*i. e.*, hub and spokes—is put in. The uniform strain, expansion, contraction and sudden stress caused by chips getting between the saw-blade and wheels is allowed for by a combination of weight and spring, which tends to elevate the hub of the upper wheel. The weight maintains a uniform tension, compensating for variations in length arising from temperature, while the spring, which is merely a heavy rubber washer about $\frac{3}{4}$ inch in thickness, regulates the tension of the saw in case of any sudden friction or strain. This combination is designed to save the machine from all sudden jars and the consequent breakage of the saw. The table is so arranged that it can be tilted to any angle within 45°.

Boring Tools.*

BY JOSHUA ROSE.

There are two principal methods of producing holes in material—namely, by drilling and by boring. When a hole is cut into solid material it is termed drilling, and when we enlarge a hole that is already in existence the operation is termed boring. We find in practice that it is a very difficult matter to produce a round, parallel and straight hole with a drill of any kind; hence, when



Boring Tools.—Fig. 1.—The Center-Bit.

such holes are required in metal, we resort to a third process, which we term reaming, this being what we may call a corrective process. If we enter minutely into any of these processes, and especially into those of drilling and reaming, we find that they involve a great number of intricate mechanical problems that are of the utmost importance, and that call for more consideration than can be given to them within the limits of a single lecture. All that can be done, therefore, is to refer to some of the more prominent ones.

Beginning, then, with the wood-worker, we may classify his boring tools under the heading of awls, gimlets, bits and augers. The awls and gimlets you are all so familiar with that it is unnecessary to describe them. The center-bit, shown in Fig. 1, will serve for boring either across or with the grain, but is most serviceable for boring thin stuff, which it will do without splitting it, as augers having conical screws at their ends are apt—and, in fact, almost sure—to do. Furthermore, it requires too much pressure to force it to its cut when it is applied parallel to the grain of the wood. I must here call your attention to an important element in shaping wood-boring tools—which is, that the action of the cutting edges should be such that the fiber is severed at its ends before it is attempted to dislodge it from the

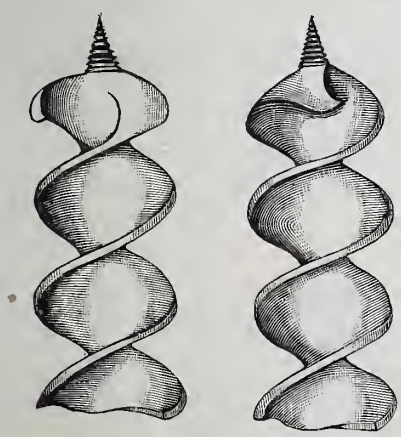


Fig. 2 —Good's Auger-Bit.

main body. We may get a good idea of the best method of cutting it by comparing it to a piece of rope, in which it is necessary to apply the cutting edge across the rope in order to sever it to the best advantage. If we apply the knife-blade endways of the rope, it merely wedges itself between the fibers, and thus we have the action which to a great extent occurs with the wing A of the center-bit, and, indeed, with the center or spike B, when boring parallel to the grain. A better form of tool for boring from the end of the grain is the auger-bit, shown in Fig. 2, because in this case the cutting edge does not wedge in the fibers, but cuts off successive layers from the end of the fiber. It will cut almost as well across the grain, but will not leave the walls of the hole so smooth as the form of auger-bit shown in Fig. 3, which has two wings, A and B, in advance of the cutting edge C, and which, therefore, cut the ends of the fibers before the edge C comes into action to dislodge them. The object of the conical screw C is to exert a force tending to pull the auger forward and feed it, but it is found that when boring with the grain the thread is apt to lose its hold. Hence, in end boring it is necessary to force the auger well forward to its cut. The pod-bit, shown in Fig. 4, is intended for end grain only. Its cutting edge extends half way across the end, and as it stands above the level of the bit it will pull out the cuttings, which is an advantage when the hole is not bored all the way through the wood. The pod-bit or nose-bit is used for boring wooden pipes or pumps, and is made as large as 3¼ or 4 inches in diameter. It bores both straight and smooth. In Fig. 5 is shown at A the nail-bit for boring across the grain. It has the defect that it leaves a central core in the hole it bores, and will not pull it out. It is unsuitable for end grain, as it would wedge itself in the fibers; it is stronger, however, than the gimlet, and is less liable to break and easier to work, especially in hardwood. At B, in Fig. 5, is shown the spoon-bit, which, as its groove does not extend to the point, extracts its own cuttings.

It is more difficult to bore a straight hole endways than across the grain of wood, and

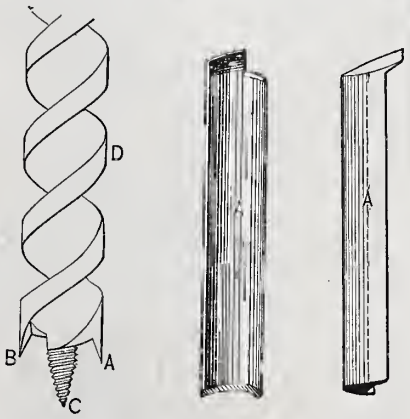


Fig. 3. Fig. 4.

Figs. 3 and 4.—The Ordinary Auger-Bit and the Pod-Bit.

this reminds me of a method resorted to by pattern-makers in making their core-boxes. These boxes are often made in halves, and the hole requires to be bored in the joint, so as to sink equally into each half. It often happens that the grain of the wood is not straight, and the auger screw is apt to follow the grain of the wood, and so bore out of line. To prevent this they cut a deep line in both halves of the core-box face, and it is found that the screw point will follow this line; or, in some cases, they saw a fine slot, instead of drawing the line, but in most cases the line is sufficient. To prevent the screw from splitting thin wood when an auger-bit must be used, a hole may first be pierced being nearly, or quite, as large as the full diameter of the auger screw.

The stone-worker's hole-producing operations are divided into drilling and boring. His drills are caused to pierce the material by means of hammer blows, the drill being revolved after each blow, so that the cutting action is in reality that of chipping. On account of the abrasive action of stone upon steel, its corners wear rapidly, and, as a result, the drill must be well spread at the end, so that the body of the drill shall not bind against the walls of the hole and prevent the workman from lifting the tool after each blow. Fig. 6 represents a drill for stone, and you will observe that its cutting edge is rounded in its length, so that the bottom of the drilled hole forms a seat that acts as a guide to keep the drill central, and, therefore, maintain the hole as nearly as possible to size, and at the same time straight. In the stone-worker's boring tool, the black or bort diamond is used as a revolving cutting-tool, being placed at the end and around the edges of solid bars or rods for small holes, and similarly situated on the end of a tube for large ones. The object of employing a tube is to reduce the amount of cutting action by leaving a core that can pass within the walls of the tube as it descends into the stone.

*From a lecture delivered before the Franklin Institute, December 14, 1883.

TRADE PUBLICATIONS.

Mechanical Refrigeration.

The processes and apparatus of the De La Vergne Refrigerating Machine Company, of this city, are described and illustrated in an interesting manner in a volume recently issued by that company. The matter covers some 74 pages and embraces 26 well-executed plates giving details of the machinery, as well as indicator diagrams and five single and double page illustrations of existing re-

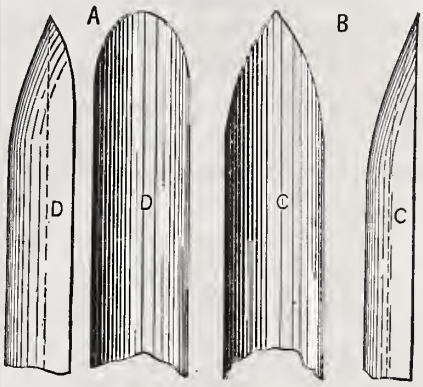


Fig. 5.—The Nail-Bit and the Spoon-Bit.

frigerating plants in different establishments. During the past six years the company have made important improvements in this class of machinery, and now claim to have perfected a system of mechanical refrigeration as reliable as natural ice and vastly more economical. In the book here mentioned they present a concise and clear representation of the different processes followed, the difficulties hitherto encountered in making them successful, and the means employed to overcome them. Aside from the fact that the particulars will be found valuable to intending purchasers of refrigerating machinery, they are of no little interest to the general reader, giving, in a general way, the principles involved in cold-producing machines, refrigerating agents employed, the economy of different methods, and a large amount of other equally valuable in-

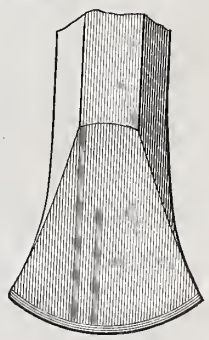


Fig. 6.—Drill for Stone.

formation. About 20 pages, exclusive of illustrations, are devoted to the description of machinery erected in a number of places, and which, we understand, has thus far given most flattering results. Hints as to the true merit of refrigerating machines and as to estimates for the cost of a plant form the concluding portion, making altogether a most desirable addition to the literature of the subject.

Gas Machines.

The Pennsylvania Globe Gas Light Company, of Philadelphia, successors to the Elkins Manufacturing and Gas Company, have sent us an illustrated catalogue of their improved Royal gas machine. The pamphlet gives a full description of the gas machine, including cuts of the air pump and carbureter. The machine is intended to supply gas to all kinds of buildings, both dwelling houses and factories, the material used being gasoline. Ample testimony to the merits of their system is given in the number and character of the references appended to the catalogue.

Second Prize Design Ninth Competition.

We present herewith the remainder of the details belonging to the study which received the second prize in the Ninth Competition. The perspective view, elevations, floor and roof plans were given in our January issue, and a part of the details in our February issue. The crowded condition of our columns precluded the publication of all these drawings together. In the three numbers referred to, our readers have the complete study, which, as we have before remarked, is of a character to be of the greatest value to those who desire to use the drawings in a practical way in their business.

New Method in Gilding and Bronzing Wood.

The new composition now employed in France for gilding and bronzing wood consists of glue, chalk, linseed oil and paper pulp. The glue is first dissolved and boiled, then silk tissue paper (such as comes between gold leaf is very excellent) is stirred in and rapidly disintegrated, then linseed oil is added, and finally chalk. While hot, the mass forms a stiff dough which is hard when cold, but softens between the fingers and can be kneaded and pressed into molds. In a few days it gets dry and is then almost as hard as stone. The paper imparts tenacity to it, so that it is less affected by blows than wood is. Separate pieces of this mass unite readily, and it is easily attached to wood. The proportions of the four constituents are not stated, except that the proper proportions are recognizable by the feeling; in summer more glue is added than in winter, as it really decomposes (spoils). Owing to the glue, of course, it will not stand the wet, and could not be employed for articles exposed to the weather. When hard, the surface can be shaved off with iron, then polished with sandpaper, and finally coated with a size called "poliment." This, says Professor Meidinger, is a commercial substance consisting essentially of clay, with the addition of soap and fatty substances. For gilding it is used just as it comes; but for bronzing only blue or gray shades are used, and some dark pigment must be added, either fine black or umber. The dry pigment would make it too dry, and hence it must be softened by mixing it with melted wax and rubbing it up fine on a stone when cold. One-third of this is mixed with the commercial gray or blue poliment. To make it adhere to the ground, liquid glue must be added. Three or four coats are applied until sufficiently covered. For gilding it is painted over with dilute alcohol, and the gold-leaf immediately laid on and pressed down. For bronzing, a brush is wet with dilute spirits and dipped in the bronze powder, which is applied nearly dry on the poliment. It dries quickly and can be polished at once with agate polishers. The gilding is done as soon as it is polished, but bronzing

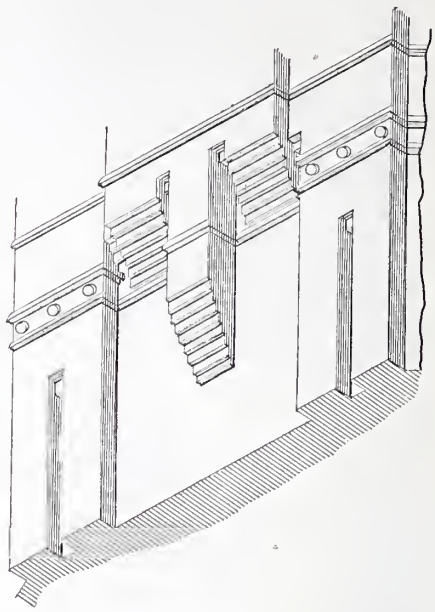
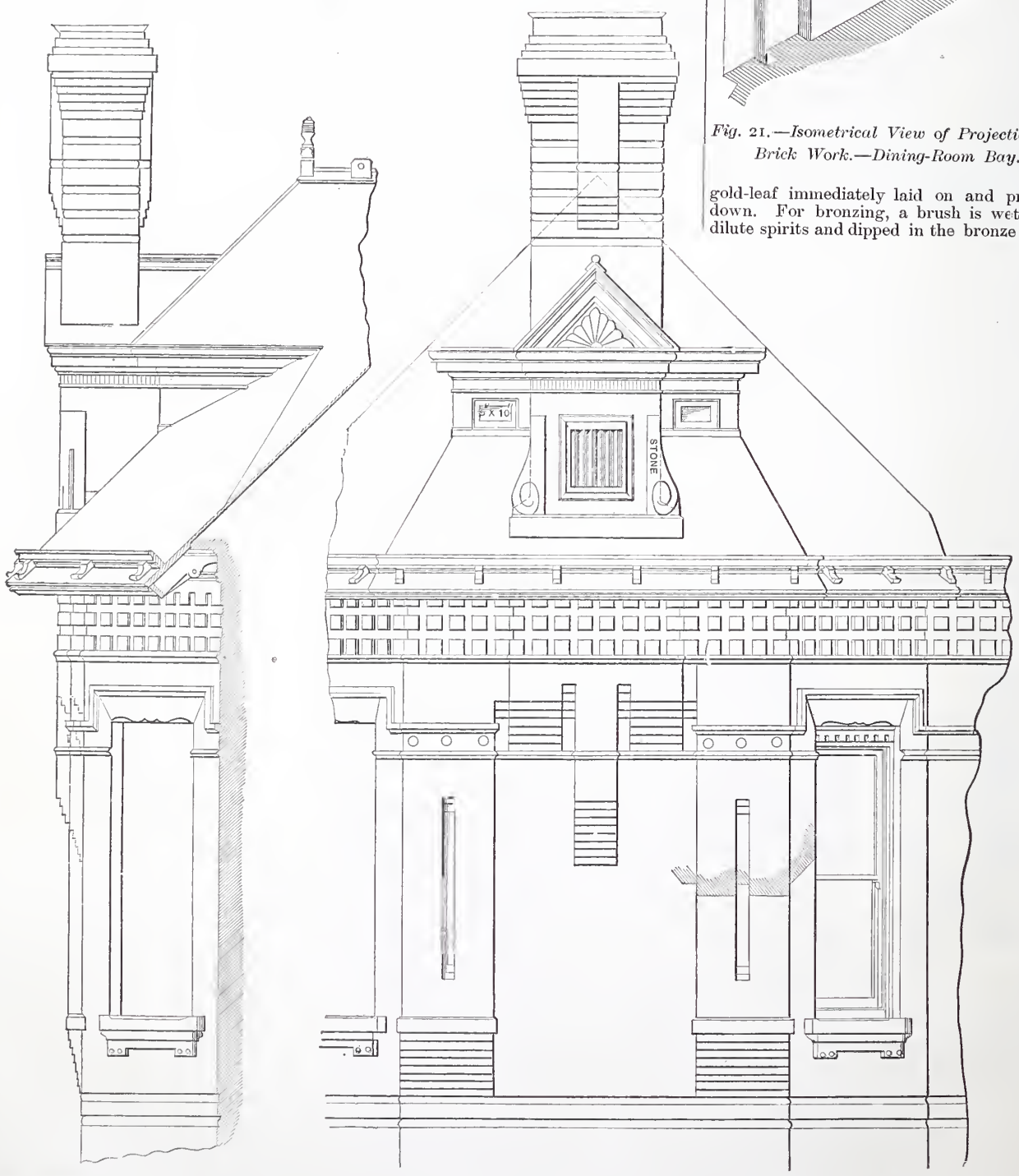
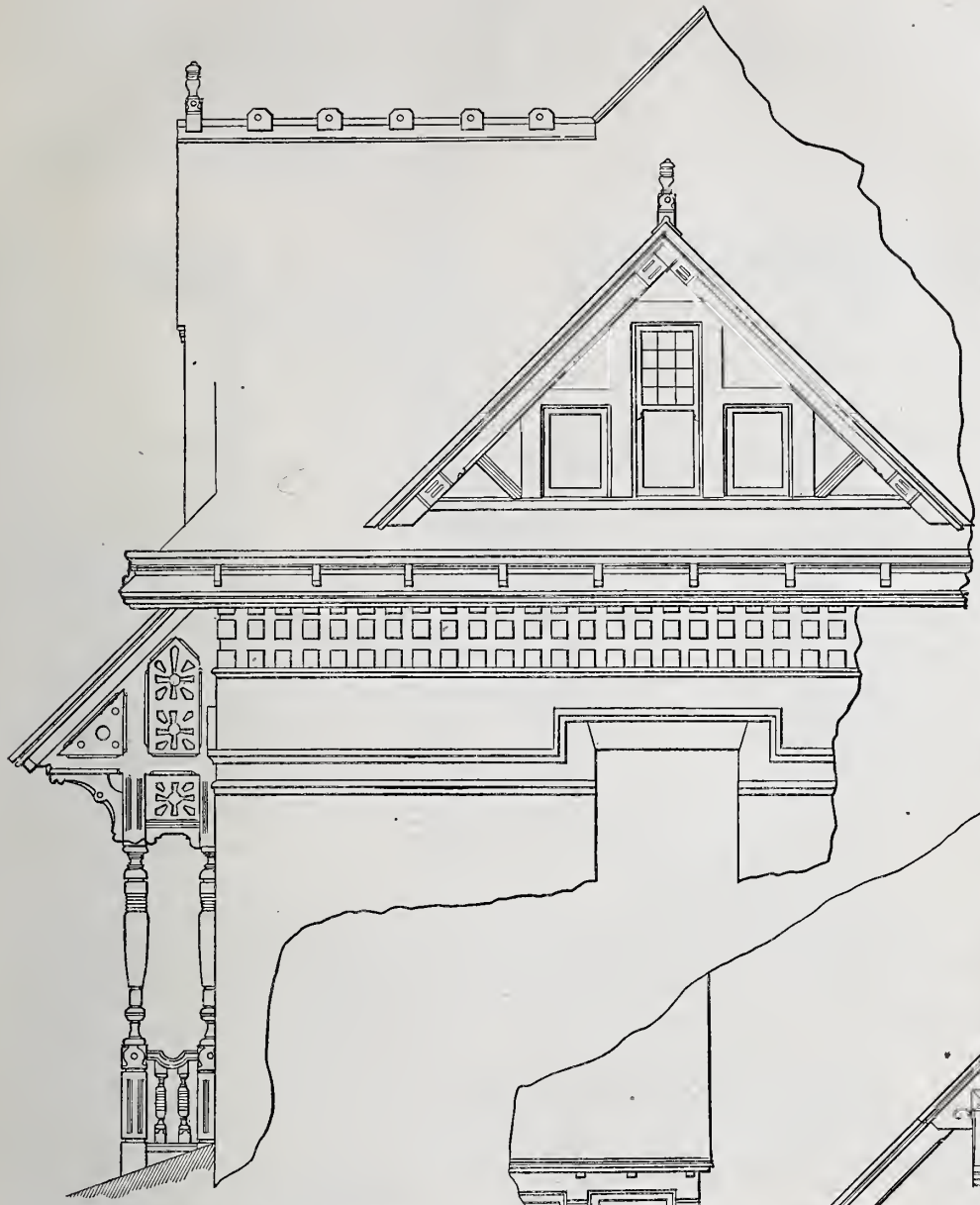


Fig. 21.—Isometrical View of Projections in Brick Work.—Dining-Room Bay.



Ninth Competition.—Figs. 19 and 20.—Front and Side Elevations of Dining-Room Bay, South Side.—Scale, ¼ Inch to the Foot.



Ninth Competition.—Fig. 22.—Front Elevation of North Gable.—Scale, ¼ Inch to the Foot.

requires varnishing, so as to impart to it a uniform luster, especially in cavities that cannot be polished well, and also to protect the bronze from change of color caused by atmospheric influences. The difference between gilding and bronzing consists, first, in

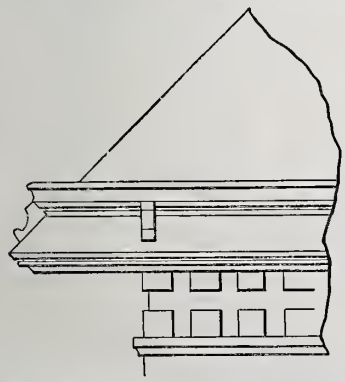


Fig. 23.—Elevation of Gutter and Cornice on Wing.—Scale, ⅜ Inch to the Foot.

using a darker poliment, as it shows through the bronze, while it is completely hidden by the gold-leaf; secondly, in applying the bronze avoiding too damp a brush and too strong alcohol; thirdly, in the final coating with varnish.

Dead-Finish.—This term, says an exchange, is applied to the finish produced by the reduction of any of the rubbing varnishes with powdered pumice-stone and raw linseed oil, the surface thus produced being left in the semi-lustrous state by omiting the polishing process. It is now more used than any other for body work, shellac varnish being generally employed, because of its adaptation to the requirements of fine cabinet-work, and properties of quick and hard drying. Copal, anime and amber varnishes are also used, but are slower drying. Veneered panels are usually "flowed" or "polished" when the body work is dead-finished. The number of coats required depends somewhat upon the quality of the filler, but usually three coats, and sometimes less, are amply sufficient.

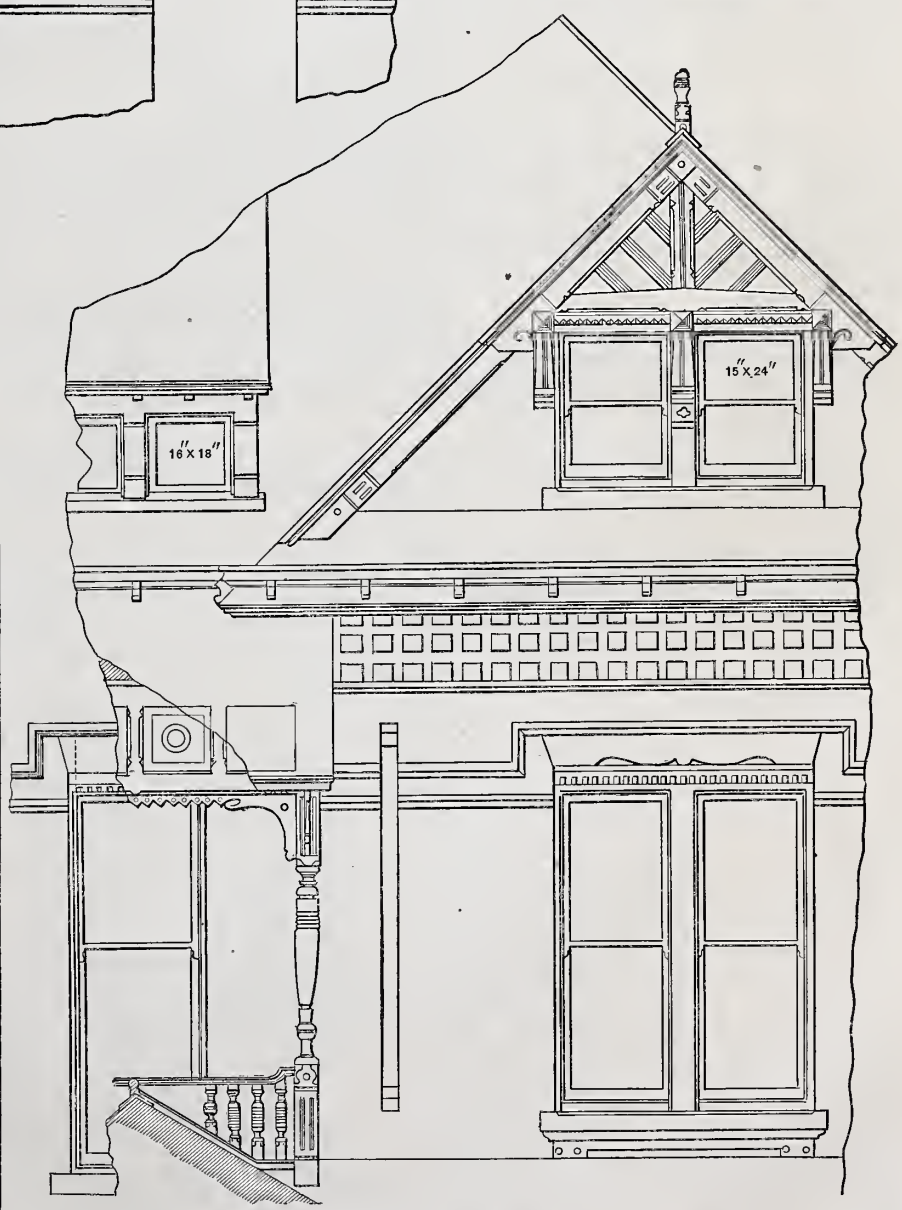


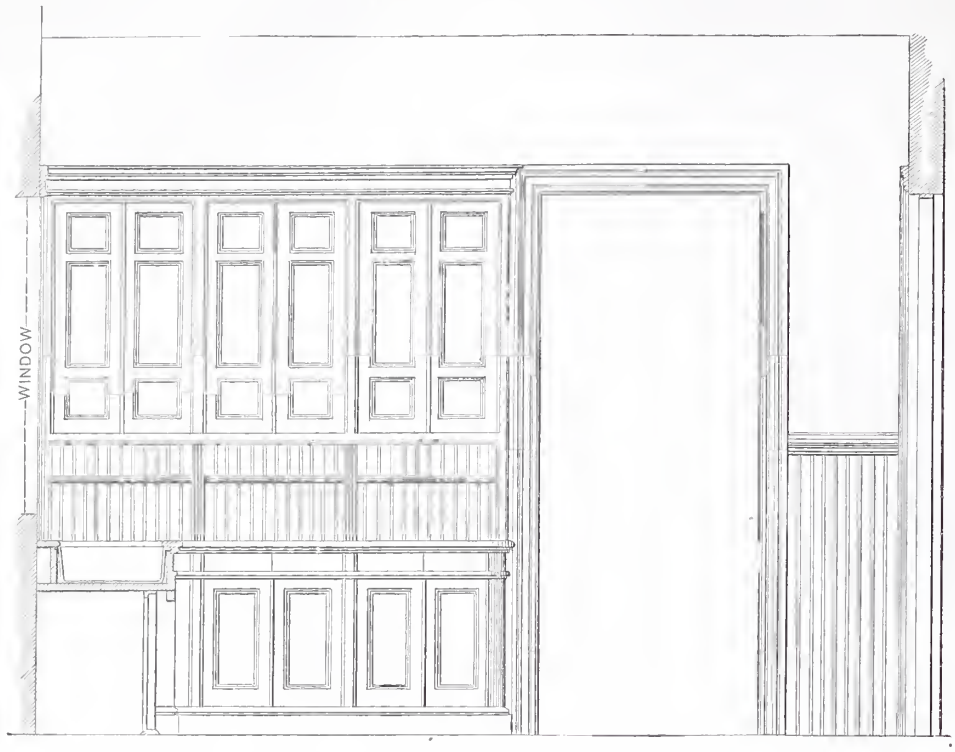
Fig. 24.—Elevation of Front Gable.—Scale, ¼ Inch to the Foot.

Drying Lumber by Steam.

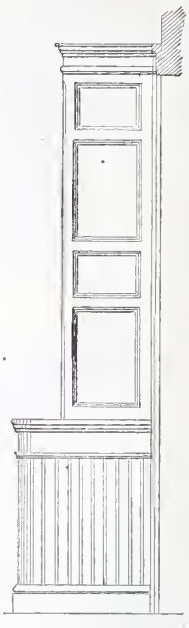
The *Lumber World* says: Small quantities of timber may be quickly and thoroughly seasoned by steaming. The philosophy of this process—which, if properly performed, does not injure the strength or durability of the timber—is very simple. A very large percentage of the sap in all kinds of wood is water. This water, heated to boiling, expands 1650 times. It follows that if wood be heated to 212°, the boiling point of water, the capillary cells can contain only $\frac{1}{1650}$ as much water as at ordinary temperature, the expanded water escaping as steam. The proportion of moisture left in the wood is, after steaming, less than that demanded by its ordinary hygroscopic condition. At least it is found to be so for certain species of hickory and white ash, which increased in weight after being removed from the steamer, and

the surfaces had become dry. The steaming should be done gradually—that is, time should be given for the wood to gradually rise in temperature, and so that the sap may escape gradually from the cells without rupturing them by its expansive force when converting them into steam. The steam should be generated in a suitable boiler, and allowed to escape at 2 or 3 pounds pressure, which should be gradually reached in proportion to the size of the pieces which it is desired to season.

Actinolite Cement Roofing.—Messrs. James Bros. & Co., of Montreal, Canada, are directing attention to what they call actinolite roofing cement. This cement is composed of a very fibrous mineral finely ground without destroying the fiber, mixed with coal tar in proper proportions and spread over two thicknesses of 16-ounce felt well cemented between each ply. The manufacturers state that this roofing can be successfully laid on either flat or steep roofs. They also state that a coating of this cement spread over tin, slate, iron or shingle roofs will make them perfectly water-tight. The cement is guaranteed not to run in summer and not to crack in winter, the fiber in its composition preventing this. In a letter, Messrs. James Bros. & Co. state that actinolite, the mineral from which this cement is made, is found in large quantities in certain portions of Canada. In process of manufacture it is reduced in attrition mills which do not destroy the fiber. Actinolite, a specimen of which we have examined, is of the hornblende family, and very much resembles asbestos, if, indeed, it is not the same. We understand that this roofing material has gained an enviable reputation among Dominion architects and builders. It is claimed to be practically fire-proof, and a number of prominent buildings in Montreal have been covered with it.



A Study in Suburban Architecture.—The Kitchen Finish.—Elevation of End of Kitchen, Looking Toward Dining-Room.—Scale, ⅜ Inch to the Foot.

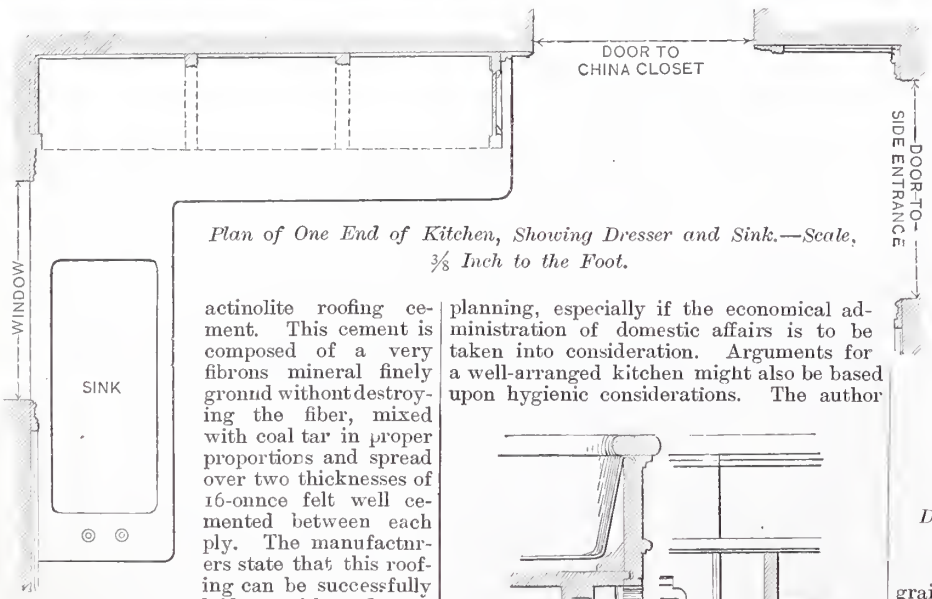


End Elevation of Dresser.—Scale, ⅜ Inch to the Foot.

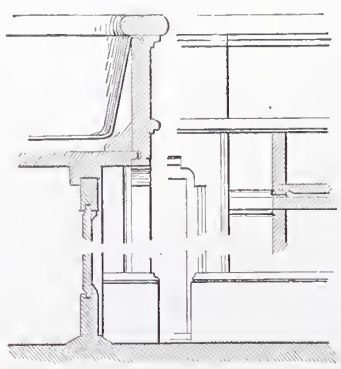
A Study in Suburban Architecture.

KITCHEN FINISH.

We present this month the kitchen finish in connection with the series of articles that have been appearing in our columns for some time past. A well-appointed kitchen is one of the most important features of house planning, especially if the economical administration of domestic affairs is to be taken into consideration. Arguments for a well-arranged kitchen might also be based upon hygienic considerations. The author of the series of papers in question—building a house for himself—has given this subject quite as much attention as some of the nicer details of decoration and embellishment. We have no doubt the arrangement shown will be found applicable in many houses, even though their plans do not fully agree with those upon which this study was based.

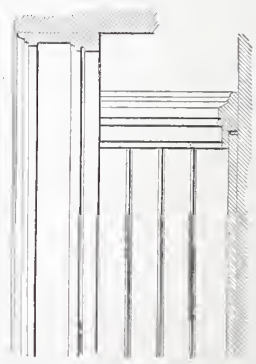


Plan of One End of Kitchen, Showing Dresser and Sink.—Scale, ⅜ Inch to the Foot.



Details of Work About Sink.—Scale, 1 Inch to the Foot.

Mr. H. Arnold, of Wilhelmshaven, Germany, has for some time past been conducting an interesting set of experiments as to the influence of sand on the strength of cement mortar. Six different kinds of sand were subjected to test, and the results showed that the strength of mortars similarly made with the same cement depends on the coarseness and size of the grains of sand, and that in sands of equal size of grain that is the best whose grain is the coarsest. In order to determine the influence of the size of the grain, comparisons were made with several specimens of sand of various sized grains, and also with granite chips, the result always being in favor of the latter. It was further found that coarseness of grain is a more important factor in the quality of a sand than the size of grain, and that sand containing uniform sized grains is not always the best. On the whole, however, Mr. Arnold concludes that, although different kinds of sand yield different results with similarly prepared mixtures of mortar, it will not be justifiable in ordinary masonry to alter the prescribed proportion of cement and sand unless the exact quality of the sand employed is known.

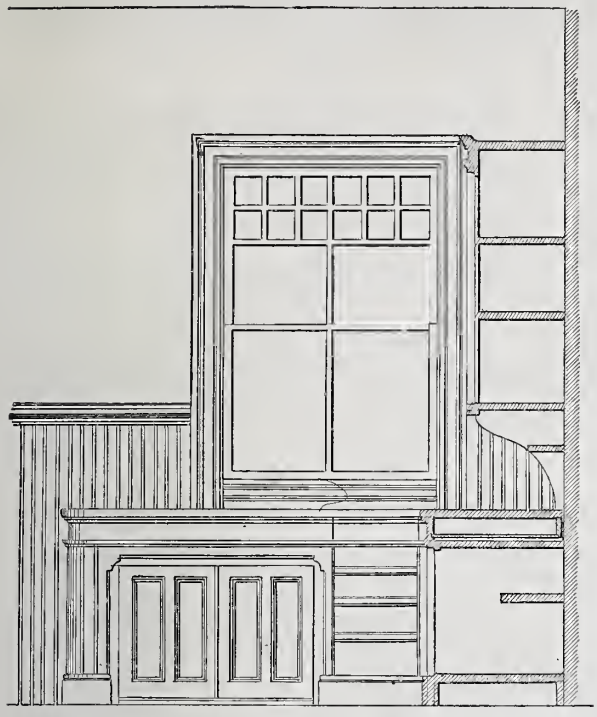


Detail of Wainscoting.—Scale, 1 Inch to the Foot.

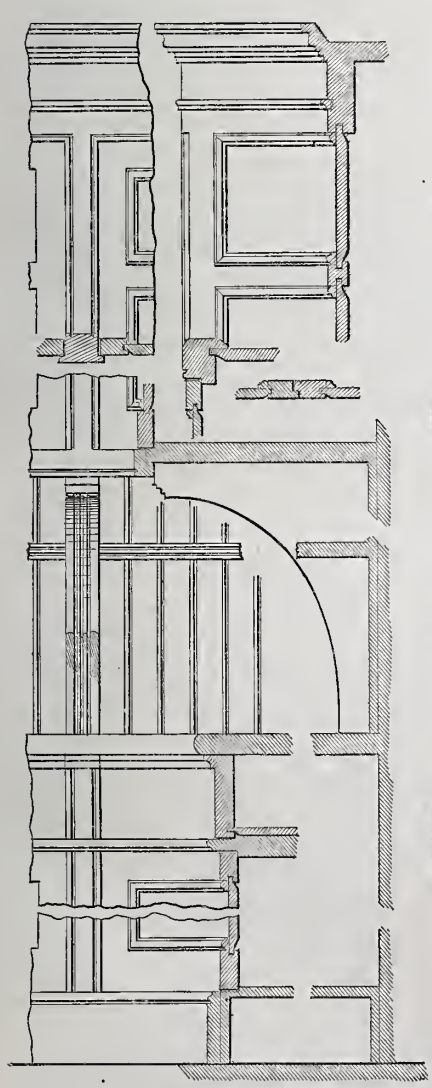
The Gimlet.

The genesis and history of that very useful little tool, the gimlet, is thus described by Mr. Call Smith in the columns of an exchange: "The gimlet is an offspring of the awl, and is of comparatively modern origin.

Traces of the dual use of the latter as both gimlet and awl are discoverable in Egypt as early as the nineteenth century before Christ, and no development of the gimlet as a separate tool was made by that people, so far as is known. At the opening of the Greek era the gimlet was known to that people simply as an awl with an egg-shaped handle. With the Greeks it first took its place as a distinctive tool, and later became very common. Its first inventor is unknown, as is also the date of the invention. Pliny ascribes it to Dædalus; but whatever Pliny did not know he deemed it a point of personal and professional honor to make up, and little credit is to be given to this fable. The gimlet of the Greeks had the cross-head or handle of the style now prevalent. It also had possibly a hollow pod, as the earliest specimens found are of that type, but it had no screw point, and demanded a large expenditure of muscle, especially in boring hardwoods, where it was not very effective. Later a gimlet of square section, having sharp corners and tapering to a sharp point, was introduced and gave the hint for a form of auger now in use. In course of time the screw point was added, and the hollow-pod gimlet, with a point of this kind, was the only kind in use for many centuries. In England this was called a wimble. This form is still in use to some extent, and is effective where very shallow holes only are to be bored, but, as it has to be removed whenever the pod becomes full of chips from boring, it causes a waste of time when deeper holes are desired. The twisted or spiral form of gimlet, which is self-discharging, is an American invention, and only of very recent date. It has, however, superseded all other forms, and is now in common use. The field of the gimlet is becoming greatly narrowed, giving ground to the more rapid and convenient brace and bit."



A Study in Suburban Architecture.—Elevation of Side of Kitchen, Showing Sink.—Scale, ⅜ Inch to the Foot.



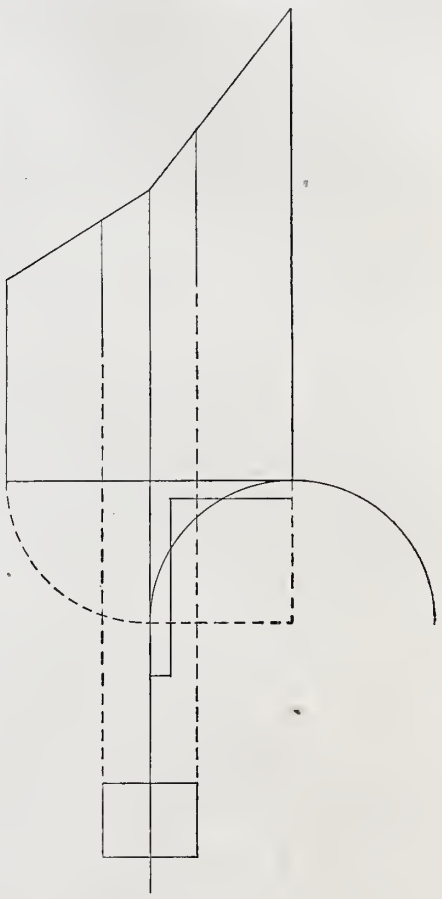
Details of Dresser.—Scale, 1 Inch to the Foot.

CORRESPONDENCE.

The Principles of Handrailing.

From W. G. P., *Toronto, Ont.*—Now that the winter months are at hand, I would like to introduce the subject of handrailing again. In the first place, I would like to say a few words on what has already appeared in your columns, headed "Practical Stairbuilding." Unfortunately, I had not seen *Carpentry and Building* when the subject was first introduced; consequently, can only judge it by what I have seen of it. I object to it, in the first place, because a correct face mold is not produced. I consider a correct face mold absolutely necessary to produce a correctly finished rail. If it is for economy that it is so cut, then I may say that it may be cut smaller still, as the size of stuff required is, both in width and thickness, equal to the diameter of a circle that will contain the finished rail. When I say required, I mean that it is always enough for the square-cut system, where the center line of wreath and the center of plank are supposed to coincide. Of course, I am aware it is often more than enough, but when this parallel mold is used to cut out by, I would advise all beginners to use the elliptic mold as well, for by sliding the mold you set both the lines to shape the inside and outside of wreath-piece, and can at the same time get the spring bevels, or, if you get them by construction, it will at once prove their correctness. In the next place, the method of arriving at what is aimed at—viz., tangents on face of plank, bevels and center line of wreath—can be got at more simply and more expeditiously by other means. It is taken for granted that the pitches have been obtained in all cases in the articles on practical stairbuilding in *Carpentry and Building*, so I will do the same at present, but will say more on it at some future time, as I consider it of the first importance—the getting the hights—that is, the resting points, or, if you will, pitches.

Now, to produce all that is called for in the system laid down, say, for a 12-inch well, take two pieces of board 6 or 7 inches wide, nail them together at right angles, outside to stand on tangents to center line of rail on ground plan; apply your two pitches, then cut off to the marks, turn the sawn end down on to what you are going to cut your face mold out of, and mark down



Principles of Handrailing.—Fig. 1.—Plan of Center of Rail and Tangent Box, with Elevation and Pitches, &c.—W. G. P.'s Letter.

the sides of the template (or tangent box) on your stuff, and you have the two tangent lines on face of plank. Make joints square to them and square from face of plank for your spring bevels. Apply your bevel at right angles to each of the pitches on the

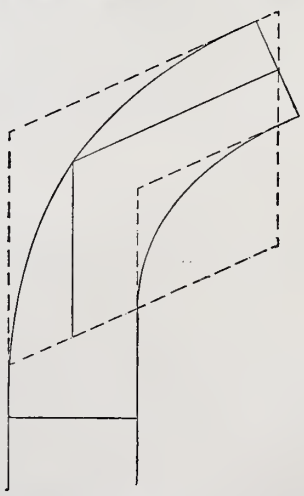


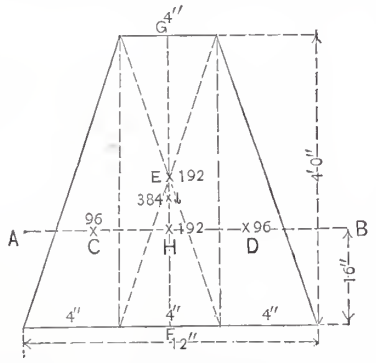
Fig. 2.—Sketch Showing Roughly What is Produced from Tangent Box when Cut.

tangent box for their respective bevels. For center line of wreath it is customary to bend a thin lath. A correct face mold can also be got from the tangent box. Draw a line on ground plan so that when drawn on face of plank, when in position in the same direction, it will be level. This is what is termed by some the ordinate; it is really the inter-

section of the oblique plane with the horizontal plane, or a line parallel with it. Now, if you wish to strike the mould with tangents, this is the minor axis of the ellipse; if you use ordinates, draw them in the direction of this line and transfer to the stuff for your face-mold pattern. For the half-width of mold at joints set off the half-width of rail from corner of tangent box each way and draw it up to cut the pitches, and you have the width of mold, or, rather, the half-width at each end. So, by this it will be seen that a correct face mold can be produced from the tangent box, not admittiug any guesswork whatever. This is a simple and expeditious way of producing face molds for any kind of rail. In my next I will give you a system, equally as simple, by lines. I inclose diagram showing ground plan of center of rail and tangent box, with its elevation and pitches, half-width of rail marked on from corner of box and drawn up to pitches for half-width of mold at both ends. In Fig. 2 is roughly shown what is produced from tangent box when cut.

Center of Gravity of Plane Solids.

From H. L. C., *Buffalo, N. Y.*—The article by C. in the December number of last year, on "Center of Gravity of Solids," is an able exposition of the subject, but as the introduction of formulæ, square root, area moments and other technical terms is apt to coufuse the average reader, I propose to arrive at the same result by a different method,



Center of Gravity of Plane Solids.—Fig. 1. *—Analysis of the Figure and the Center of Gravity of its Component Parts.*

which will clearly illustrate the principles which govern the problem. We will commence with the same figure illustrated in the December number, and as the terms weight and area are synonymous when used in connection with a plane figure, we will use the term weight hereafter, as it properly belongs to the consideration of the subject. We will, therefore, assume that each square inch of our figure weighs 1 pound, so the total weight thereof will be 384 pounds. Of this, each of the triangles will weigh 96 pounds and the parallelogram 192

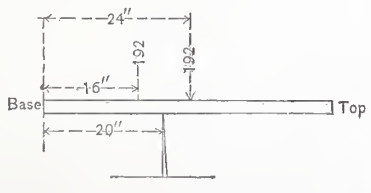


Fig. 2.—*The Shape in Fig.* 1 *Turned Down Flat to Determine Actual Center of Gravity.*

pounds. Now, as the center of gravity of any body is situated in that point which if placed directly over a single point of support the body will remain evenly balanced, or in equilibrium, and as the whole weight of the body is borne by the point of support, we will assume that the whole weight of our body is concentrated at the center of gravity. Now, as the center of gravity of every triangle is one-third of its perpendicular hight above its base, and as our triangles are the same hight, their respective centers of gravity will come on the line A B at C and D, and as the center of gravity of a parallelogram is at the intersection of its diagonals, we easily find the point E. Now, as the basis of our triangles are the same width, and as the line F G runs longitudinally through the center of our figure, it follows that the points C D are equidistant from the line F G, and if we add the weights together and place them at H, the equilibrium of our figure will not be disturbed, as far as they are concerned. We will now turn our figure down edgewise, Fig. 2, and we find that we have two weights of 192 pounds each, one 24 inches from the base and one 16 inches from the base. Now, as these two weights represent the total weight of our figure, any point of support that will keep them in equilibrium must be placed under the center of gravity of the whole figure, and, as both the weights are upon the liue F G, the point of support must also be placed under that line, and, as the weights are equal, it follows that the point of support must be placed the same distance from each, which will be at I, Fig. 1, and which is the center of gravity of the whole figure, distant 20 inches from the base.

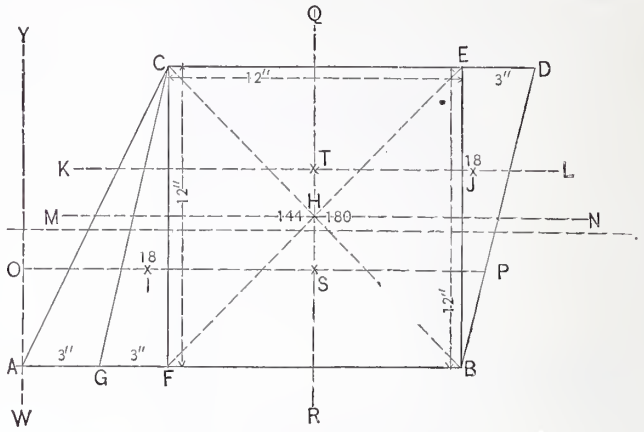


Fig. 3.—*Similar Treatment of an Irregular Trapezoid.*

We will now pass to the consideration of an irregular trapezoid, A B C D, Fig. 3. We find, upon resolving this figure into a square and two triangles, that one of our triangles is a great deal the largest, and the other one is upside down; but by making G F equal to E D we will have the triangle C G F equal E D B. We will now locate the centers of gravity of the two triangles and the square, as follows: 144 pounds at H, 18 pounds at I and 18 pounds at J. Now we find that, the two triangles C G F and E D B being equal, and their centers of gravity being the same distance from the center line Q R, and on opposite sides of it, we may do the same as we did in Fig 1, and bring the weights at J and I to S and T, on the line P Q. Now, we find that S and T are equidistant from the point H, and as the weights of S and T are equal, their common center of gravity must be at H, in the same place as that of the square C E F B. We can, therefore, add the weights of the two triangles and the square together, $18 + 18 + 144 = 180$ pounds, and place the sum at H. It is evident that, if it were not for the triangle C A G, our calculations would be ended, but we must now find what effect it has upon the equilibrium of our figure. Although it is not a right-angled triangle, it has exactly the same area as the triangle C G F, and its center of gravity is on the same line O P, so that we may immediately carry its 18 pounds of weight to S, on the center line Q R. We now turn our figure down edgewise, Fig. 4, and mark the position of the weights H and S. We will then consider that part of the figure between H and S to be a lever, and that it is necessary to place a fulcrum under it in such a position that the weights at S and H will counterbalance each other. Now it is evident that, as H is ten times as heavy as S, S must have ten times as much of the lever as H; so we divide the distance H S into 11 parts, and as the distance between H and S is 2 inches, $2'' \div 11 = \frac{2}{11}''$, H's arm of the lever, and $\frac{2}{11}'' \times 10 \frac{20}{11}'' = 1\frac{9}{11}''$, S's arm, which brings the center of gravity of the whole figure on the line U V $5\frac{9}{11}''$ from the base line A B. But we have yet to find the exact point on the line U V of the center of gravity of the whole figure, and for this purpose we make the diagram Fig. 5. In this case we will not divide the large triangle A F C, but carry its whole weight to I, and that of the small triangle to J, on the line M N. Now we find that the weights J and I being unequal, and being at unequal distances from H, makes the case more complicated than the two previous ones, but we could solve it in the same manner by first finding the center of gravity between H and J, and then between the combined weights at that center and I; but we will have recourse to a different method, which will give us an opportunity to use moments.

Now, the moment of any body is the product of the weight of the body multiplied by the distance of its center of gravity from the fulcrum or axis around which it revolves, or would revolve if it had no other support except at that point. In calculating the moment of a body, its weight is generally expressed in pounds, and its distance from its axis or fulcrum may be indicated in feet or inches; if in the former, the moment will be in foot-pounds; if in the latter, it will be in inch-pounds. As all our measurements are in inches, we will use the latter term. Since we have no axis around which our weights have a tendency to revolve, we must draw an imaginary one at some distance from all of them and perpendicular to the line M N. W Y, Fig. 5, will be the axis, just touching our figure at A. We will now lay our figure down edgewise, with the axis at one end.

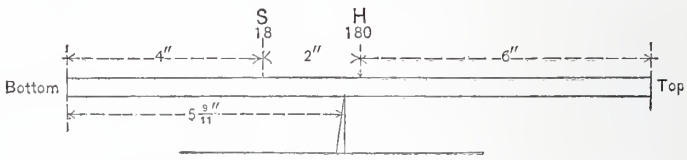


Fig. 4.—*The Shape in Fig.* 3 *Turned Down Flat to Determine the Position of* U V.

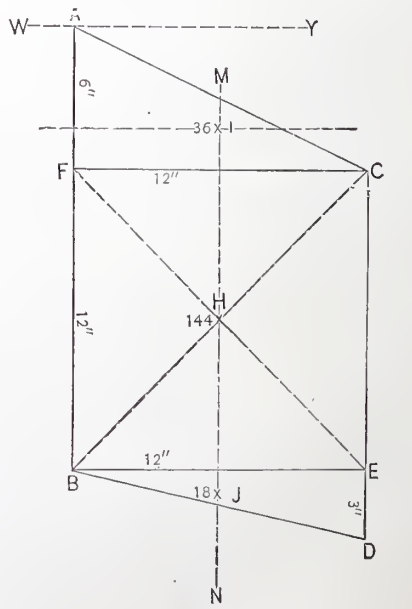
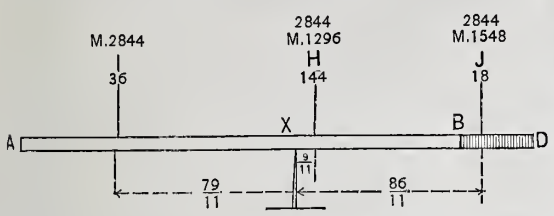


Fig. 5.—*The Center of Gravity for the Whole Figure.*

and place our weights on it at the proper distances, Fig. 6. The moment of the weight at I is $= 36 \times 4 = 144$ pounds, 4″ being its distance from W Y. The weight at H being 12″ from W Y, its moment will be $144 \times 12 = 1728$ inch-pounds; weigbt at J, 19″



Center of Gravity of Plane Solids.—Fig. 6.—The Shape in the Preceding Figure Turned Down Edgewise.

from W Y, moment $= 18 \times 19 = 342$ inch-pounds. Now, as tbe moment of each weight divided by tbe weight itself will give its distance from W Y, so will the sum of the moments divided by the sum of the weights give the distance from the axis W Y that the whole weight of the figure must be placed to have the same effect on the equilibrium of the figure as the tbree weights at I, H and J, and this point must be the center of gravity of the whole figure. Therefore,

$$\frac{144 + 1728 + 342}{36 + 144 + 18} = \frac{2214}{198} = 11\tfrac{2}{11}'',$$

the distance of the center of gravity from W Y. Now, to prove the correctness of this result, we will draw Fig. 7, and if the sum of the moments of H and J is equal to the moment of I about the center of gravity or axis X, the result is correct. As I is $7\frac{2}{11}''$, or $\frac{79}{11}''$, from X, its moment will be $36 \times 79 = 2844$; H is $\frac{9}{11}''$ from X, moment equal $144 \times 9 = 1296$; J is $\frac{86}{11}''$ from X, moment equal $18 \times 86 = 1548$, and sum of moments H and J

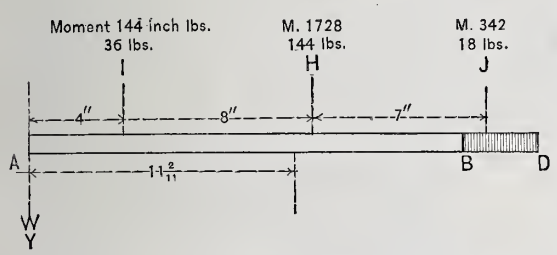


Fig. 7.—A Proof of the Correctness of the Methods Pursued.

$1296 + 1548 = 2844$ = moment of I, which shows the result to be correct. The center of gravity of the figure A B C D is, therefore, at Z, Fig. 8, $5\frac{9}{11}''$ from the base line A B, and $11\frac{2}{11}''$ from the line W Y. The foregoing methods are applicable to any figure bounded by straight lines, and the following is a graphical method for finding the center of gravity of any four-sided figure, either trapezoids or trapeziums. The graphical method illustrated in the December number can be applied to trapezoids only. Take any figure, A B C D, Fig. 9, and draw the diagonals A D C B; bisect either of them, as C B at D. Take the longest division of the other one, D E, and set it off on itself from A to F. Join F and D and divide into three equal parts; the first of these divisions from D at G will be the center of gravity of the whole figure. The center of gravity of any irregular figure may be found by cutting tbe figure out of stiff card-board and balancing it across a knife-edge in two directions at right angles to each other, or nearly so. Where tbese lines intersect will be the center of gravity.

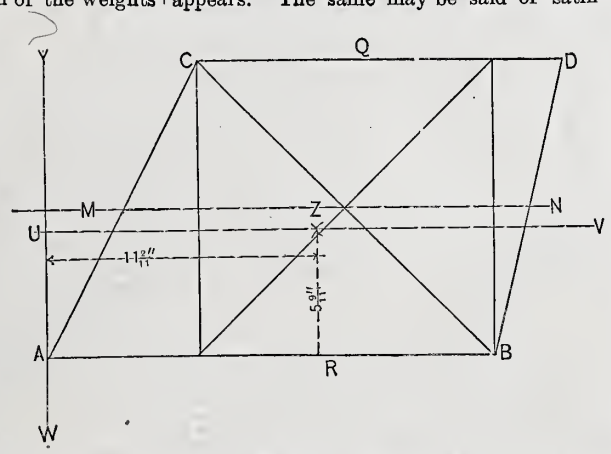


Fig. 8.—The Actual Center of Gravity of the Figure Shown in Fig. 3.

Painting and Graining.

From FAIR PLAY, *Malden.*—I have read the article on graining and grainers, published some time since, taken from an exchange. My idea is that the writer errs in the information he gives as to how houses should be painted. I think the man is a theorist, and not a practical man, else he would bave taken an opposite view. Suppose the woods which he calls handsome are imported, and that they are placed in position or are made into doors, wainscots and other parts. I desire to ask, How long will tbey retain their natural color, however beautiful they may be? Ash loses its freshness and brightness after two years, and, even if treated carefully, turns so dark after five years' use that it is very commonly painted over or grained. Walnut comes next, and with the rubbing that it constantly demands, the beautiful hue soon disappears. The same may be said of satinwood, which is too hard and expensive for general use. I might continue by mentioning still other hardwoods. The grainers to which the writer refers must have been amateurs, since he describes their efforts as ridiculous. I have seen graining done in Boston that was so fine that it took a good judge to discern it from the real wood. It has come under my observation to see beautiful hued woods, after a lapse of a few years, painted over and grained, looking much better for the change. Although these woods were well taken care of and carefully polished, they gave out, while graining remained intact under harder treatment. I once worked for a house painter who permitted me to inspect his kitchen and dining-room, which be had grained some 20 years before. It looked well even after such long use. I would like to see any of the woods I have mentioned retain their freshness as long as that graining. Some time since I saw painted over and grained, on Chester Square, two pairs of black walnut doors, costing originally $60 each. The moldings were falling off for lack of something to hold them on. After being painted and grained they became good-looking doors, whereas if they had not been painted they would have rotted before this. A house painter, according to the writer in question, is a nuisance and one who offends good taste. I reply, "Not so, sir." Some house painters, at least, are men of taste, and culture, too, and they make a study to place harmonious colors and to decorate houses in accordance with tbe best of taste. It takes a lifetime to become a good imitator of woods and marbles. There is just as much real art in imitating a thing in the line of woods and marbles as there is in a painted sky, ocean, trees and other things which enter into so-called works of art. Excuse me for the space I have occupied, but I want to see justice done to painters and grainers.

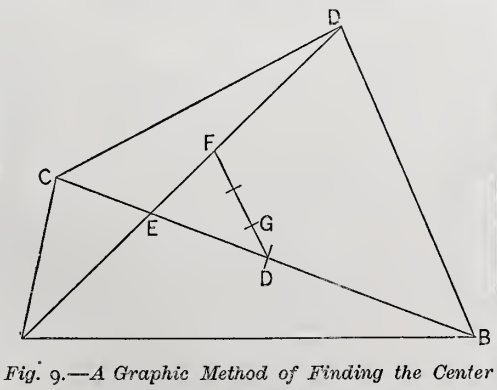


Fig. 9.—A Graphic Method of Finding the Center of Gravity of an Irregular Figure.

Private Telephones.

From J. L. W., *Jackson, Ga.*—I am thinking of putting a telephone between my bouse and shop, a distance of ¼ mile. I desire to make it as inexpensive as possible to be effective. I am aware that *Carpentry and Building* has heretofore publisbed considerable information on this subject, but at the time I was not interested in telephones, and, accordingly, did not impress my mind with the facts presented. If you will kindly give at this time such information as I am in need of you will confer a favor.

Answer.—Some two years since the subject of private line telephones working without a battery, commonly called acoustic telephones, was up for consideration in *Carpentry and Building*, and we investigated the subject as carefully as lay in our power. Several different telephones were sent us, and we constructed short lines according to the directions and we gave them every possible test in our power. The results of our investigations were laid before our readers at the time, and we also published accounts of the success reacbed by several of our readers in the use of similar apparatus, and the claims the inventors made for their goods. While some very satisfactory results were obtained, the general verdict was tbat the instruments we tested were not adapted for general use. Their working properties, it became clear, depended very largely upon conditions which are somewhat difficult to maintain in private lines. Among these may be mentioned tension of the wire, and freedom from contact with limbs of trees, and other similar requirements. We are aware that numerous improvements have been made since that time in telephones of this class, and one or two instruments which we have inspected at fairs and expositions have seemed to work remarkably well, and possibly, had we made our investigations at a later date, we would be in a position to recommend something for use. As it is, we are not acquainted with any apparatus of this character which is giving universal satisfaction. This is not saying, however, that such apparatus does not exist. Those forms of instruments which we investigated at tbe time above mentioned, if we mistake not, have entirely disappeared from the market, at least in the hands of those who formerly controlled them. To a certain extent the cheap forms of apparatus of this kind are now sold by "novelty" men, and tbe fact that the goods are handled in this way goes far to place them among toys or goods of doubtful value If any of our readers are using acoustic telephones of a satisfactory character, we sball be pleased to hear from them. If this account meets the eyes of any manufacturer who has anytbing that he desires to submit for a trial, we shall be pleased to examine it with a view of publishing the results of our investigations in this journal. Tbe matter of convenient communication between house and office is of such universal importance that we feel willing to go to considerable trouble in proving the merits of apparatus that is likely to be satisfactory to a large class among our readers who would use it if it were once brought to their attention.

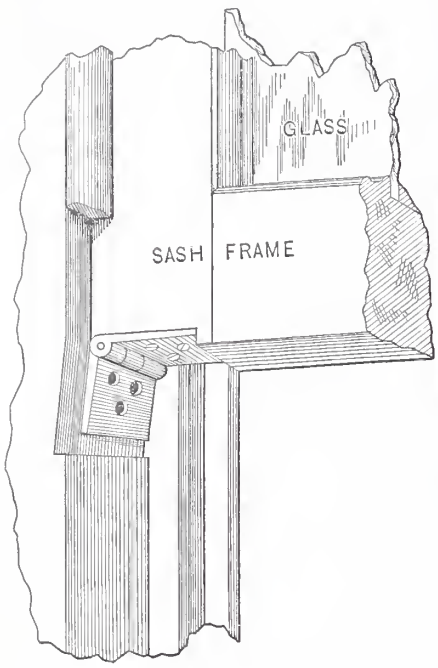
Siding Gauge.

From A. S., *Seattle, W. T.*—I notice in both tbe Sept. and Nov. numbers of last year of *Carpentry and Building* anxious inquiries

about Nestor's patent weather-boarding hook for marking, gauging and leveling siding. The implement is manufactured in Waterbury, Conn., if I mistake not, and may be bought through Patterson Brothers, 27 Park Row, New York. From practical experience with the tool I am free to say that it is all that it is claimed to be.

Improved Sash Support.

From C. M. R., *Wheeling, W. Va.*—A cheap and easily applied sash-holder consists in a common inside blind butt put on the bottom of the sash as shown in the accompanying sketch, with notch cut in the frame to receive it. The same device can be reversed and put on the top of the meeting rail, where it will serve as a lock to hold the sash down. Of course, it is understood that the hinge is screwed to the sash, only allowing the hanging flap to slip into the slight ledges cut in the frame at the desired hight.



Improved Sash Support.

Hopper Bevels.

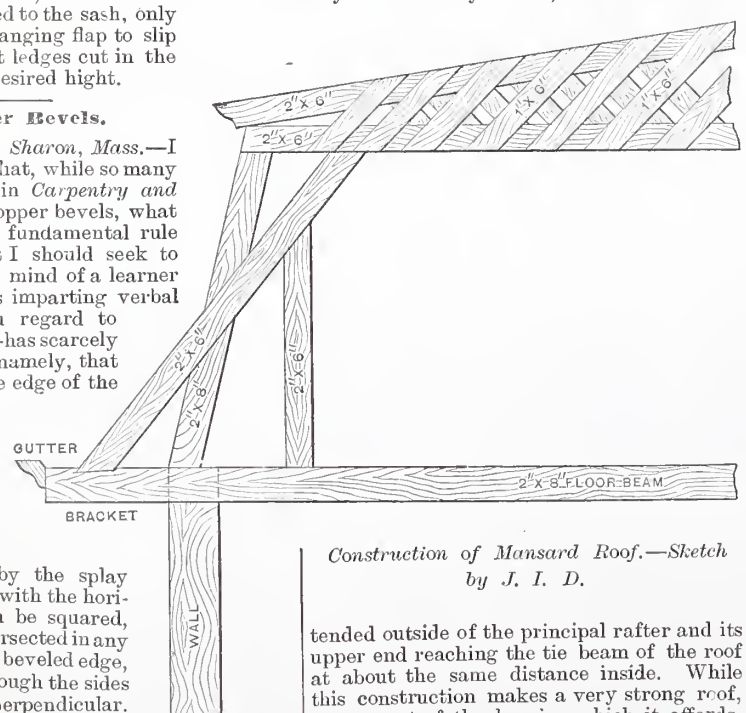
From H. I., *Sharon, Mass.*—I am surprised that, while so many have written in *Carpentry and Building* on hopper bevels, what I consider the fundamental rule—the first fact I should seek to impress on the mind of a learner to whom I was imparting verbal instructions in regard to splayed work—has scarcely been noticed—namely, that by beveling the edge of the side of the hopper so that it will be level when the sido is in position—or in other words, by beveling it to the angle made by the splay of the hopper with the horizontal—it can be squared, mitered or intersected in any way across the beveled edge, precisely as though the sides were to be perpendicular. It cannot be possible your former correspondents are ignorant of this fact; why, then, have they not laid more stress on it? H. McG. is practical, and evidently understands the principle, bnt he merely says, in a commnnication published over a year since: "If the top is level, a straight 45° miter cuts the joint." To which I would add that any kind of a joint that can be marked on tho edge of a perpendicular-sided box can be marked on that of a splayed box, and in the same manner, provided the edge is beveled to stand level. The rule holds good in nearly every conceivable situation, which is more than can be said of the more elaborate methods. It matters not whether the box is square, three-cornered, polygonal, unequal-sided, sides splaying differently, sides of different thickness stuff, or if you want to fit a partition across the corner of a splayed box at any angle or inclination, all there is to do is to bevel the edge of your board, and proceed precisely as if the sides were plumb. If the edges are to be left square, take a piece of waste stuff, bevel the edge, strike across the edge the kind of joint required, make your down bend a short distance on both sides, plane the edge square again and set your bevel across the edge by the marks on the two sides of the stuff. It can be done inside of five minutes, which would be less time than most carpenters would take to furbish up their memories and draw an elaborate system of lines, unless they did enough splayed work to keep a method fresh.

As regards the cut across the width of the board, or the down bevel, I would say that H. McG.'s method is the one I most frequently use, and I refer those interested to his diagram in the February number for 1882. I would like to give detailed directions, with diagram, for making the simplest form of splayed box, for the benefit of beginners, and as an illustration of my method I think it would do much good; but I fear my letter is already too long. I appreciate the advantages of mathematical calculations where necessary, and regret that mathematics are not more studied by the craft, but I object to using tedious and complicated formulæ where simple methods will answer better.

Construction of a Mansard Roof.

From J. I. D., *Des Moines, Iowa.*—I inclose a transverse section to scale, showing a method of constructing a mansard roof, which I hope will be of use to J. C. C., who inquired for something of this kind some time ago

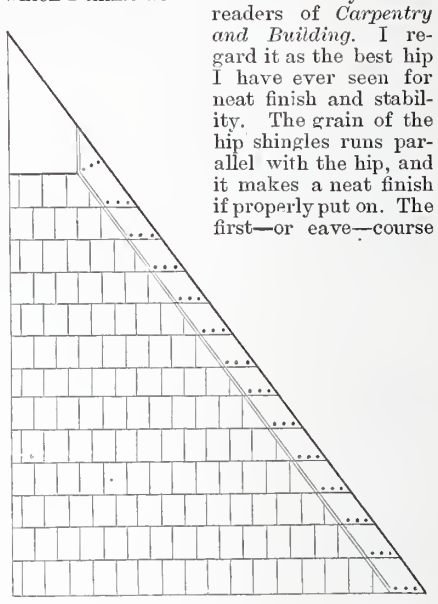
Note.—The diagram which our correspondent incloses shows the principal rafter, extending from the deck of the mansard roof to a point immediately in line with the outside face of the wall, and a supplementary or auxiliary rafter, with its foot extended outside of the principal rafter and its upper end reaching the tie beam of the roof at about the same distance inside. While this construction makes a very strong roof, on account of the bracing which it affords, it does not strike us as being the best to employ in the majority of cases, for several reasons. In the first place, the roof would have the equivalent of a curved rafter, which, as we have pointed out in other instances, we consider poor construction, from the fact that it makes a surface that is more difficult to cover with slate or shingles than a straight one, and has nothing to recommend it to use but its profile. A second objection is that the appearance of a mansard constructed upon this plan would be like that of a very large hat on a small head; in other words, the foot of the rafter extending so much beyond the wall line would give tho roof the appearance of being just that much too large for the building upon which it is placed. We are aware that there are many buildings in the country constructed upou plans that are open to both objections we have named, and which have been designed by architects whose standing warrants them being considered authorities. Nevertheless, we think that good construction and good taste point out these particnlar features as highly objectionable. As it is the province of this journal to discuss features of construction in particular, we shall be glad to learn the opinions of our practical readers npon the construction shown, its expediency, relative expense and general utility.



Construction of Mansard Roof.—Sketch by J. I. D.

Shingling Hips.

From W. A. Y., *Price's Landing, Pa.*—I send the construction of the hip of a roof, which I think will be new to many of the readers of *Carpentry and Building*. I regard it as the best hip I have ever seen for neat finish and stability. The grain of the hip shingles runs parallel with the hip, and it makes a neat finish if properly put on. The first—or eave—course is laid the same as the old-fashioned hip roof. Then I commenco with hip shingles, letting their butts run down to the eaves and nailing them to prevent the hips from turning up and warping. I also nail the hips about 1 inch above where the butts of the next course will come. I carry the hips up one course ahead of the balance of roof, nsing shingles for hips from 4 to 5 inches wide, being particular to have all hip shingles of the right width, and lapping the hip alternately each way, first one side and thon the other, and nailing the points about the middle of the conrse. This description, with the accompanying design, will, I think, explain the idea. If any of the readers of *Carpentry and Building* have any better hip than this I should be pleased to see descriptions of it published in the paper.



Plan of Shingling a Hip Roof, Recommended by W. A. Y.

Shape of Hip Shingles.

Lending Tools.

From C. M. R., *Wheeling, W. Va.*—I think carpenters should not lend their tools to non-professionals for the purpose of doing work that would otherwise fall to the carpenter to perform if the outsido parties could not borrow the tools for doing it. It would be just as reasonable to enter a barber shop and ask tho barber to lend you his razor, that you might shave yonrself in order to avoid his reasonable charge.

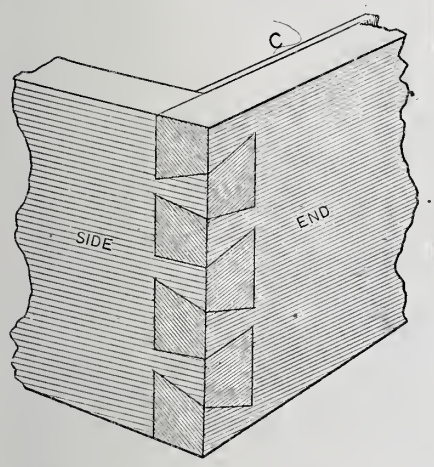
Cistern Filter.

From R. H. C., *Grayville, Ill.*—In answer to an inquiry from J. F. D., published in a recent issue, I will relate some of my experience. Ten years ago I built two cisterns 12 feet in diameter and 12 feet deep.

I put a manhole in each cistern. In the center from the bottom to the top I built a 4-inch brick wall, using good hard-burned brick for the purpose, laid in cement. I used no cement on either side of the wall. In operation the water runs from a tin roof into one side of the cistern and passes through the wall into the other half. In this there is placed a 2-inch lead pipe with a foot valve which connects with a McGowan Victor pump. The pump is attached to a vaneless windmill which is erected on the house. I believe I am safe in saying that I have the purest water in the world both winter and summer. The tops of the cisterns are finished with iron covers set in cement. This fall I entered them to clean them out, but found no deposit worth speaking of.

Puzzle in Dovetailing.

From J. J. S., *Bellville, Texas.*—I inclose a drawing of what I call a double dovetail, or, rather, a dovetail two ways. The first



Puzzle in Dovetailing.—Fig. 1.—*Perspective View* (*Outside*).

sketch shows the dovetail in perspective, while the second shows an inside view and also explains the manner in which it is put up. After the pieces forming box have been united it becomes necessary to secure the connections in the proper place, and also to obscure the extended recesses at the end of the box. This is accomplished by a thin lining put in at the ends, as represented in Fig. 1 at C. This done, the connections cannot give way and the joint needs no glue

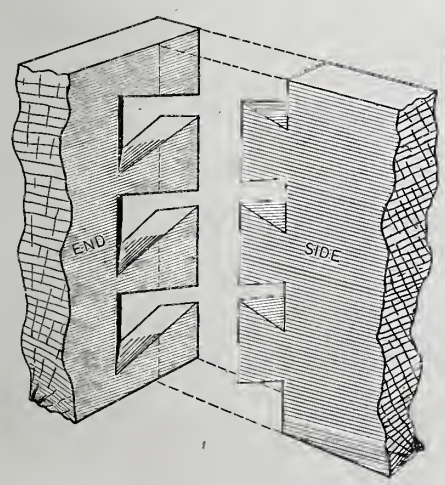


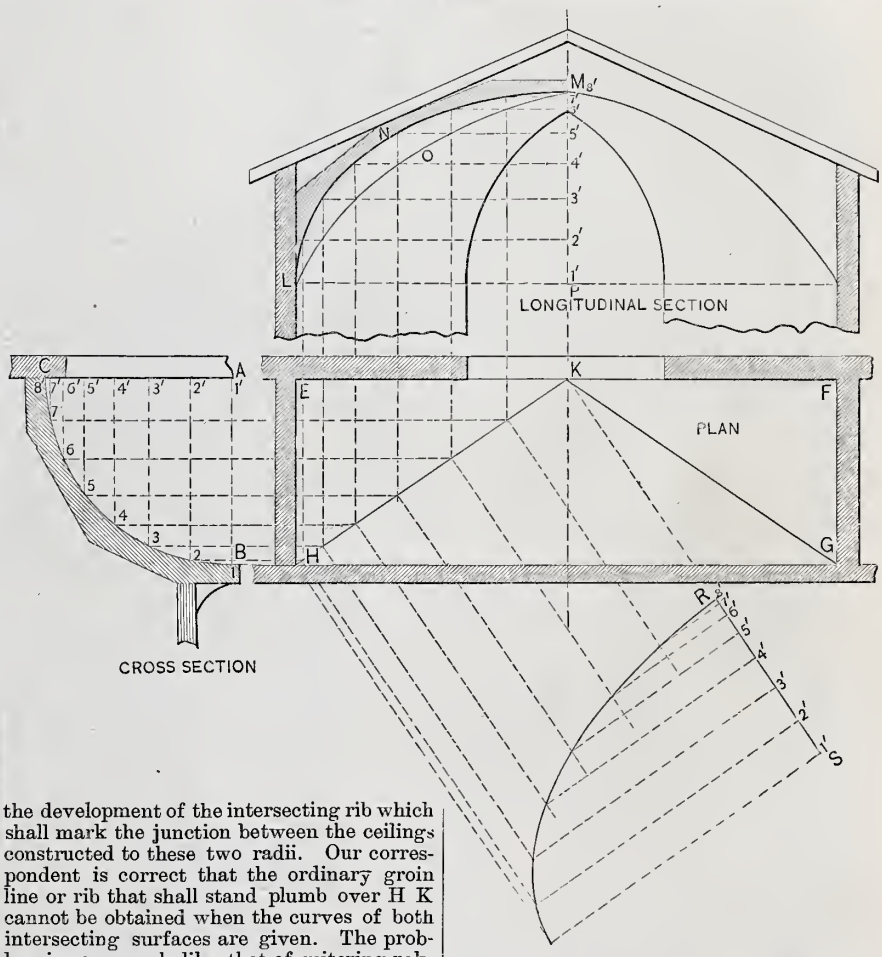
Fig. 2.—*Inside View.*

or other similar means to hold it together. This puzzle is original with me, and I have made it during the last 15 years. This is the first time, however, that it has been explained to the public.

Groin Ceiling.

From J. W. D., *New York.*—I desire to learn, through *Carpentry and Building*, how to get an angle-rib to stand plumb over the line H K in the accompanying plan, and form the intersection of the two curved ceilings which meet at that point. The rouble in the case is that there are two given ribs. The curve C B of the cross-section is one, L O M of the longitudinal sec tion is the other. The position of the ceiling in question is over the front gallery in a church, and the angle-rib is where the main ceilings join. There is a very fine window marked K in the plan. This window is 16 feet wide by 42 feet high. The architect says that the rib can be put up to stand plumb over the line H K in the plan. For my part I fail to find any method that from two given ribs will develop the required shape. I cannot see how I can have a true ceiling and a groin line plumb over the plan line named. If *Carpentry and Building* can enlighten me upon this subject it would be a favor.

Answer.—In the accompanying engraving we have represented all the more important parts of our correspondent's sketches, and there is also incorporated in it a diagram showing the method by which the rib in question can be developed. We have omitted some parts contained in his diagrams which may be described in this connection. For example, the radius of the ceiling shown in the cross-section is given as 17 feet 9 inches, and the radius of the ceiling shown in the longitudinal section is given as 28 feet and 3 inches. The problem that is presented to our correspondent's mind, therefore, is



the development of the intersecting rib which shall mark the junction between the ceilings constructed to these two radii. Our correspondent is correct that the ordinary groin line or rib that shall stand plumb over H K cannot be obtained when the curves of both intersecting surfaces are given. The problem is very much like that of mitering raking and level moldings in a cornice. It is neccessary to change the profile of one or the other in order to accommodate the given conditions. It is true that a rib plumb over the line H K could be devised which would be so adapted that both surfaces would end against its opposite sides. This would not be good construction, for it would be nothing more or less than forcing a solution of the problem. The only method, therefore, is to elect which one of the two ribs shall be taken as a basis, and then working out the profile of the other from it.

In order to illustrate the rule applicable in such cases, we will assume that the rib C B of the cross-section is to be the basis, and, therefore, that the rib corresponding to it is to be developed for the longitudinal section. The same set of lines and measurements for the most part may be used for developing the rib of the longitudinal section, and also for developing the shape of the groin rib. Divide the profile B C into any convenient number of spaces, as indicated by 1, 2, 3, 4, &c. From the points thus established erect perpendicular, as shown by 1, 1', 2, 2', &c. Draw the plan line of the groin rib H K. From the same points in the profile B C as already obtained carry horizontals to the right, producing them until they cut H K, as shown. From the points thus established in H K carry lines across the longitudinal section at right angles to its base line, as shown, producing them indefinitely. Transfer the hights on the line A C, obtained thereon by the lines cutting it from the profile B C to the line P M in the longitudinal section, as shown by 1', 2', 3', &c. From the points thus established in P M carry lines at right angles to it to the left, producing them until they cut lines of corresponding numbers drawn from points in the plan line H K. Then the points at which these lines intersect will be points in the profile of the longitudinal section which will correspond to the given profile in the cross-section. A line traced through these points, as shown by L N M, will be the profile sought.

To obtain the profile of the angle-rib erect perpendiculars from the base line H K, as shown in the diagram below the plan. Continue these lines indefinitely. On the line drawn from the point K of the plan, as shown by K S, set off the vertical hights already obtained on the line A C, as previously explained, and which also correspond to the points in P M, all as indicated by the small figures 1', 2', 3', &c. From the points in S R thus established carry lines at right angles to the left, as indicated, producing them until they intersect lines of corresponding numbers drawn from the base line H K. Then a line traced through the points of intersection thus obtained, as shown in the diagram, will be the profile of the groin.

Groin Ceiling.—Plan Accompanying Letter from J. W. D., with Diagram Illustrating Rule for Obtaining the Required Profile.

The principle underlying the determination of the two profiles here shown is easily understood. The hight is the same in all cases. Thus, compare A C with P M and S R. The curves spring from a given level on the opposite sides, but the base lines over which they are erected differ in length. It becomes a question, therefore, of distributing a given hight through curves of different lengths. Therefore, establishing points in a

normal or given profile and making use of corresponding points in the profiles to be obtained, by means of lines carried both vertically and horizontally we obtain points of intersection, through which, if a line be traced, the required profile will be obtained. The difference between the profile L N M, which, we have shown, corresponds with the given profile B C and established profile given by the conditions of the problem, as stated by our correspondent at the outset, is shown by comparing that line with L O M in the longitudinal section.

REFERRED TO OUR READERS.

Palmer & Storke's Plane Irons.

From W. S. W., *Winden, Mo.*—A carpenter working for me has a set of iron bench planes marked Palmer & Storke's patent, Auburn, N. Y. From using them I think they are the best that I have ever seen. I am informed that the makers have stopped manufacturing them, and yet I desire to purchase a set of this kind. Can you inform me, through the columns of the paper, where I can obtain them, or can any of the readers of *Carpentry and Building* afford the same information?

Joining Rails to Newel Posts.

From E. S., *East Providence, R. I.*—I would like to learn, through the columns of *Carpentry and Building*, the best way to fasten stair- rails to newel-posts, in order to make a firm job of it. Time in the accomplishment of this work is no object. I desire to know the best way to fasten them in position, so that there will be no nails or screws to be seen when the work is finished.

Dumb Waiters.

From H. G., *Medina, Ohio.*—I desire to construct a dumb waiter, and would like some of the craft who have had experience to give their ideas as to the best and most economical form and manner of building one. How can I manage to make it slide up and down at all times alike, or with the same ease, as sometimes there is more in the cupboard than others?

Is Carpentry a Desirable Calling?

BY A CARPENTER'S SISTER.

Looking over back numbers o this journal for a recipe to stain floors, I came on the old discussion whether it was desirable for young men to learn the trade of carpentry. Now, I'm not in the trade, as you will see, hut my brother is, and, having observed his calling from an unbiased view, I want to put a word in right here. Possibly, as a family, we have not run to trade, the men beingcollege-hred two or three hundred years back to the good bishop from whom we trace our descent. The elder brother was to follow the tradition of the family and enter a profession, like his father. But while preparing he injured his eyes and health, so that he was forced to give up study for active work. He might have been a farmer, as we owned a cosy place in the country, but, having a natural turn for tools, he chose independently, somewhat to my horror at first, I own, to become a carpenter. So down went Greek and mathematics for the plane and saw. We live in one of those frank, pleasant towns where a carpenter is as good as anybody, provided he is as good a man. My brother put brains into his work. I can't say when or where he learned his trade, but in less than three years he was doing the responsible work ou a $10,000 house near Boston, which he finished so much to the owner's satisfaction that he made the boy a present of money over and above the agreed price, in order to reward his faithfulness. We all took an interest in his work, and evenings and off days there was much reading up books on ventilation and architectural design—drawing, planning and designing. It was found to be delightfully convenient to have a craftsman at hand to run up a set of shelves, remodel a piece of furniture or improve a room, and in one season we pretty nearly remodeled the house between us, I furnishing the suggestions—you can trust a woman for that when she has a man at her elbow intelligent and willing enough to carry out her ideas. I have watched his work sharply, but in seven years I fail to find why the young man who can design a cottage in colonial style and plan a convenient arrangement of rooms for it (with his sister's help), model and make chimney pieces, sideboards and furniture for it, studying from Viollet-le-Duc and Jacquemart in French, through Gwilt and the old English designers down to the last doings of the Architects' Club, has not as fine a calliug as any on the globe, and second in diguity only to that grandest of all—gardening. Surely the building of men's homes must rank in necessity and dignity—and profit, too—with that first of all pursuits which brings the bread to his mouth and his children's.

The double sashes were to go on the house at the beginning of winter, and I was waitiug impatiently for the man to do the job. The bell rang one morning, admitting a well-mannered young gentleman in fashionably cut gray morning suit, who took my ideas aback by saying he had come to put the windows on. Off went the neat gray coat, which would have looked in place in a club window or on the sunny side of Fourteenth street, New York. An equally neat linen blouse took its place, and the young man was soon up his ladder screwing on the sash with ability and dispatch. He did not smoke a vile pipe or viler cigar, though the suspicion of a good one faintly entered with him. He did not sing a roaring song or whistle to mark his independence when women were near. He came down and set an unsteady table right for me, and took the order for other repairs with as quiet, easy, good-humored grace as any gentleman who ever enters the house, and with as eutire independence. I don't know his uame, but I was glad to see him, for he favored the strong ersuasion I begin to cherish that there is not the slightest reason why carpentry is not a calling for gentlemen.

Why not? It is a clean business, a sunshiny one—far more acceptable in this respect than the office of superintendent of a mine, or a ranch owuer, or of that of a downright hard-working artist—occupations which young men are very ready to take nowadays. It is healthy, not over-laborious, and certain. Except in the hardest times, a good carpenter is sure of work. And when one of your correspondents writes that carpentry has never paid well, and never will, and that the American father prefers that his boy should learn a profession because it pays better, I think he can't know the professions as well as he thinks he does. Look at the hosts of small professional men—lawyers, ministers, editors—who manage to keep a decent coat on their backs out of necessity, but which is about all they can do. A poor carpenter can be sure of $2 a day if tolerably industrious, and about the cities it is a poor hand who can't make $15 a week. That is the full average price paid a reporter on a city paper, more than half the young lawyers make, more than most clerks get, and more than half the doctors make, taking their expenses into account. If a man settles into a groove, content to push a plane or drive a saw all day for $2.50, he is not likely to get more, nor will he in any of the professions. I don't know any calling that obliges a man to get rich. But it does seem as if Mr. Sam Walker, the worthy builder I know, who has finished seven houses in one year, which cost him $8500 apiece, and which sold for $13,000, might be satisfied with his modest success. Yet Mr. Walker worked his way up from the ranks of men who are doing days' work for him still.

I have been trying to inspire my excellent brother with the idea that there are rewards in his calling. He says that dozens of houses around here which sell readily for $2000 could be built better than they are now for $1500, allowing the designer full wages for his own time all through, and I have asked him why he does not take the money, which he could readily obtain on easy terms, and build a house or two as a business venture. But he hems aud haws, talks about the risks in building, and, finally, asserts that he is not well enough posted in all the details to carry a house through from cellar to attic. He can plan for his own house, or take the carpentry for a boss carpenter and do all the work, the head man looking in once a week, but the idea of responsibility is too much for him. He isn't sure but he might fail somewhere, and that, I believe, is where the trouble lies with the majority of carpenters. They don't know their trade by heart, root and branch, as they need to in order to be successful. Then, they have never studied the market for houses to know the business part of their ventures, just like many authors who write good books, and farmers who own good property, who never know how to make any money out of them.

I judge by the demonstrations in your columns that carpentry will admit of considerable education to carry out its details, and I know that designing takes all the taste and culture a man can bring to it, and as it is a sure, and in the long ruu a fairly-paying, business, which will compare with any honest profession, how is it that a good carpenter who has worked in all departments of the trade and put up fine houses, can talk disparagingly of it as one that has "never brought him very much of this world's goods, and never will." I'm afraid his ideas are too soaring, and he is anxious for the piling hundreds of thousands at the feet of railway men, Congressmen and speculators. We know these men all die rich and live easy, up to the elbows in gold, high jinks all day long, and no walking the floor or lying awake uights to know where the money is coming from. Perhaps Mr. Henry Villard, with wrecked nerves and fortune, would not like just now to change with the Cape May builder whose bills are good and his arm as steady to swing an adze as ever. I beg pardon for my intrusion. Women are forever putting themselves into the world's affairs, hut I doubt if one of them has ever put her head into the carpenter's shop before, unless to chat with the smart journeyman while she had a bracket cut or some such trifle done. But, you see, it makes all the difference having a brother in the trade.

STRAY CHIPS.

As an evidence of the rapid growtb of manufacturing enterprises in tbe great West and Soutbwest, and their successful operation in competition with the older establishments of the East and of Europe, we observe that the contract for furnishing tbe polished plate glass for the new 10-story office building now being erected in New York City for Mr. Cyrus W. Field has been given to the Crystal Plate Glass Company, of St. Louis, Mo.

Mr Frank J. Grodavent, whose efforts have been submitted to our readers in various issues of *Carpentry and Building*, has lately removed to Leaveuworth, Kan., where he has associated himself with Mr. E. T. Carr.

The firm of Shimer & Co., of Milton, Pa., consisting of George J. Shimer, Samucl J. Shimer and C. L. Johnston, manufacturers of the Shimer matcher heads, was dissolved January 10. The business hereafter will he conducted by Samuel J. Shimer on the premises occupied hy the old firm.

The drawings for a brick building for the Brush Electric Light Company have been prepared by Mr. George Archer, of Baltimore. The structure will be located on Constitution street, between Monument and Madison, will be 45 x 78 feet in size and two stories in hight, and cost $5500. Mr. John Waters is the builder.

According to the report of the Buildiug Department of the city of Chicago for tbe year ending Decemher 31, 1883, there were 3204 permits issued for huildings and 1602 for sheds. These buildings had a frontage of 85,588 feet and cost $21,527,610. The cost of the sheds was $160,000.

A hotel building having a frontage of 320 feet, with wings at ends, 40 x 227 feet, is in progress of erection at Chestnut Hill, Pa. The structure will be three stories in hight, built of stone and tile, with tile roof. Tbe cost is placed at $170,000. The plans were furnished by Messrs. G. W. & W. D. Hewitt, of Philadelphia. These gentlemen have also furnished the plans for a structure to be built of brownstone and brick at Devon Station, on tbe Pbiladelpbia Railroad. Tbe length will be 312 feet, with a wing 42 x 140 feet, and four stories in hight. The cost is placed at $152,000. The building will be known as the "Devon Inn."

Messrs. J. B. Shannon & Sons, the well-kuown dealers in builders' hardware, &c., of Pbiladelpbia, have recently removed their business from 1009 Market street to a more commodious structure at No. 1020 Market street. This change will enable the firm to keep the various departments of tbeir business separate, and consequently allow of the employment of a larger force.

At Atlanta, Ga., tbere is a school of carpentry connected witb the Clark University, for the industrial education of young men. Several huildings for farming purposes, a blacksmith shop, a fine dormitory and some of the prettiest cottages in the city are tbe work of the students.

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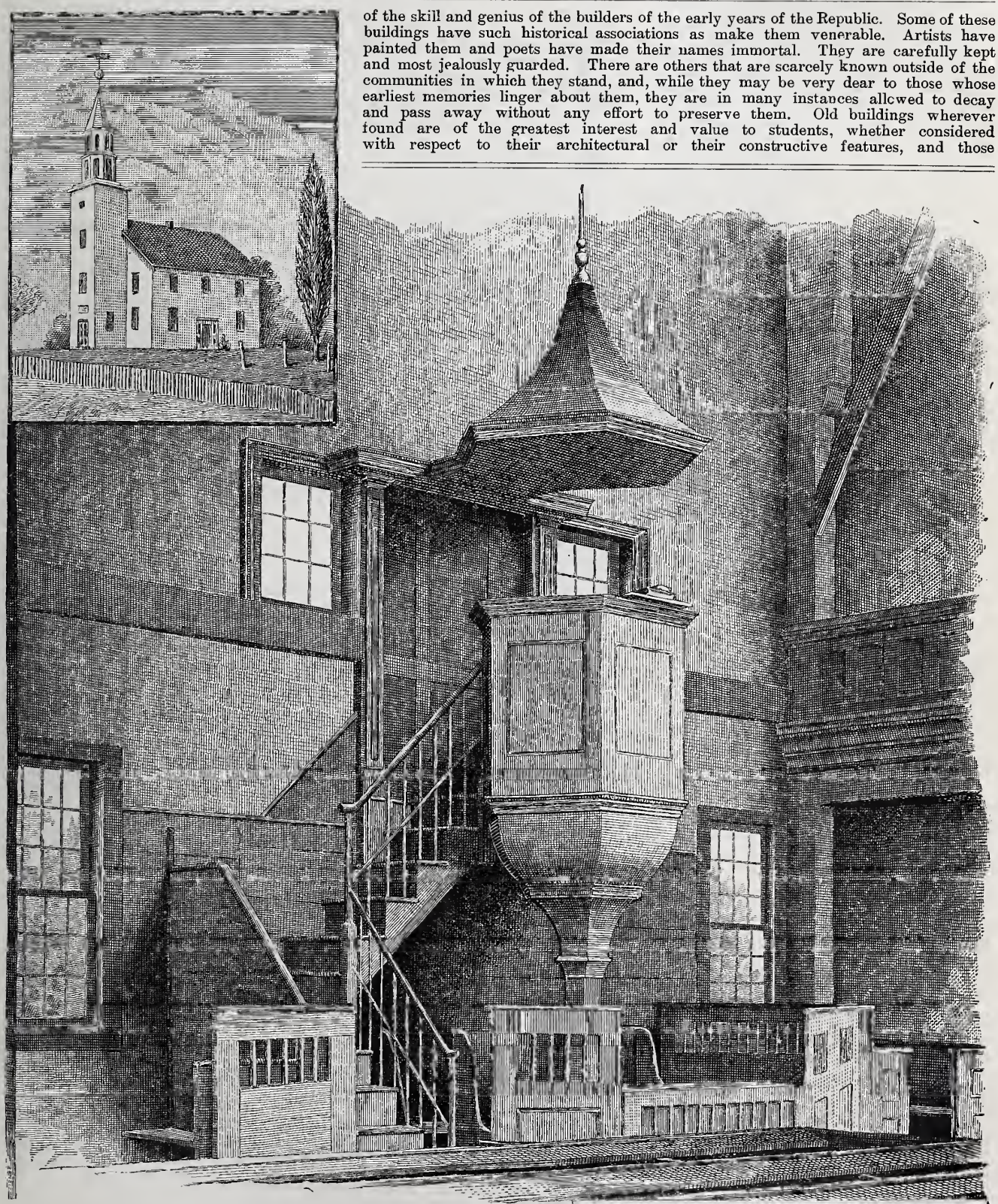


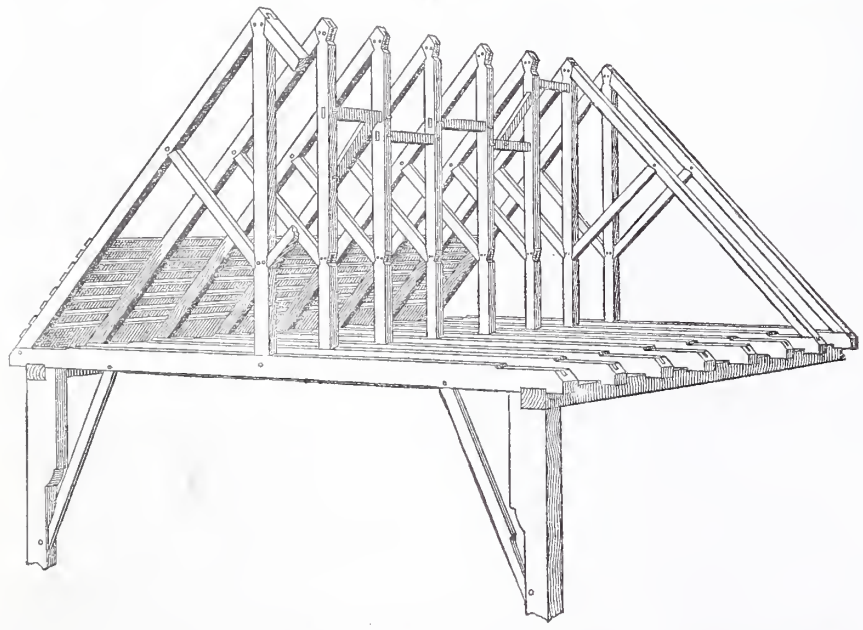
AN EXAMPLE OF OLD-TIME CARPENTRY.

BY A. O. KITTREDGE.

IN different places throughout the older portions of the country there are to be found a few buildings which, having escaped the ravages of fire and the destruction of the elements, have come down to us as striking examples of the skill and genius of the builders of the early years of the Republic. Some of these buildings have such historical associations as make them venerable. Artists have painted them and poets have made their names immortal. They are carefully kept and most jealously guarded. There are others that are scarcely known outside of the communities in which they stand, and, while they may be very dear to those whose earliest memories linger about them, they are in many instances allowed to decay and pass away without any effort to preserve them. Old buildings wherever found are of the greatest interest and value to students, whether considered with respect to their architectural or their constructive features, and those

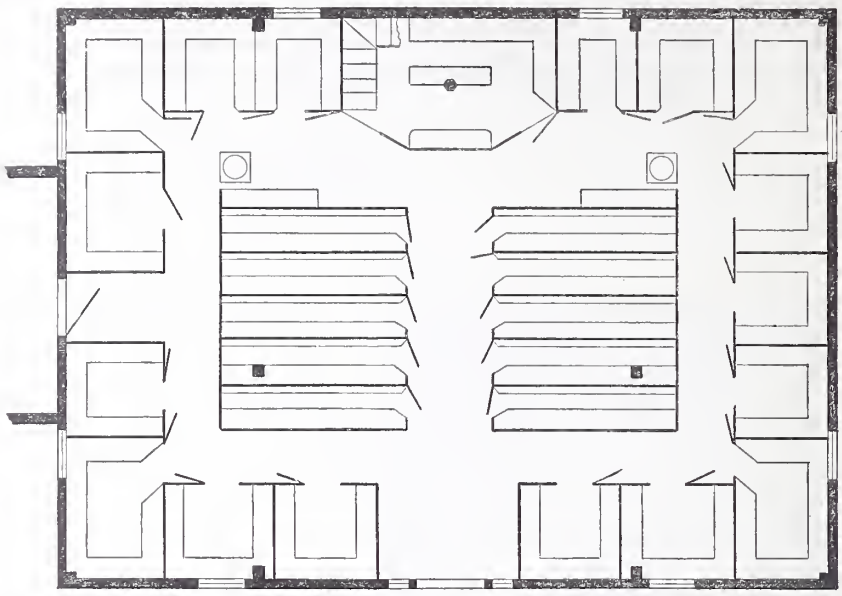
about which no stirring historical events cluster are frequently as important in their lessons as those more widely known. The changes which have taken place both in features of design and in methods of construction during a hundred years are strikingly portrayed in all of these structures, and this gives them value even if they possess it from no other source.

No observing mechanic can visit any of the buildings erected in the early years of the country's history without coming away with new ideas and higher conceptions. The conspicuous honesty of the builders of that period, both in the materials employed and the construction chosen, fills him with admiration, while the patience with which they wrought, laboring, as they were compelled to, with scanty tools and insufficient appliances, commands his highest respect. The uniform excellence of their work compared with much that passes current at the present day is refreshing, while the quaintness of the shapes employed and the designs that were common in those days add a charm to the whole that is indescribable. It is not every one that finds it convenient to examine specimens of old-time carpentry, however much he would enjoy doing so, and there are many among the readers of this journal who live where there are none but new buildings —that is, on the extreme outposts of our national progress—who would consider it a great privilege to examine what is often considered quite commonplace by their fellow craftsmen living in older communities. To all such a brief description, with illustrations, of an old church building which possesses some features of interest will no doubt prove acceptable.



An Example of Old-Time Carpentry.—Sketch Showing a Portion of the Roof Framing.

The external appearance of the building is shown by the sketch in the upper corner on the first page. It is a frame building, and therefore probably of more interest to carpenters than one built of more durable material. It is modest in appearance and unpretentious in all respects. There are no striking historical memories associated with it, yet it proves well worth a visit, whether the trip is prompted by mere curiosity or is made for the purpose of studying the methods of builders of bygone years. The building is known as the Old Brookfield Church, and is to be found in the little village of Slate Hill, some five miles south of Middletown, Orange County, N. Y. It was built shortly after the close of the Revolutionary War, as may be gained from the tablet which graces its front, a reproduction of which is shown at the bottom of the engraving already referred to. Times were hard in those days and money scarce, and accordingly not a few of the subscriptions toward its cost were made in labor and materials. The building, from this fact, may be taken as representing the skill of the average builders of that period. It is hardly necessary to say that no architect was employed. The building itself affords ample evidence that construction and design proceeded hand in hand, and that the latter gave way to the former far more frequently than construction yielded to the claims of grace and form. The work was undoubtedly managed throughout by a conscientious builder, who sought to the best of his ability to fashion the materials furnished him into a church edifice that should meet the modest requirements of the community. Almost every part of Orange County is at present easily accessible, but

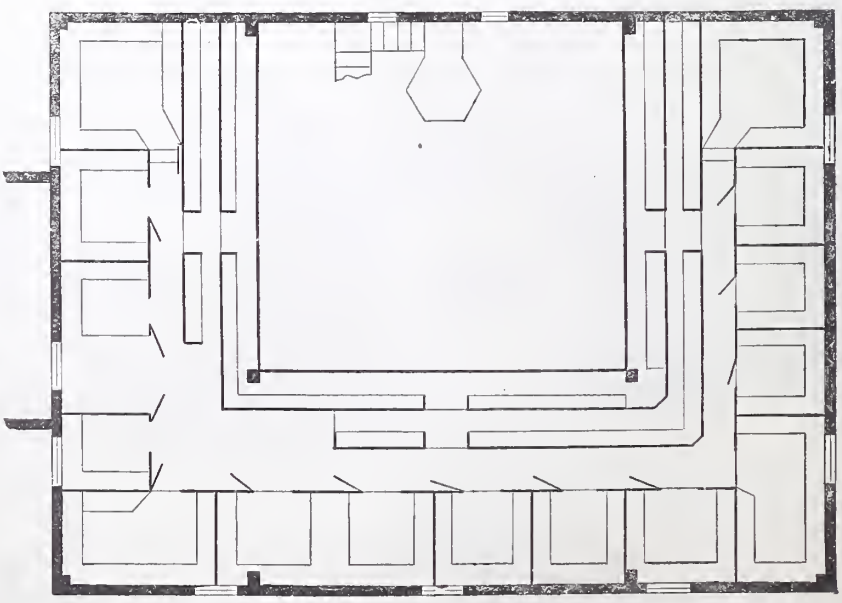


Floor Plan.—Scale, $\frac{3}{32}$ Inch to the Foot.

100 years ago those portions remote from the Hudson River and other natural highways were even further from New York City and other points of supply, so far as trade was concerned, than many parts of the far West at the present time. This building, therefore, of necessity was constructed out of native materials wrought by home labor, and it portrays in a remarkable manner the state of the building art at that time. That the work was thoroughly done is amply evidenced by the staunch frame, which is apparently good for another century.

Sawmills were not easily accessible, and so we find that the timbers used in this building, even to the long rafters in the roof, were all hewn to shape. Cut nails and shelf hardware as understood at present were unknown in those days. Hand-made wrought nails and hinges of domestic manufacture are therefore conspicuous features, while the door latches are of patterns to warrant the lovers of the antique offering a premium for them. All of the hardware is guiltless of screws.

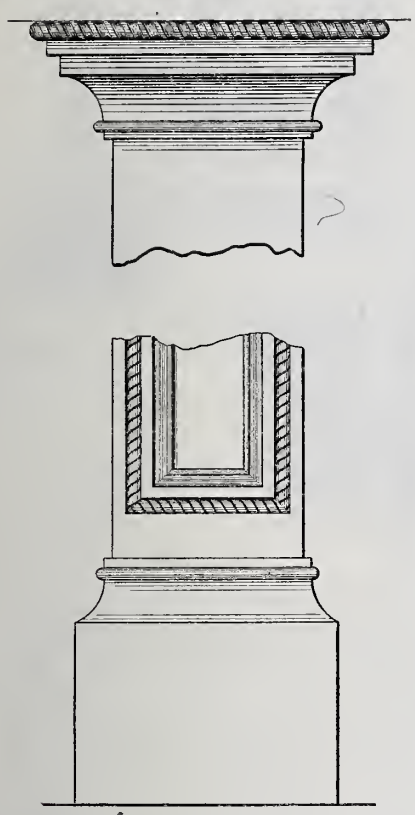
The quaint simplicity of the interior is shown by the first-page engraving. The high pulpit is supported by a pedestal that bears a striking resemblance to a modern goblet. It is reached by a narrow flight of stairs furnished with a handrail, in the construction of which the builders successfully dodged all problems of ramp and twist. The pulpit is crowned by a sounding board suspended by a rod from the ceiling. The



Plan of Gallery.—Scale, $\frac{3}{32}$ Inch to the Foot.

inclosure at the base of the pulpit is entered by two doors or gates, one of which is shown

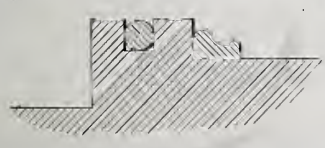
open, and within a straight-back seat stands behind the desk. The latter is as peculiar as other features. When not in use its presence is obscured by a wooden screen which brings the inclosure around the pulpit to a common level. In the engraving this screen is shown dropped down, hanging suspended by its hinges. The background at the right shows one of the square or family pews, a number of which are arranged around the walls of the room. Above is one end of the gallery, while the character of the framing of the building is revealed by the white-oak post and brace which are



Old-Time Carpentry.—Detail of Pilaster Back of Pulpit.—Scale, 3 Inches to the Foot.

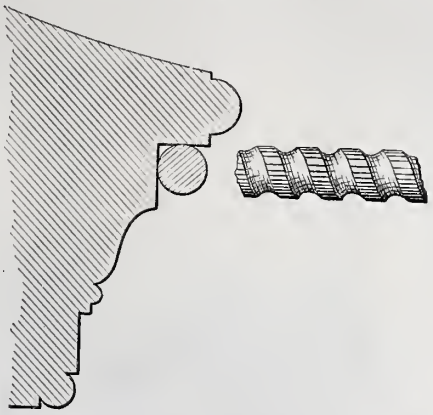
seen in the same part of the engraving. In the foreground the tops of the pews which occupy the center of the room are to be seen. By reference to the floor plan, and to the plan of gallery, which are given opposite, the general arrangement of pews and seats will be understood.

A sketch of the roof framing also appears upon the opposite page. The rafters, as we have already stated, are hewn. They are of white oak and are made tapering, the ends at the eaves being larger than those at the peak. They are mortised and pinned into the tie-beams which serve as ceiling timbers, in a peculiar manner, and are also mortised and pinned to the uprights or king-posts against which they terminate at the top. Struts support their centers, while girts connect the several bents together



Section Through Pilaster Back of Pulpit, Half Size.

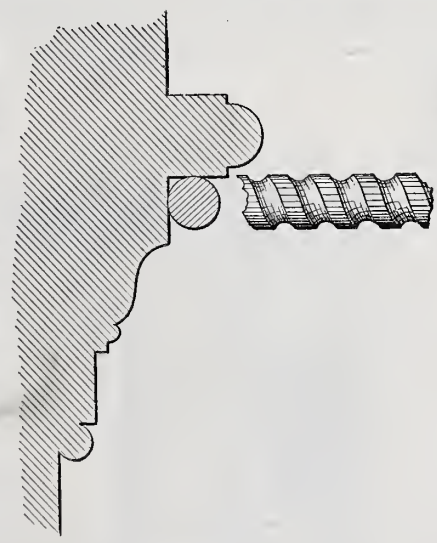
in a way to form a very substantial roof. The form of the roof is not unlike a common king-post roof, and yet there are features about it that are not usually found in works on carpentry. The covering of the roof is of shingles. The roof has been renewed twice since the building was erected. The first covering employed shingles which at present would be regarded as of mammoth size. They were 32 inches long and from 12 to 14 inches in width. They were rived out of pine logs felled in the immediate vicinity of the church. At present few vestiges of the pine which formerly abounded in the vicinity remain. The second roof was put on in 1828, and the shingles used at that time were some 28 inches in length, while their width had diminished correspondingly. Both of these coverings were laid upon lath



Molding Around Sounding Boards, Half Size.

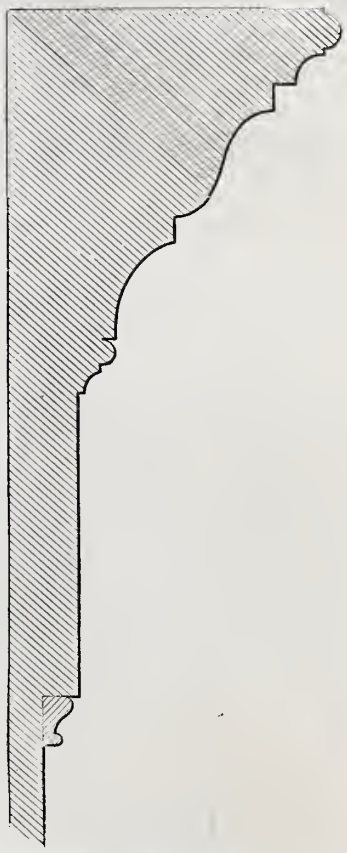
or narrow strips so placed as to adapt them to the size of shingles used. The present roof is composed of shingles of ordinary dimensions, laid upon lath, the product of a modern sawmill, and is in all respects very much like roofs of modern buildings. The siding of the building is of cedar, the boards being from 9 to 12 inches wide and ¾ inch thick. The lower edge of each board has been straightened, and has also been rebated so as to show only ½ inch thickness. The lower edge is further finished by beading, a feature which always attracts the eye of carpenters who visit the building. The siding is in a fair state of preservation, and only a portion of it has required relaying in the necessary repairs which have been made.

The framing of this building is something which every builder who visits it finds of great interest. The work was all done by "scribe rule," and every joint is marked. The massive proportions of some of the timbers, particularly of those which carry their largest ends uppermost, suggests that



Molding at Line of Floor of Pulpit, Half Size.

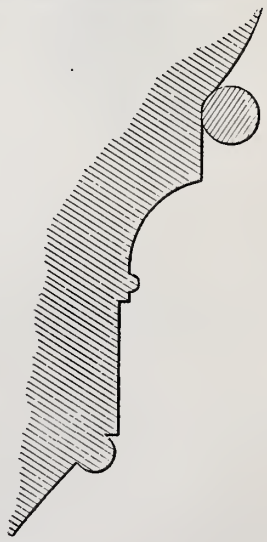
it was cheaper at the time the building was erected to allow the surplus timber to remain than to cut it away. It is only upon some such hypothesis as this that we can account for the unusual size of the upper ends of the main posts in the frame. The post shown above the end of the gallery in the first engraving measured outside of the wall 9 x 11 inches in the smaller part, while in the portion shown above the brace it is 22 x 11 inches. The construction of the building is not above criticism in all particulars, as the reader will, no doubt, detect by even casual examination, and faults could be found if we had that object in view. The management of the braces in the corners is an example in point. The foot of the brace coming against the post below its largest part, is to be taken, however, as evidence that the increase in size of the upper part was introduced purely as ornament. The heavy timbers employed in this building suggest the importance which attached to the "raising." It was a much greater event than any barn raising, both on account of the interest centering in the building itself, and by reason of the actual labor involved, considering dimensions and weights. The record is that people came 20 and even 30



Cap Molding Around Pulpit, Half Size.

miles either to assist in the work or to be witnesses of what was considered a remarkable undertaking. This, contrasted with present methods of construction, balloon framing and modern appliances in the way of derricks and hoists, by which labor is reduced to a minimum, serves to show the changes that have taken place since the days referred to.

The interior finish of the building is of pine, and has never been touched by paint



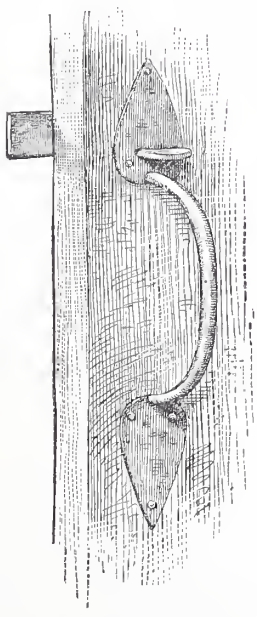
Molding Around Pedestal of Pulpit, Half Size.

or varnish or filling of any kind. It remains to this day just as it left the hands of the mechanics who put it in place. All the work is pinned together, and evidently was constructed of well-seasoned stuff. The

sketches on the preceding page show details of moldings, and illustrate the straits to which the builders were put in securing forms and enrichments appropriate to the place. For an egg and dart molding, or something similar, a spiral cut in a lathe has been substituted. This innovation upon accepted architectural forms is striking, yet the effect produced is not bad, and it harmonizes with other features very well. The smallness of the various members of all the profiles commands attention. The dimensions of the moldings suggest fine cabinet-work instead of the finish of a large room. The sketches are, for the most part, half full size.

One of the engravings on this page shows a hinge on one of the pew doors. As before mentioned, the hinges are secured in place by hand-made wrought nails, one of which has afforded the artist the subject of another sketch. The key of the ancient lock which does duty on the outside door is likewise presented, while a typical latch from one of the inside doors is shown below. "A corner in the gallery" illustrates the straight-back comfort which the builders kindly provided for the worshipping throng. The hight of the pulpit makes the gallery pews more desirable than those in the main body of the house, but the finish and pattern of all of them are the same. The floors of this building are laid of stuff unusually wide, some of the boards measuring as much as 14 inches. In whatever direction the visitor turns some new surprise in form or construction meets his gaze. The glass in the windows was

Old-Time Carpentry.—The Key to the Meeting-House.

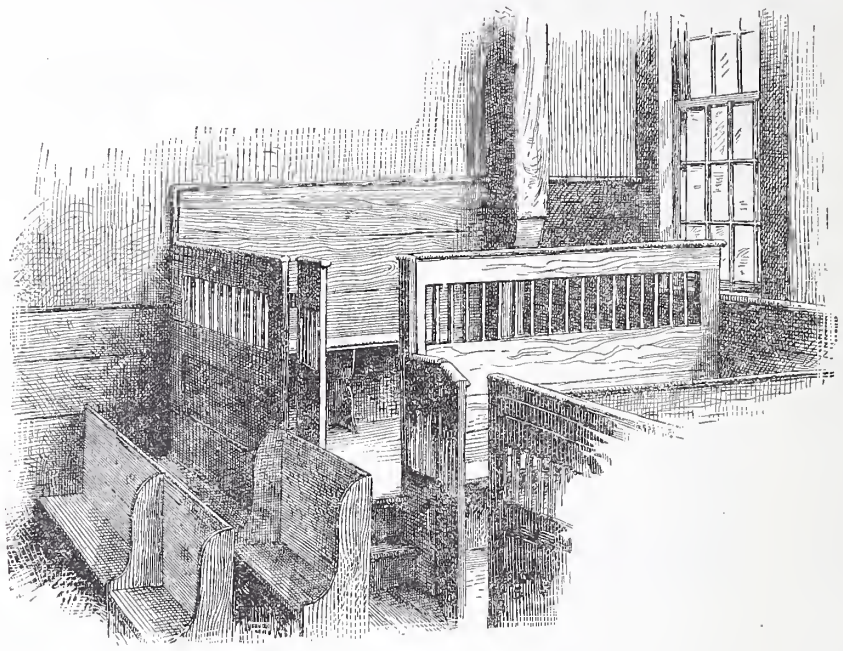


A Typical Door Latch.

imported long before protection to home industries had been inaugurated or even the idea of American glass-works had been suggested. The small panes and blueish cast which they possess are in keeping with other features.

The walls and ceilings are finished in plaster. The lath employed are of elm split to size and carefully nailed in place. The quality of the mortar used would put to shame the shoddy contractors of the present day, while it would be hard to equal even where the very best is sought. The walls are almost as hard as rock, and some clinch pieces wrenched from the ceiling and exposed upon a hard roadway resisted crushing under the wheels of a loaded wagon almost like pieces of stone.

A number of the tools used by the mechanics in the erection of this building have been preserved as relics and are shown to visitors. Among them may be mentioned a handsaw made by Spear, in England, nearly 125 years ago, which is in a good state of preservation, and might be used at this day in competition with modern tools. A compass-saw has also been saved. Two planes—a fore-plane and a smoothing-plane—are likewise in the collection. An auger, a pair of dividers and an adz go to make the

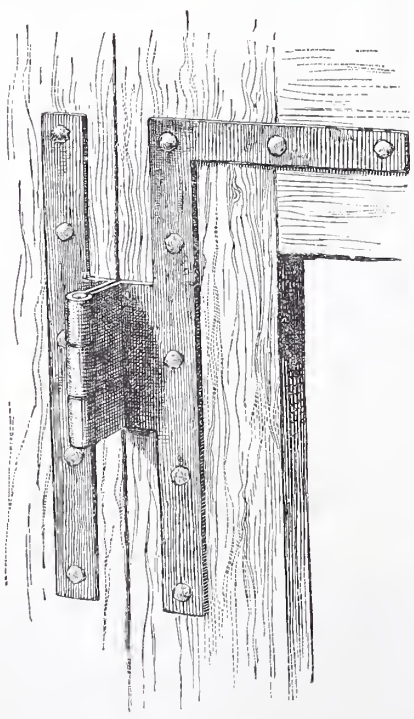


A Corner in the Gallery.

lot, each piece showing some distinctive feature that marks its era as compared with the tools now in use. The Bible and Psalm Book first used in this church are also preserved, and were in their place upon the pulpit desk when our artist made his sketches.

The California Redwoods.

A writer, who was an eye-witness to the operation, says it is a magnificent, yet a painful, sight to witness the operations in one



Wrought Hinges Upon the Pew Doors.

of these redwood forests. You stand in the midst of vast trees, so close together that there is a dim, religious light around you like that of a cathedral. This delusion is furthered by the apparent regularity with which many of these trees grow. You can look down a long aisle as if it were a groined arch of cathedral roof, and the only thing which undeceives you is, on looking up far above your head, to see rifts of blue sky between the branches. But you are suddenly startled by a long cry of warning, which follows the rhythmic chopping sound of the axe and the swish of the saw. It is the woodman, and his melancholy cry portends the fall of a mighty tree. There is a long and labored groaning sound—it is the tree breaking away from the friendly base which has held it perhaps for ages. Then there is a sharp "crack." The tree has snapped in twain. The mighty mass trembles slightly for a moment, then inclines in the direction toward which the practiced woodman has designed it to fall. It topples—it falls. There is an awful crash—the falling tree is smiting the branches from a fellow-tree which still stand upright, but not for long. There is a sound like a peal of thunder—the tree has struck the ground. The earth trembles for rods around as if there were an earthquake; there is a cloud of dust, and all is over.

The redwood is a most valuable kind of timber. It is very slow to burn, and if ignited is easily extinguished. It is very heavy and very dense in fiber, yet very easy to work, splitting with the utmost accuracy, and yielding to the saw, chisel, &c., with the utmost ease. When polished it makes a most handsome wood for interior fittings, and many of the finest houses in California are fitted with this wood in its polished state.

Among the items that contain a germ of truth, but which are so covered up with inaccuracies of statement as to leave the general reader bewildered, we may cite the following, which appears in a recent issue of a Chicago architectural paper: "The metal roofers are taking steps toward improving the quality of the zinc and tin employed in

An Old-Time Nail.

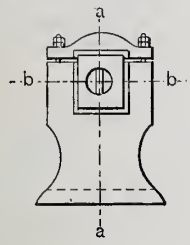
roofing, and making the use of the superior metal uniform." Comments on this absurd statement are hardly necessary. If we had the writer of it in hand for the purpose of catechising him, we should probably ask what is meant by the "superior metal." The idea of improving the quality of the "zinc and tin employed in roofing" is very good. Our readers will notice that nothing is said about improving the quality of roofs by employing a better grade of materials, although it is evident that such was the real intention.

Construction of a Cheap Lathe.—IV.

THE HEADSTOCK CASTINGS

(Continued.)

Line out the mandrel centers on the headstock; drive a bit of hardwood into the rough hole cut out in the brasses, to form a temporary basis for their center, Fig. 18;



Cheap Lathe.—Fig. 18.—Centering the Brasses.

whiten both it and the back part of the headstock with chalk, to show the lines better. Then put it on the lathe-bed; set the marker of a scribing block to 5 inches, and scribe off the centers of the brasses and the hole for the back center, Fig. 19. Strike up the vertical centers with a square from the central line of the bed,

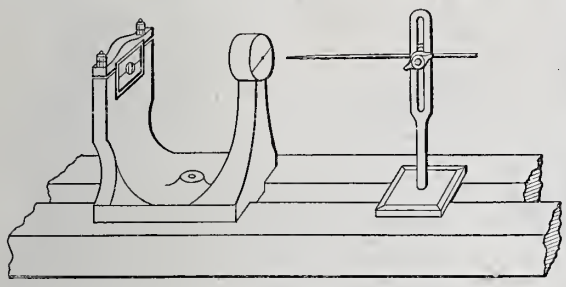


Fig. 19.—Scribing the Cutters of the Brasses and Back Center.

and where the lines intersect (Fig. 18, *a a*, *b b*) draw with dividers a circle ⅞-inch diameter on the brasses and one ½-inch diameter on the back end, for the back center. The headstock is now ready to go into the lathe to be bored. An angle-plate will be bolted on the face-plate, and the headstock

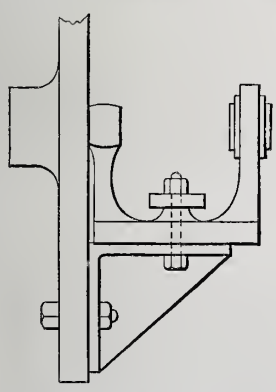


Fig. 20.—Angle-Plate Attached to Face-Plate, with Headstock in Position.

bolted to the former in such a position that the center of the mandrel bearings shall coincide with the center of the face-plate of the lathe, Fig. 20.

A tool shaped like Fig. 21 will be fixed on the slide-rest for boring the mandrel

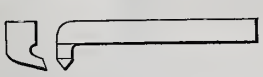


Fig. 21.—Tool for Boring the Mandrel Bearing in the Brasses.

bearing in the brasses, a coarse cut being taken first and a finishing cut afterward. Then the headstock will be turned round on the angle-plate, and a ½-inch hole for the reception of the back center will be drilled with a common drill held in the slide-rest. Rechuck the headstock with the center of the boss on its foot (Fig. 22, A), central with the axis of the lathe, and drill a ⅝-inch tap-

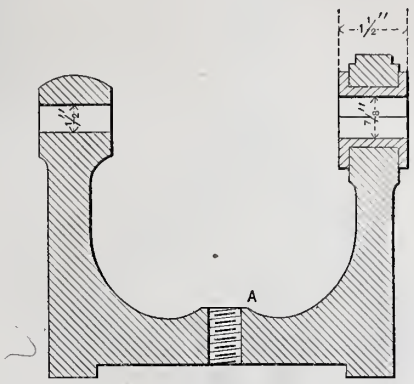


Fig. 22.—Longitudinal Section Through Headstock.

ping hole to receive the hold-down bolt, and tap accordingly.

Now, take out the mandrel brasses and clip them together over a piece of iron—a shop mandrel, in fact—turned to ⅞-inch diameter; hold them with two plates and bolts, Fig. 23, and turn their faces to 1½ inches over, while thus held in position. Remove from mandrel and replace in headstocks, which will now have the sectional appearance presented by Fig. 22.

The back poppet will now be treated in a somewhat similar manner. The bottom will be filed true, and the projecting guides should be parallel and true for easy movement up and down the bed The centers will be marked by the scribing block set as for the headstock. The casting, fixed to the angle-plate, will next be bored with the same tool as that which we used for the mandrel brasses, to the dimensions, Fig. 24, the sharp angle in

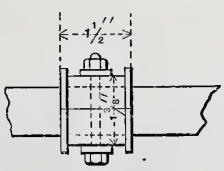


Fig. 23.—Turning the Faces of the Brasses.

the recess for the screw collar *a* being cleaned out with a scraping tool. The boss for the set-screw *b* will be drilled through for a ⅜-inch tapping hole and tapped. The boss on the foot will be drilled and screwed to ⅝ inch, as in the headstock.

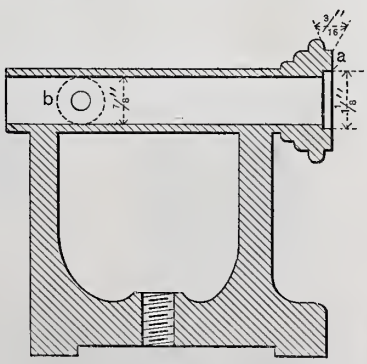


Fig. 24.—Longitudinal Section Through Tailstock.

Our poppets are now ready to receive their mandrels and other fittings, the details of which we shall consider in our next article.

NOTES AND COMMENTS.

A chapter in contemporary art might be written, having for its title "The Signs of the Times." Almost every phase of what is sometimes called in derision the "art craze" is manifested in the business signs to be read on all the fashionable streets. High art has run riot in this direction, and signboards in all manner of styles, from quaint old letters to nondescripts that beggar description, may be seen if one but finds the time to look for them. For example, on Fourteenth street, in this city, a sign may be read which gives the storekeeper's name in letters no two of which are of the same size, nor have they the same slant. Taken as a whole, the sign is almost unreadable. Another characteristic example will be found on a building in Fifth avenue, near Twentieth street, over the new quarters of a well-known firm. We might mention still other examples, but little good would be done without the assistance of illustrations. A chapter on the signs of the times, if carefully prepared by a competent writer, would be decidedly interesting, if not sensational in character.

The insufficiency of the public-school system at the present time is in part owing to the fact that it and the industrial system of the country have gradually grown apart. Formerly a boy worked in a shop part of the year and went to school another part. At present he attends school regularly, or else works without intermission. Mr. Coleman Sellers, Jr., in an address on mechanics before the Franklin Institute, Philadelphia, a short time since, alluded to this fact in the following language: "In our early history the workshops were not far removed from the schools. It was almost impossible to attend school from one year's end to the other. A lad had to work in the shop or on the farm for some months of the year, and he could attend school the rest of the time. What was the result of this? Its tendency was to produce good, solid men, who were daily applying their school instruction to workshop manipulation. Who were made by this kind of training? The men who have taken the lead in building up our system of railroads, our workshops and our factories."

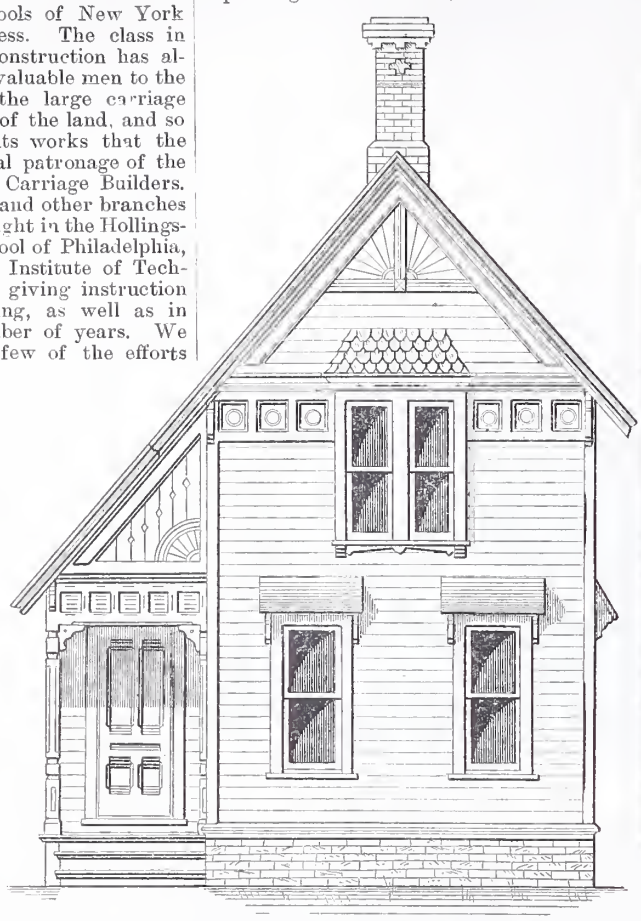
Continuing this train of thought, Mr. Sellers said: "What is the result of the later system of training in the public schools? The students are separated entirely from manual labor, and their heads only are developed, and this development fits them only for the professions of doctors, lawyers, and what not. And not one single thing has come to them that will help them to enter a workshop. There is a very simple reason for this. The teachers are not mechanics. They are not expected to be. The scholars can more easily learn the things that relate to buying and selling than what relates to mechanic arts. The instruction given in the schools must bear the teacher's idea. Very few teachers in public schools are expected to understand the principles of mechanics. The examples prepared for the scholars are not taught as having relation to mechanical work. Yet many of the calculations apply as correctly to the operations of machinery as they do to the business of buying and selling. If mechanical operations were taught in schools, it would give a rest to head labor, and the hand labor would make the brain stronger."

Mr. Sellers believes, with many others who have investigated the subject, that it is possible to have taught in the public schools the underlying principles of manual labor. There are a few simple tools that are used in a great many trades, and he thinks their use might be very judiciously introduced in the course of study. Whether such a radical change in the public educational system of the country is to be brought about or not, it is very evident, from the success of various experiments that have been made, that trades can be acquired in much easier ways and with far less loss of time than by the old apprentice system. The various kindergarten schools of the country have made their mark. Our readers know of the suc-

cess of the New York Trade Schools, where instruction is afforded in plumbing, stone-cutting, bricklaying, carpentry, plastering and other branches of the mechanical trades. The Industrial Art Schools of New York are also achieving success. The class in carriage drafting and construction has already contributed many valuable men to the equipment of some of the large carriage manufacturing concerns of the land, and so highly appreciated are its works that the class is under the special patronage of the National Association of Carriage Builders. Wood-carving, modeling and other branches are being successfully taught in the Hollingsworth Industrial Art School of Philadelphia, while the Massachusetts Institute of Technology, Boston, has been giving instruction in practical blacksmithing, as well as in other trades, for a number of years. We have meutioned ouly a few of the efforts that are beiug made toward affording the youth of the land an opportunity to acquire an industrial education. Some of those institutions we have not mentioned are quite as conspicuous as those we have named. Seed has been sown upon good ground, and it promises an abundant crop.

What is known as the Chautauqua system of home study has become very popular in mauy directions during the past few ycars. It has remained for the National Association of Carriage Builders, however, to apply it to industrial education. For some years past the carriage builders, through a committee appointed by the National Association, have maintained a class in carriage drafting and construction in connection with a technical school in this city, and its success has been almost phenomenal. At a receut meeting of the association it was determined, in order to enlarge its sphere of usefulness, that the committee in charge of this class should arrange for giving instruction upon what is commonly known as the Chautauqua plan. By this means classes will be organized in various parts of the country, and their instruction will be carried on by correspondence upon a regular system. Lesson papers, with directions and schemes for elementary drawing, are to be sent out, and after these are returned they will be sent back with further instructions from the teachers. One of the gentlemen of the committee is reported as saying: "We are now ready to teach any apprentice or artisan in the land all the mysteries of mechanical drawing relating to the carriage trade." This departure in technical education is a novel one, but the very satisfactory results attendant upon the Chautauqua system in other directions warrant the expectation that it will be entirely successful. We commend it to the attention of all who are interested in the practical education of youth as a principle applicable in various directions.

It has occurred to a gentleman resident in Georgetown, West Indies, that a possibly valuable source of energy is allowed to run to waste in the tropics in the shape of the water which pours off the roofs of the houses whenever there is a shower. The gentleman in question, in a lecture delivered recently before a local society, said that, "having been frequently struck by the great volume of water discharged from roofs during heavy tropical rains, it occurred to me that the power so wasted might be utilized in some way by converting it into electricity by the following means: The water from each roof might be conducted into one main down-pipe, in which would work a small turbine wheel driving a dynamo-electric machine, the electricity so developed by every passing shower to be stored in accumulators of the type of Faure's secondary batteries. These, as they became charged in variable time, depending on the rainfall, could be collected and stored at central depots from whence the power could afterward be distributed uniformly, either by electro-dynamic engines or utilized for purposes of electric lighting."

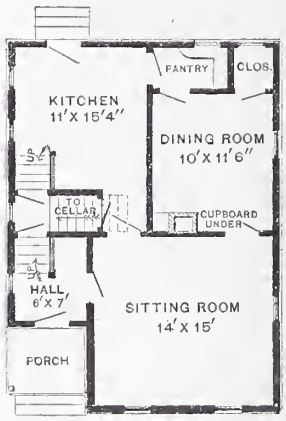


Cheap Frame Houses, Thirteenth Competition.—Mr. Bishop's Design.—Front Elevation.—Scale, ⅛ Inch to the Foot.

Side Elevation (Left).—Scale, ⅛ Inch to the Foot.

Cheap Frame Houses.

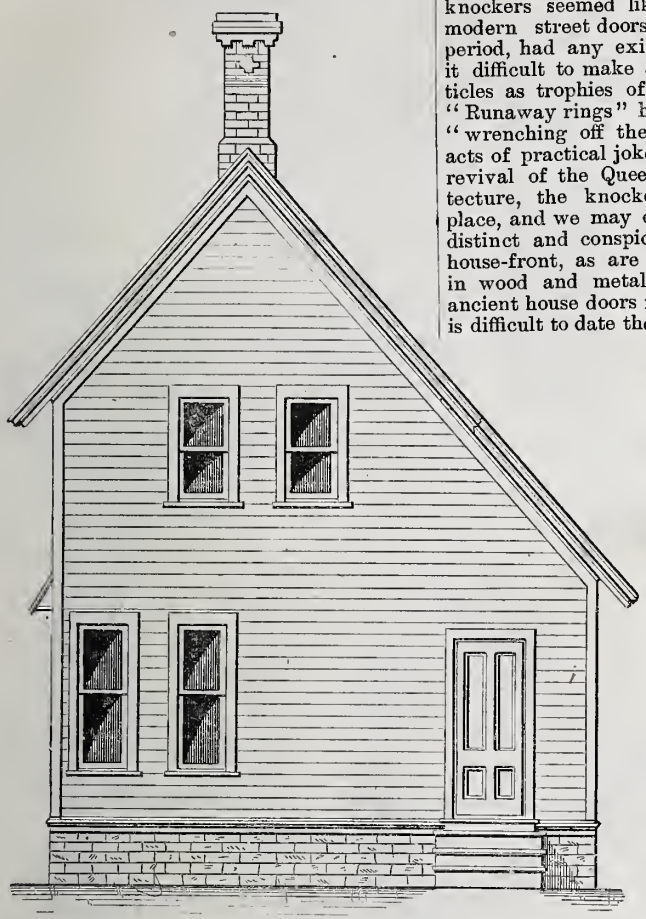
We present herewith the elevations and details of the design submitted in our Thirteenth Competition by Mr. S. A. Bishop, Smethport, Pa., and which received one of the three even prizes awarded in the contest. The perspective view of this house will be found on page 47 of our issue for last month, and particulars with respect to the result of this competition are in the same connection. In the brief description of this study submitted by the author we find the



First Floor Plan—Scale, $\frac{1}{16}$ Inch to the Foot.

following particulars: The leading feature of the floor plans is compactness, a special effort having been made to use all the room to advantage. The stairs lead from the front hall, while there is also a connection with the kitchen. The dining-room is located so as to be converted into a sleeping-room in case such an arrangement should be preferred. One chimney is made to accommodate all the rooms. The chambers are of fair size, with abundant closet room. The arrangement of the lower floor is such that an addition at the rear could be easily made if required. Simplicity of detail and general convenience have been the points striven for by this author. The cellar is calculated

under the dining-room and kitchen only. The chimney has been planned to start 2 feet below the ceiling of the dining-room. The



Cheap Frame Houses.—Rear Elevation.—Scale, ⅛ Inch to the Foot.

following is the "Bill of Materials" that has been submitted with this design, from which it will be seen that sheeting was contemplated in addition to the siding:

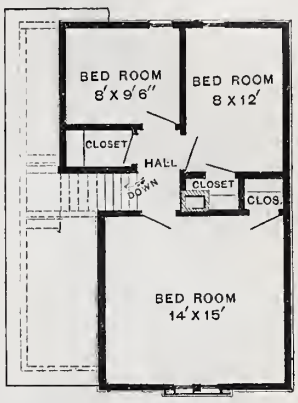
64 cubic yds. of Excavation.
36 perches Cellar and Foundation Walls.
875 Brick in Chimney.
5600 ft. Framing Timber.
1400 ft. Sheeting.
150 lineal ft. Cornice.
1500 ft. Siding.
8600 Shingles.
1100 ft. Roof Boarding.
1400 ft. Flooring.
325 lineal ft. Inside Base.
106 lineal ft. Water Table.
10 lineal ft. Belt Course.
One 4-Light 18 x 30 in. Mullion Window Frame, Sash and Glass Complete.
Five 2-Light 16 x 32 in. Plain Window Frames, Sash and Glass Complete.
Two 2-Light 20 x 24 in. Plain Window Frames, Sash and Glass Complete.
One 2-Light 24 x 32 in. Plain Window Frame, Sash and Glass Complete.
One 1-Light 16 x 32 in. Plain Window Frame, Sash and Glass Complete.
Four 2-Light 24 x 32 in. Hood Window Frames, Sash and Glass Complete.
Three 1-Light 16 x 16 in. Cellar Window Frames, Sash and Glass Complete.
1 Front Door 2 ft. 10 in. x 7 ft. 10 in. x 1¾ in. thick, Frame and Casing Complete.
1 Rear Door 2 ft. 8 in x 7 ft. 6 in. x 1¾ in. thick, Frame and Casing Complete.
5 Inside Doors 2 ft. 8 in. x 7 ft. x 1⅜ in. thick, Frame and Casing Complete.
1 Inside Door 2 ft. 4 in. x 7 ft. x 1⅜ in. thick, Frame and Casing Complete.
1 Inside Door 2 ft. 6 in. x 6 ft. 8 in. x 1⅜ in. thick, Frame and Casing Complete.
4 Inside Doors 2 ft. 6 in. x 6 ft. 8 in. x 1¼ in thick, Frame and Casing Complete.
2 Inside Doors 2 ft. 4 in. x 6 ft. 8 in. x 1¼ in. thick, Frame and Casing Complete.
2 Inside Doors 2 ft. 8 in. x 6 ft. 8 in. x 1⅜ in. thick, Frame and Casing Complete.
360 yds. Plaster and Lathing.
159 yds. Outside Painting.
114 yds. Inside Painting.
1 Stairs, from Hall.
1 Stairs, from Kitchen.
1 Stairs, Box.
1 Stairs, to Cellar.
1 Porch, Columns and Finish.
1 Rear Steps.

William Peoples, of Allegheny City, Pa., writes us that the prospect of a good season's work in the building business around that locality at the present time is considered very favorable.

Door-Knockers and Bells.

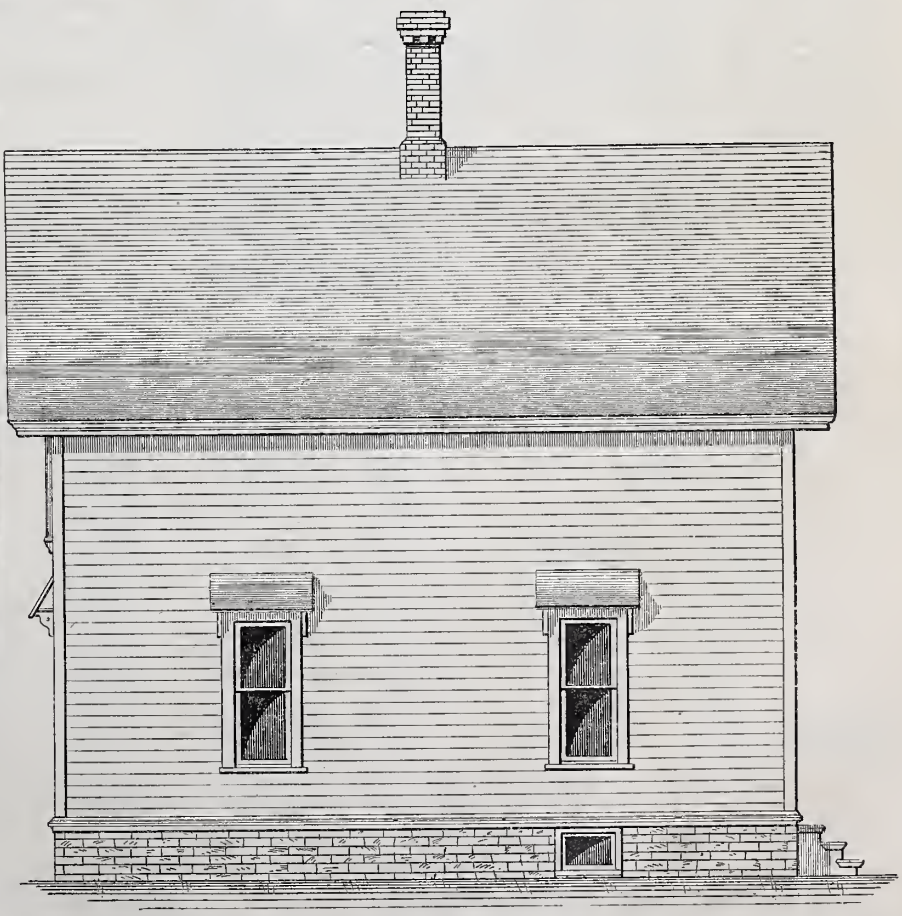
Some years ago, says an English exchange, knockers seemed likely to disappear from modern street doors. "Mohawks" of that period, had any existed, would have found it difficult to make a collection of these articles as trophies of their noctural frolics. "Runaway rings" had to take the place of "wrenching off the door-knocker" as the acts of practical jokers. But in the present revival of the Queen Anne style of architecture, the knocker is again taking its place, and we may one day see it become a distinct and conspicuous ornament of the house-front, as are the beautiful knockers in wood and metal that we still see on ancient house doors in Continental cities. It is difficult to date the precise introduction of knockers, but they certainly are a far more ancient institution than door-bells. What may be called their descriptive use, the mode of manipulating them which denotes the rank or business of the person touching them, has been in vogue for near two centuries at the least. The thundering knock, still dear to London footmen, is alluded to by early eighteenth century writers. Gay, in "Trivia; the Art of Walking the Streets" speaks of the "knocker wrapt in flannel band," to deaden its noise in case of sickness. In France it was the etiquette to knock low, or merely to scratch, at the door of superiors. A knocker has this advantage over a bell—that it describes as well as announces a visitor. He needs a finely trained ear to discriminate between the sounds of "up-stairs and down-stairs" door-bells. But the sharp "rat-tat" of the postman, the double knock of the visitor, the single rap of the "rates" or the "taxes," are readily distinguishable by the meanest intelligence. Persons with quick ears may learn a good deal about their neighbors by listening to the language of their knockers.

Door-bells are less interesting. They were probably originally introduced for the advantage of trade. A good knocker will last as long as the door, and is not liable to get out of repair, but house-bells are sources of



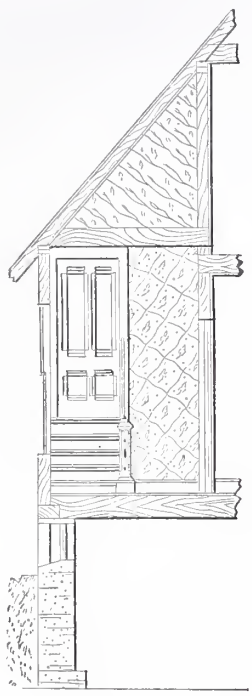
Second Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

income to the bell-hangers. The fierce tugs of tradesmen's boys constantly break the wires, and as these are usually carried about the house in mysterious fashion, under floors and up walls, only professional aid can repair them. For other purposes, however, bells are perhaps among the most ancient of devices for producing noise for practical purposes. They have been used as ornaments, as charms, as prizes. In the time of James I a silver bell was the prize for horse races—whence came the expression, "bear the bell." Silver bells were anciently worn as decorations. The marvelous properties once ascribed to church bells are too well known to need recapitulation. Croyland Abbey is said to have boasted the first tuneable set of bells in England. There is a legend that one of the bells in the cathedral of Saragossa tolls spontaneously before the death of a King of Spain. "Bell" played as



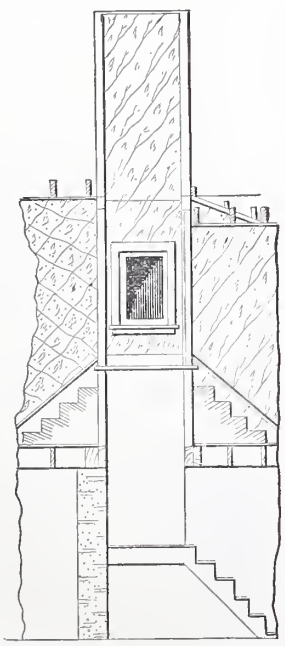
Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

important a part in church ceremonies as "book and candle." Horace Walpole reckoned among the chief gems of his collection a silver bell, exquisitely wrought with figures of insects, and executed by Cellini. It has been used by the Pope when cursing caterpillars and other noxious insects which



Cheap Frame Houses.—Section Through Hall. —Scale, ⅛ Inch to the Foot.

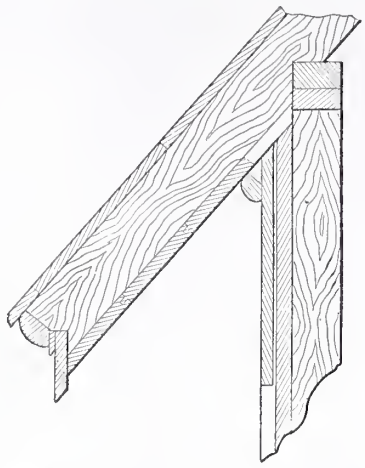
infested the fields. Southey has versified the legend of the Inchcape Bell. Off the Cornish coast also, near Boscastle, a whole peal of bells are said to be buried in the sea, and their chime is supposed to be occasionally audible. These bells were being brought to shore by a captain, who, when the pilot expressed his thankfulness at their safe voyage, reported that no thanks were due save to his good vessel. Whereupon the captain straightway sank with vessel, crew and bells, only the pious pilot being rescued from the general wreck. And the bells are said to ring still at times under the water.



Section Through Stairs.—Scale, ⅛ Inch to the Foot.

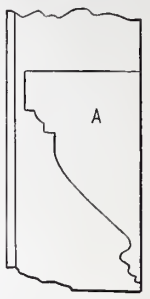
Bells have long been beloved of poets. Four centuries before Schiller wrote his "Song of the Bell," a bell had suggested to a royal minstrel the composition of a poem. In the "King's Quhair," James I, of Scotland, tells us that, in writing it, he followed the fancied advice of the bell he heard "ringing to matins:"

"Aye, methought, said the bell,
Tell me, man, what thee befell.
And forth withal my pen in hand I took,
And made a cross, and so began my book."



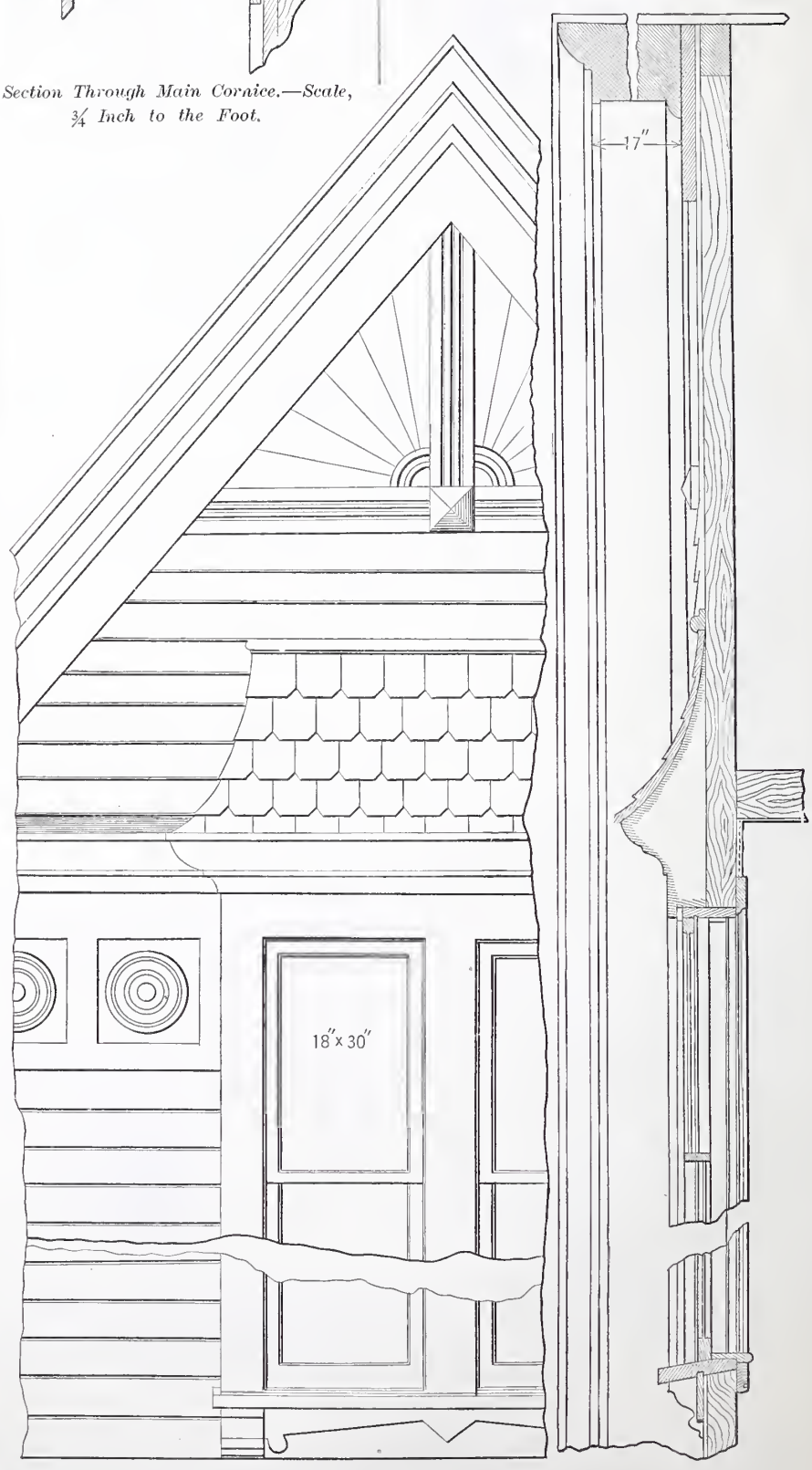
Section Through Main Cornice.—Scale, ¾ Inch to the Foot.

Every one knows the old French story (familiar in English in many prose and poetical versions) of the unlucky lady who followed the supposed advice of the church bells. "*Prends ton valet, prends ton valet,*" and decided on marrying her footman, afterward to discover that she had made a dire mistake, and that the bells had distinctly cried, "*Ne le prends pas, ne le prends pas.*" "As the bell tinks, so the fool thinks," runs an old proverb.



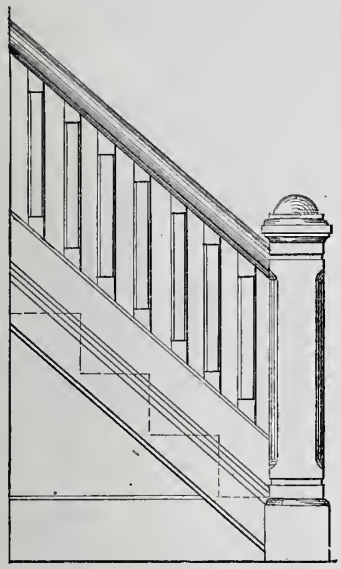
Side View of Bracket A in Porch.

A parish in Perthshire formerly boasted an ancient bell of great repute in curing mental disease if placed on the head of the sufferer. It was also believed to have the property of extricating itself from the hands



Details of Front Gable.—Scale, ½ Inch to the Foot.

of thieves. It was latterly locked up by the parish authorities to prevent its being used for superstitious purposes. England was formerly called the "ringing island," from the multiplicity of its sets of chimes; but the Continent has now far eclipsed its reputation in this respect. Many descriptions of bells are now obsolete. The dustman's and the footman's bells are things of the past, and the crier's bell is only heard in remote places. One terrible bell is also silenced—that sound once heard in the London streets two centuries ago, when the conductors of



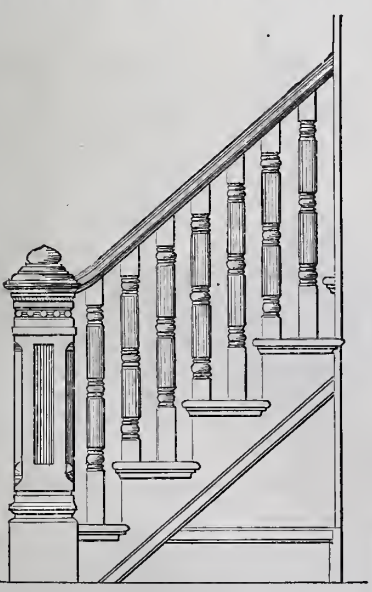
Cheap Frame Houses.—Back Stairs.—Scale, ½ Inch to the Foot.

the plague carts rang a bell as they cried, "Bring out your dead." Happily, our present bells are put to less awful uses.

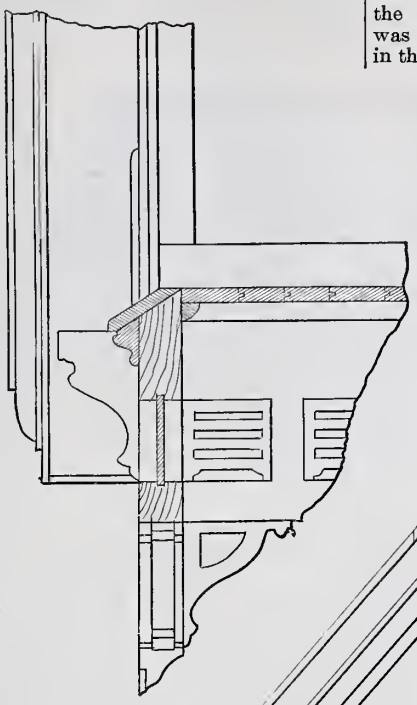
Chimneys.

A writer in Harper's *Young People* gossips pleasantly about chimneys, as follows:

Chimneys seem so natural to us that we forget that there was a time when they were unknown. They were invented about the same time with clocks and watches. No house in ancient Rome or Athens had them. The Greeks and Romans heated their rooms with hot coals in a dish, or by flues underneath the floor. The smoke passed out by the doors and windows. You could always tell when a Roman was about to give a dinner party by the clouds of smoke that came out of the kitchen windows. It must have been very unpleasant for the cooks, who had to do their work in the midst of it. The tall chimneys that rise over the tops of the houses in New York and Brooklyn, pouring out their clouds of smoke, would have seemed miracles to our ancestors a few centuries ago. Even the pipe of a steamer or the chimney of a kerosene lamp they would have thought wonderful. In England, in the time of the Conqueror (1066), the fire was built on a clay floor or in a hole or pit in the largest room of the house. The smoke



Front Stairs.—Scale, ½ Inch to the Foot.

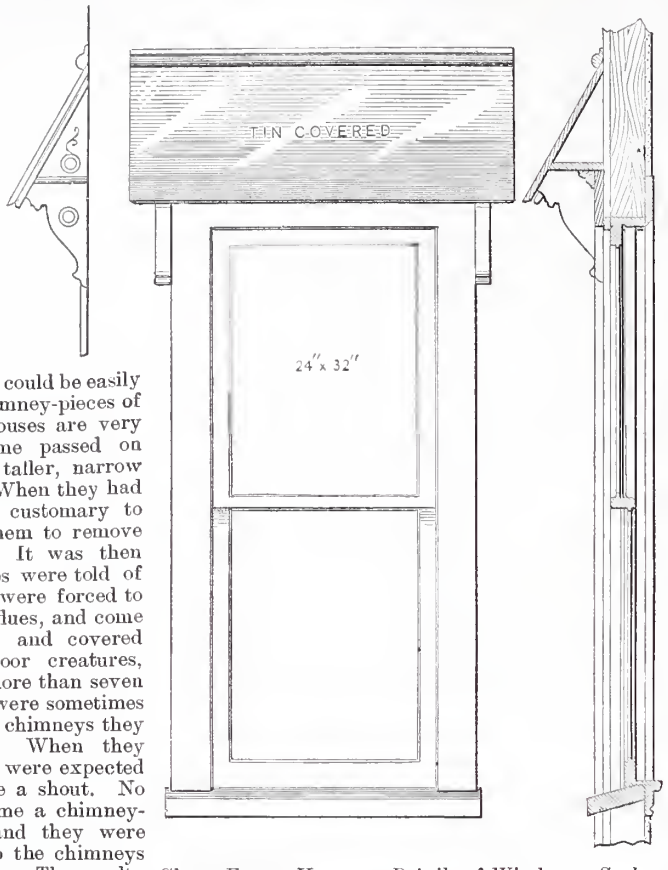


Vertical Section Porch Gable.

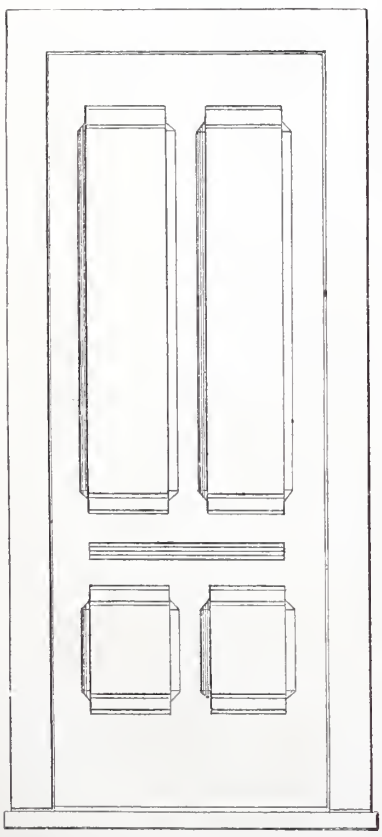
Details of Porch.—Scale, ½ Inch to the Foot.

passed through an opening in the roof. At night a cover was placed over the coals. Everybody was by law obliged to cover up his fire when the bell rang at a certain hour. In French this was *couvrefeu*, and hence the word "curfew" bell.

Chimneys began to be used generally in England in the beginning of the reign of Elizabeth. No one knows who invented them, or when they first came into use. We find them first in Italy. In Venice they seem to have been not uncommon as early as 1347. In 1368 they had long been in use at Padua. They were at first built very wide and large, so that they could be easily cleaned. The wide chimney-pieces of some of our older houses are very curious. But as time passed on chimneys were made taller, narrow and often crooked. When they had to be cleaned it was customary to send boys up into them to remove the soot and ashes. It was then that the saddest stories were told of the little sweeps who were forced to climb up the narrow flues, and come down torn, bleeding and covered with soot. These poor creatures, who were often not more than seven or eight years old, were sometimes suffocated in the foul chimneys they attempted to clean. When they reached the top they were expected to look out and give a shout. No boy would ever become a chimney-sweep from choice, and they were often driven to climb the chimneys by the fear of a whipping. The cruelty of master-sweeps was fearful. The little chimney-sweep has passed away. His place is taken by a patent broom and a colored operator. Chimneys are built 200 and 300 feet high. In Birmingham, England, one fell down recently on a large factory, killing and wounding 30



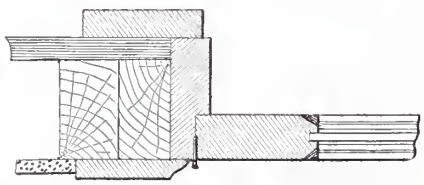
Cheap Frame Houses.—Details of Window.—Scale, ½ Inch to the Foot.



Front Door.—Scale, ½ Inch to the Foot.

or 40 workmen and others. The tallest chimney in New York is that of the Steam Heating Company.

The chimney is one of the most useful of inventions. We cannot well understand how the Greeks and Romans did without it But with us it is everywhere. Our lamps would never burn without the chimney; our steamboats and engines would be worthless without it; our factories are moved by it; it warms our houses, and gives employment to thousands of people. In the days before chimneys were invented men lived in clouds of smoke. The walls of the finest palaces in ancient Rome were soon covered with soot and

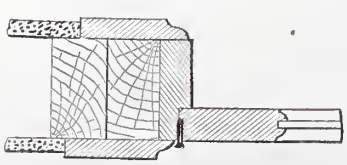


Section Through Front Door.—Scale, 1½ Inches to the Foot.

filth. It was impossible to keep them clean. The mosaics and the paintings on the walls soon became discolored. In the castles of England and France it was still worse. Here the huge fire blazed in the center of the great hall. The smoke covered the roof with black drapery, and the savage knights and squires were forced to endure the cold or to live and breathe in an air that was dangerous to sight, health and life itself.

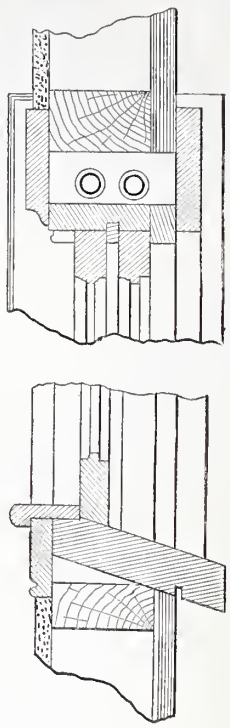
Imitation Stained Glass.

Among the many uses of the printing-press, says an exchange, none is more novel than the production of imitation stained glass. Designs for any pattern desired are engraved on wood. The blocks of wood are



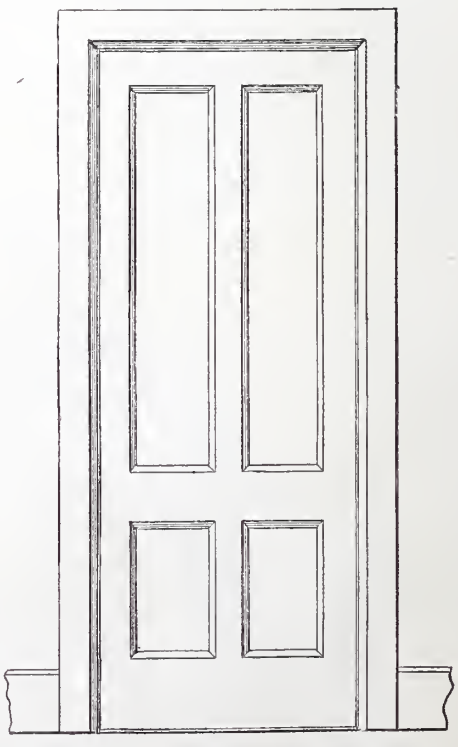
Section Through Inside Doors.—Scale, 1½ Inches to the Foot.

placed on an old-fashioned hand-press, and then are inked with oil colors compounded with special reference to the use for which they are intended. Then a sheet of very thin hand-made porous paper is laid on, and a prolonged impression given, in order that



Sections Through Window.—Scale, 1½ Inches to the Foot.

the color may thoroughly permeate the paper. Each color is, of course, printed at a separate impression. Having completed the printing process, the different pieces of paper which compose the design are soaked in warm water half an hour, taken out, the water sponged off, and then coated on one side with a thin cement. A similar coat of cement is given the glass to which the paper is to be applied, and then the paper is laid on in place, and varnished over. The plain glass window becomes at once, to all appearances, a window of stained glass. The effects of the lead lines, the irregular pieces



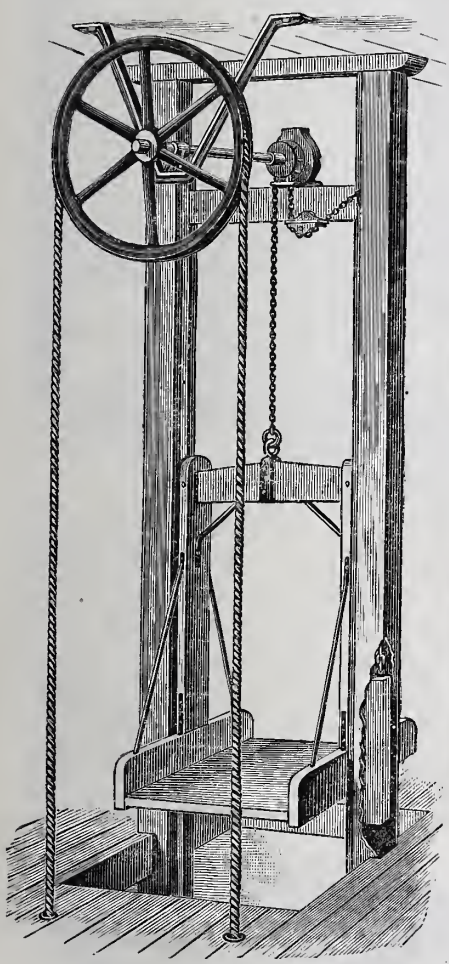
Inside Doors.—Scale, ½ Inch to the Foot.

of colored glass, the heads of saints and soldiers, the antique or the modern Japanese designs, are all to be had as brilliant in color as any imitation can be expected to be of the genuine glass. The glass thus prepared costs about one-tenth as much as genuine stained glass, and can, when it requires it, be washed without fear of injuring the surface.

NOVELTIES.

New Automatic Hoist.

Figs. 1, 2, 3 show in different forms the Wythe automatic hoist that is heing introduced hy John Q. Maynard, No. 12 Cortlandt street, New York. The first view shows the hoist in use as a dumb-waiter. The second shows the parts of which it is composed, and illustrates how it operates. The small engraving shows a side view. Besides heing used in dumh-waiters, the device is equally applicable in the construction of light hand elevators and as a portahle hoist. The special advantages claimed for this hoist are rapidity and the fact that it will hold its load at any point without a ratchet, brake or other auxiliary device of uncertain nature.



Novelties.—Fig. 1.—Light Hand Elevator, with the Wythe Automatic Safety Hoist.

Our readers will understand the operation of this hoist from the following description of the parts of which it is composed and statement of their functions:

Fig. 3 is a detailed view of the different parts shown in line and placed in the order they are put together. A is the shaft; B, outer-bearing for shaft; C, hand-rope wheel; D, set collar; E, cover and guide; F, sprocket-wheel for the lifting chain; G, lifting and trip arm, with sleeve securely pinned to shaft; H, outer eccentric ring, with slotted jaws for the insertion of suitable lugs on the side of the sprocket-wheel; I, pressure disk; K, inner or small eccentric; L, guide disk; M, case or frame; N, set collar for retaining the parts in their proper place when so adjusted. When the parts are put together there is no possibility of their becoming displaced. There is little or no wear on the inclosed parts, and the principal strain is on the outer case or frame. The reason why this simple mechanism holds its load automatically in lowering without check-rope, clamp or brake is that, when the shaft A is revolved hy the hand-wheel C, the sleeve and trip-arm G engage with the lugs in the case of the outer eccentric ring H, revolving the same and carrying therewith the lifting chain-wheel which is attached to it hy projecting lugs on the side. The arm G is also provided with a projection which revolves the small eccentric ring K around the hub of the case, and is so arranged that the whole will travel around the common center or axis simultaneously. The circular pressure disk I is prevented from revolving by the guide disk L, which imparts a circular movement to the pressure plate. The load is raised by the chain-wheel, which receives its power from the shaft through the outer eccentric and trip arm, but when the power ceases the load is prevented from running back hy the thicker part of the eccentric wedging in hetween the outer case and the pressure ring. The position of the wedge opening is controlled hy the small eccentric. For lowering the load the small eccentric is revolved in the opposite direction hy pulling on the hand rope, therehy moving the pressure disk in such direction as to open the space for the larger eccentric to move into, which movement will continue as long as the small eccentric is revolved.

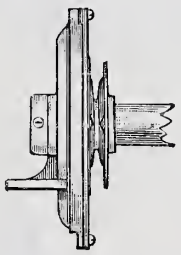


Fig. 2.—Side View of Hoist.

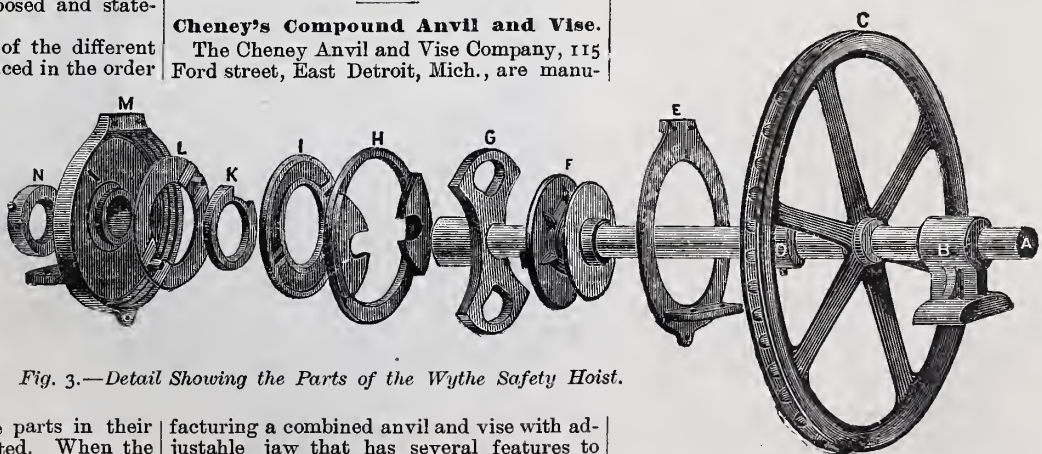


Fig. 3.—Detail Showing the Parts of the Wythe Safety Hoist.

Cheney's Compound Anvil and Vise.

The Cheney Anvil and Vise Company, 115 Ford street, East Detroit, Mich., are manufacturing a combined anvil and vise with adjustahle jaw that has several features to commend it for general use. The face of the anvil is chill-hardened and the jaws are steel-faced, thus adapting it for such rough use as occurs in repair shops, about farms and in various other places where a very fine tool is not required. A horn is presented on the end of the anvil which is used for various purposes, while a cutting edge is inserted at the hack part of the plane surface, making it useful in various work of the character of amateur blacksmithing. This tool was de-

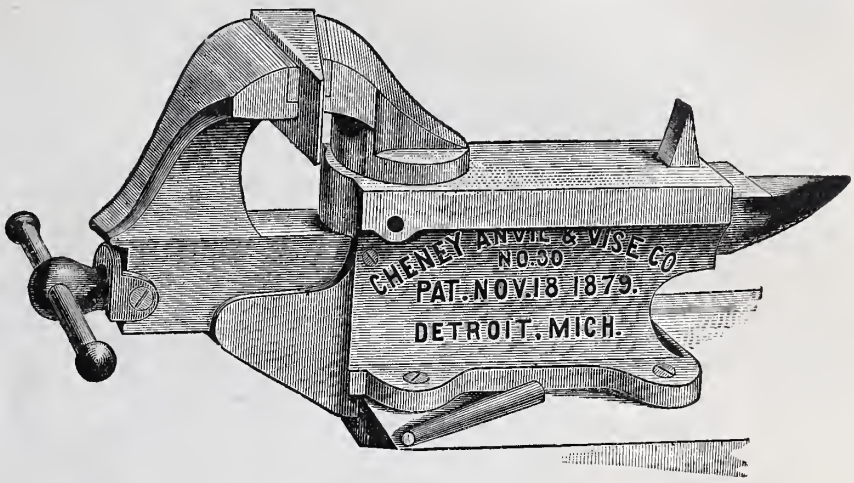


Fig. 4.—Swivel Jaw Vise, Made by the Cheney Anvil and Vise Co., Detroit, Mich.

vised to supply the want for a good but moderate-priced anvil and vise combined. It has heen improved from time to time since it was first put upon the market, its strength increased and the castings made smoother, until it is now offered hy the manufacturers with the conviction that it meets the requirements. A ledge has heen added to the front of the vise, coming against the face of the hench in such a way as to relieve strain upon the fastening screws.

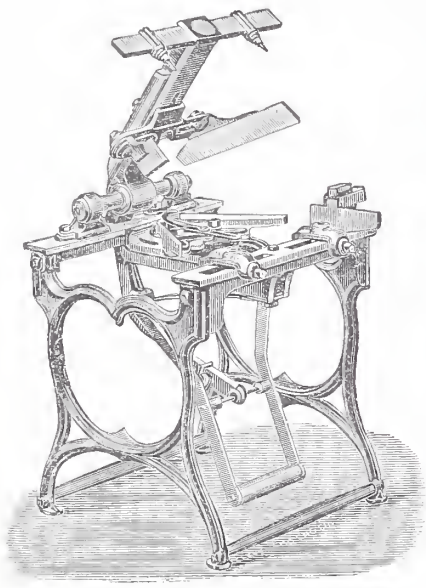
Sawdust Plastering.

John A. McConnell, of 119 Water street, Pittshurgh, is calling the attention of huilders to sawdust house plastering. The distinguishing feature of this invention is the use of sawdust instead of sand with the lime in preparing the mortar for house plastering. Among the advantages claimed for this material in the inventor's circular we notice the following: Sawdust plastering is warmer than sand plastering, for the reason that it is somewhat porous and full of small air spaces. The fire in a room will warm the inner surface of the walls composed of it, while in the case of sand plastering the face of the wall is always cold. Accordingly, it is argued that less heat would be consumed in the room than by the use of common plaster. The fact that the material is porous also makes it a non-conductor of heat and a non-conductor of sound and dampness. The further statement is made that sawdust is lighter than sand, and that it does not run out at breaks or holes made in the plaster, as in the case of sand. A glutinous substance is employed in the manufacture of this material, which glues the particles of sawdust firmly to the wall, thus preventing the dust falling off. In respect to finish, the statement is made that this is done in the same ways as with other plaster. Among the other advantages alluded to in the circular before us is its porousness and air spaces as helps toward

overcoming the echo in churches and halls. These statements are certainly of interest, and, if correct, the material will undoubtedly find ready use. We shall be glad to hear from any of our readers who have given it a practical test, in order to learn definitely of its merits.

Slate-Dressing Machine.

We took occasion some months since to describe briefly a manual devoted to the slate-roofing business, issued by Messrs. Auld & Conger, of Cleveland, Ohio, and at that time alluded to the slate-dressing machine which was advertised in the book as being of great interest to roofers generally. We now have the pleasure of submitting an engraving of the machine, from which our readers can gain a better idea of its scope and usefulness. The manufacturers offer it confidently as doing the work of from 5 to 20 men, and of performing it much better than is possible by hand. The knives are so arranged as to be adjustable to any size or



Novelties.—Fig. 5.—Auld & Conger's Slate-Dressing Machine

shape. The machine cuts and punches at the same operation, countersinks the hole and cuts round or straight, as may be required, and all without spoiling the slate. The punches make holes looking very much as though they had been drilled and countersunk. There is no scaling off of the kind that is frequently seen where slate are punched by hand, and which greatly weakens the slate, often causing the nail heads to pull through, thus displacing the slate. An advantage to which the manufacturers draw attention is that this machine punches the slate to a gauge, which, in the case of lath or iron frame roofing, is indispensable. An intelligent boy with experience necessary to properly select the slate can easily punch and cut the most difficult patterns, producing

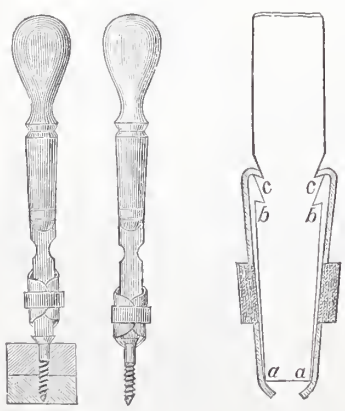


Fig. 6.—Novel Screw-Driver Attachment.

far more work in a day than the most skillful slater can cut by hand in the old way. A special feature of this machine is that it brings the different patterns to which slate are cut upon a common basis. For example, in cutting slate by hand those patterns which are the most difficult to cut, such as convex and concave points, necessarily command the highest price. By the use of this machine, on the other hand, one pattern is cut as easily as another, and, therefore, a larger profit is made upon the use of such as command a high price in the market, or else the slater can give his customers the advantage. The weight of the machine is about 140 pounds; it is made of iron and steel, and is very strong and durable. At the price at which the machine is sold, the statement is made that it will pay for itself in cutting 100 squares of any circular pattern. The machine is patented, and is sold including the right to use in specified territory.

Novel Screw-Driver Attachment.

Fig. 6 of our engravings shows an attachment for screw-drivers that is at present being introduced to the trade by C. W. Drake, of No. 81 Wood street, Pittsburgh, Pa. It is a device by which the screw is held to the bit of the driver either in screwing or unscrewing, thus preventing the annoyance of slipping, which frequently occurs in using this indispensable tool in the ordinary way. The attachment consists of two pieces of metal so bent as to go around the screw-driver, as shown in the full-size section at the right. They slip by each other on the face of the blade, and are held together by an elastic band passed around them. The only change that is necessary in the bit of the screw-driver to adapt it to receiving this attachment is to file slight nicks in the blade, as shown in the cut. Here, however, they are greatly exaggerated, their actual depth being less than half of that indicated in the cut. Two sets of nicks are necessary, one to adapt the attachment for ordinary screws, and the other for round-headed screws. A special advantage which this little attachment possesses is that it may be easily slipped out of the way on the blade of the screw-driver, as shown in the view to the left, when it is not wanted, as, for example, when the screw is almost driven home. It may be slipped up on the blade of the screw-driver in this manner, and thus be kept ready for use whenever required The device is very simple in its parts, occupies little or no room when not in use, and serves to hold the bit against the head of the screw in a manner to make it very useful to all who have much work to do. We understand that it is being sold through the hardware trade generally, or sent by mail by the manufacturers.

The Diamond Sash Ventilator.

A decided novelty in the way of a sash ventilator is presented in Fig. 7 of the engravings, and is manufactured by the Diamond Ventilator Company, 130 Dearborn street, Chicago. In the form shown in the cut, and that in which our readers will be most particularly interested, it is applied to a window sash. The same features, however, are embodied in ventilators adapted for use in passenger, sleeping and refrigerator cars, and for various other purposes. The term "Diamond," used in describing this device, is derived from the shape of the openings through which the air is discharged into the room. The device consists essentially of two cylinders threaded and working together, as shown in the engraving. The outer end, which would be that to the right in our cut, is provided with a wire screen covering the opening, and through this the exterior air is drawn toward the room to be ventilated. The amount of opening on the inside is controlled by the handle of the ventilator and the screw already alluded to. As shown in the engraving, it is in the position of about one-half

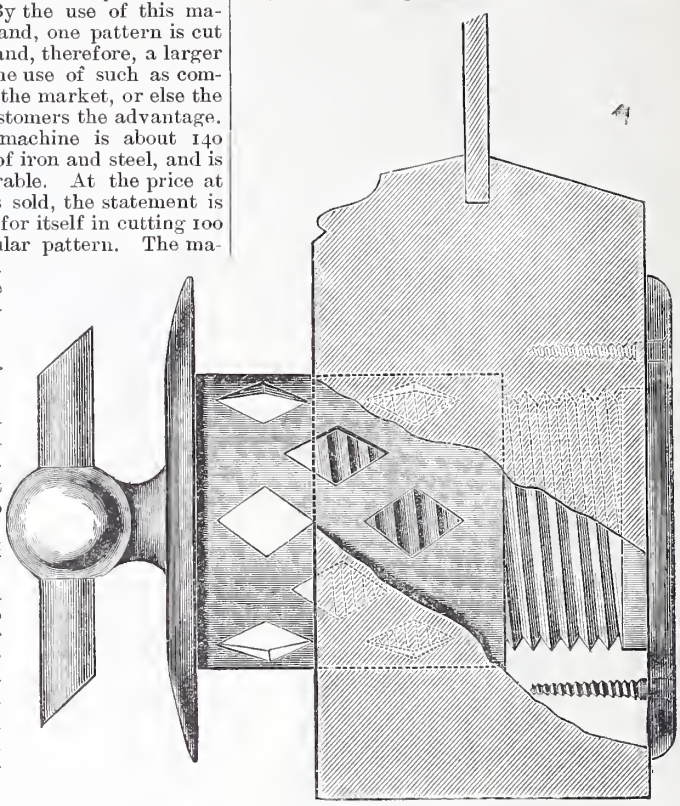


Fig. 7.—The Diamond Sash Ventilator.

capacity. By revolving the handle to the left the opening would be increased, while, on the other hand, by turning it to the right it would be shut. Our readers will perceive the advantage of a device of this kind, since it is easily applied in many places where otherwise no ventilation could be obtained. A number of these inserted in the window sash of a close office would supply the fresh air necessary to the comfort of the inmates, without subjecting any one to a draft or the danger of taking cold. An objection that might be raised is the smallness of the opening, and, consequently, the limited supply of fresh air to be obtained by it. By

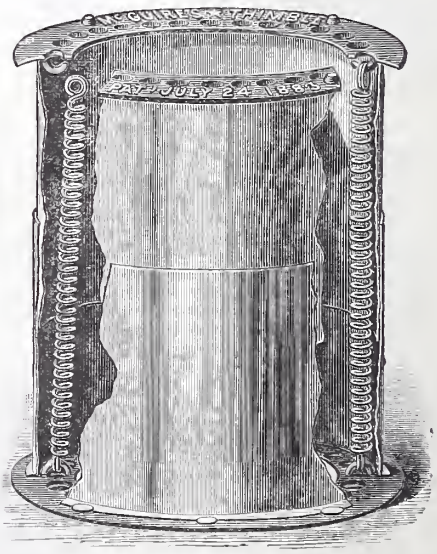


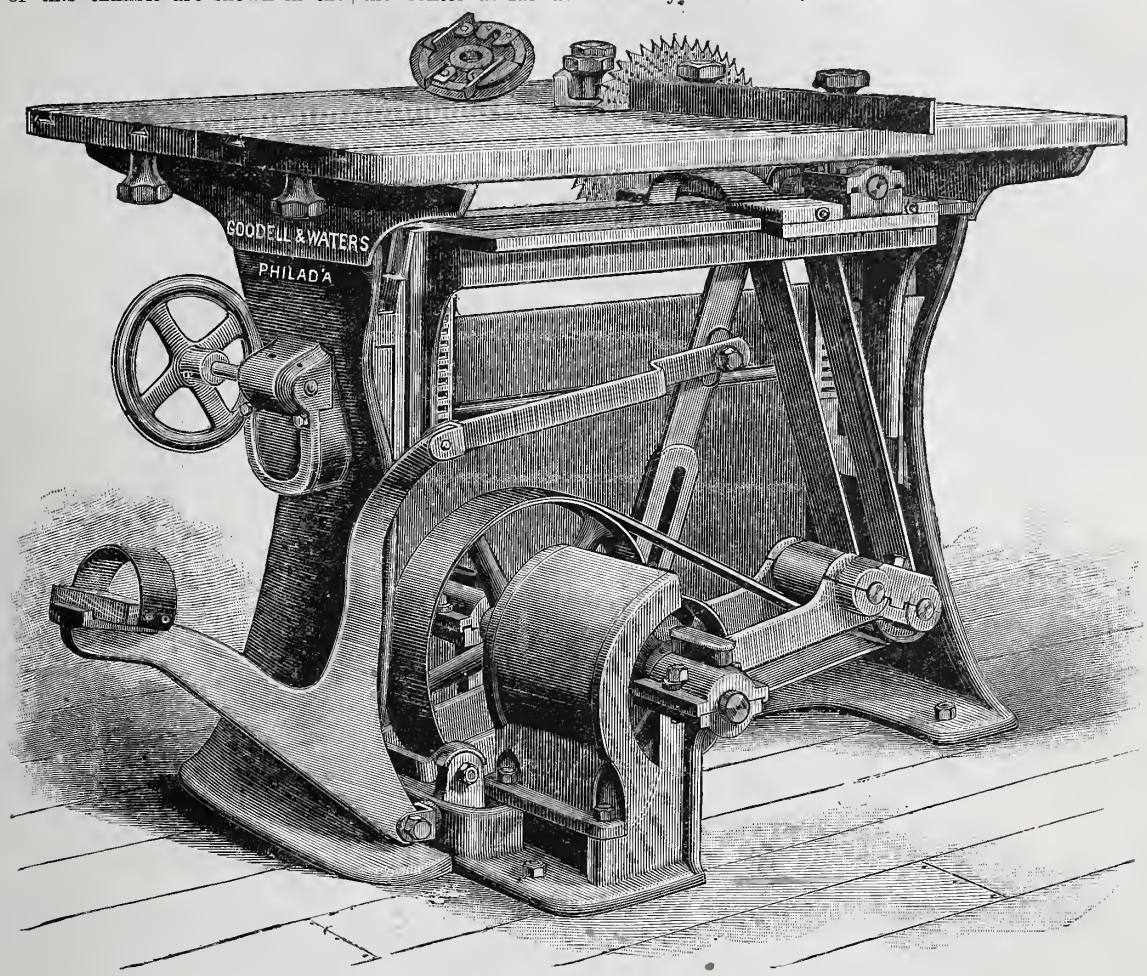
Fig. 8.—McGuire's Star Thimble.

using the larger sizes, and a number of them, this difficulty is in the main overcome. Several sizes are made, adapting the device to various uses.

Improved Thimble.

Messrs. Tryon & McGuire, of Syracuse, N. Y., are putting upon the market a thimble known as "McGuire's Star Thimble," a general view of which is afforded in

Fig. 8 of the illustrations. The peculiar features of this thimble are shown in the engraving, and consist of the means by which the cylinder heads are fastened together and made adjustable. For this purpose spiral springs are employed which are made with an eye instead of a hook, and are so arranged that they cannot straighten out. The cylinders constituting the thimble are fastened to the heads by copper rivets, which give strength to the body and also prevent the hubs being turned off from the cylinders. From this construction it will be evident that the thimbles can be fitted to floors or walls of different thicknesses. Two sizes of each of the given diameters are manufactured; thus, the 5-inch is made to extend from 4 to 8 inches, and also from 6 to 12 inches. The 6-inch is made likewise in two varieties, as is also the 7-inch. The advantages of a device of this kind are so apparent that our readers will detect them without any extended description upon our part.



Novelties.—Fig. 9.—Traverse Cut-Off Saw Bench, Built by Goodell & Waters, Philadelphia.

Traverse Cut-Off Saw Bench.

Fig. 9 of our engravings shows a traverse cut-off saw bench built by Goodell & Waters, 3100 Chestnut st., Philadelphia. This machine, although specially designed for a cut-off saw, may be used advantageously for a variety of work, such as slitting, under-gaining, grooving and rebating. The mandrel is extended 3 inches from the solid collar to receive the expanding head or universal cutter-head. The table may be moved each way from the center as far as necessary to receive the cutter-head. The table used upon this machine is iron, planed and fitted with square and bevel cut-off and slitting guides. The mandrel is hung in a traverse frame gibbed to planed guides, which can be raised and lowered while the saw is in motion in order to suit the work. This is accomplished by a hand-wheel in front of the machine below the table. The counter and shipper are attached to the frame. The machine is provided with a foot-treadle for actuating the traverse frame. As large as 14-inch saws may be used. The traverse is 24 inches.

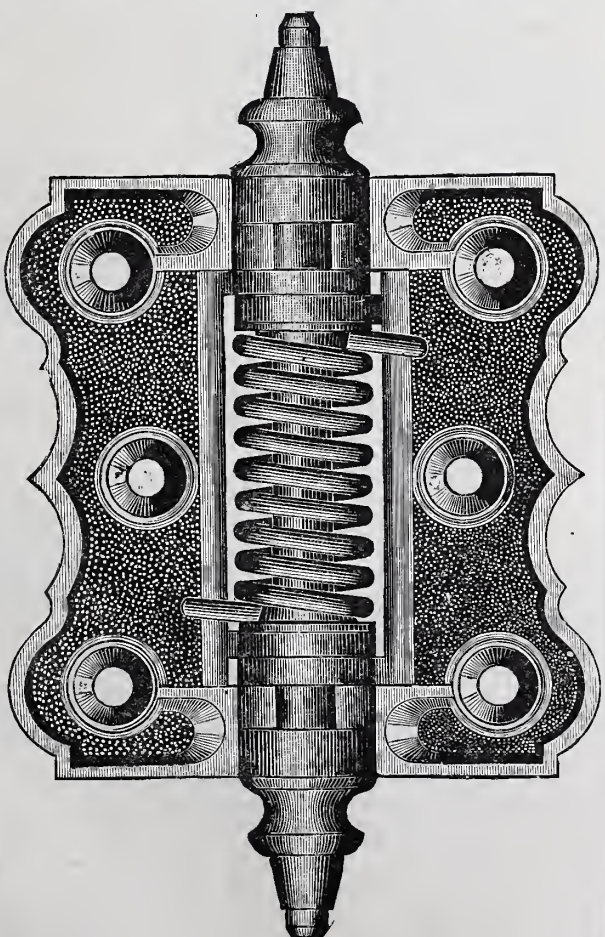


Fig. 10.—The Wiles Spring Hinge.

The Wiles Spring Hinge.

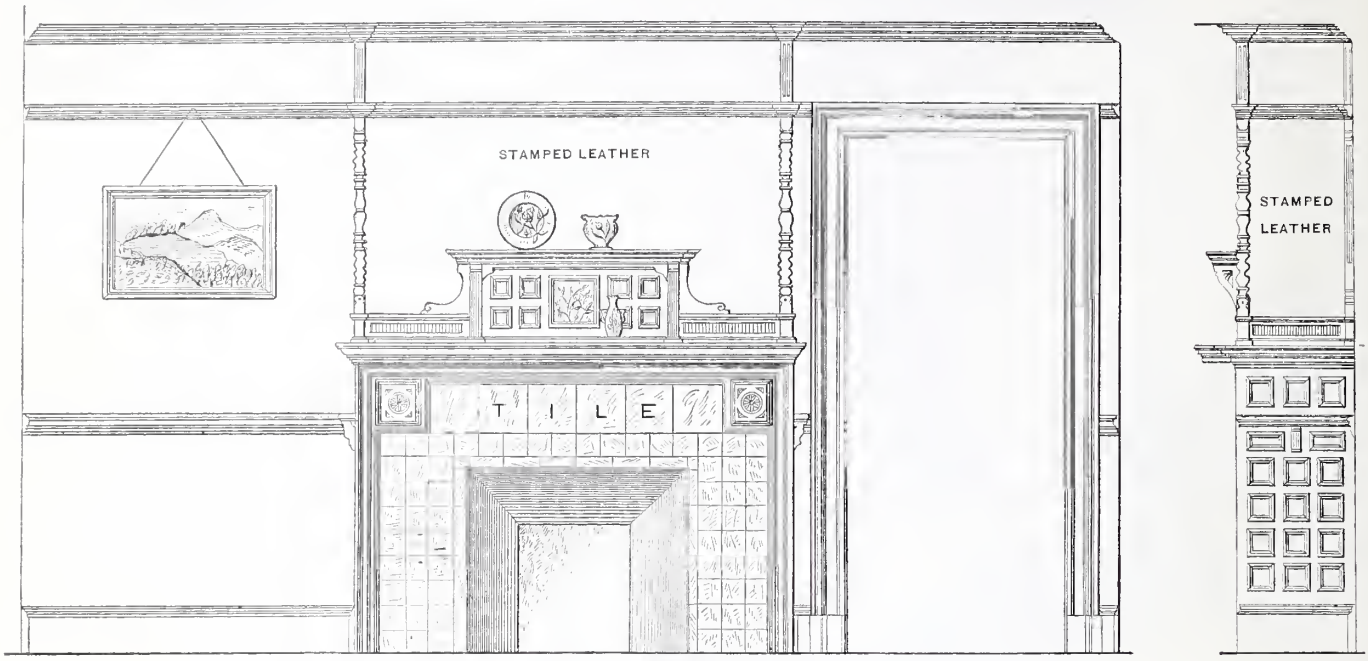
The spring hinge illustrated in Fig. 10 of the engravings does not differ materially at first sight from many other similar articles in the market with which our readers are generally familiar. The manufacturers, however—the Bartlett Hardware Company, of Freeport, Ill.—direct attention to features which indicate that it possesses far more than it would be judged to have on casual examination. They claim for it that it is the only spring hinge ever invented having its spring in the line of the pintle, and so constructed as to close the door until it is opened to a certain point, and when opened past that point to throw it open and hold it there. It is also a loose-pin hinge, permitting the instant removal of the door from the casing without turning a screw. It is also described as a spring hinge whose force is greatest when the door is closed, and whose force decreases gradually as the door is opened until it reaches the dead point, and increases as the door leaves the dead point and until it is wide open, where it holds it securely. The spring acts as a cushion or bumper when the door is fully open, and prevents it from striking the wall, and at the same time renders it impossible to break the hinge itself by any sudden jar as it is thrown back.

The question of the relative durability of roofs frequently arises, and copper is very generally admitted to be the most durable material now in the market for general purposes. Penurious Stephen Girard, of Philadelphia, in his time said that copper was also the cheapest, and it is held by some that the practical test to which it has been subjected on the Girard College buildings fully confirms their founder's judgment.

A Study in Suburban Architecture.

CHAMBER MANTELS.

We complete the illustrations of "A Study in Suburban Architecture" by presenting herewith the mantel in the second story hall and in the chamber over the library. Our subscribers now have the entire series before them, and if they take the trouble to review it, considering the study as a whole, we think they will agree with us that it is one of the most complete, both in descriptive matter and illustrations, that has ever been published in any architectural or building journal. This work has been done in the interest of builders and house owners, and we know, from numerous letters we have received, it has proved serviceable to a large number.

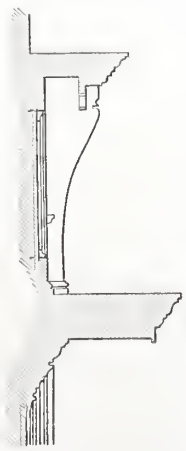


A Study in Suburban Architecture.—Elevation of Mantel in Hall, Second Story.—Scale, ⅜ Inch to the Foot.

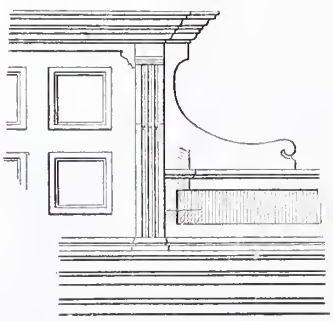
NEW PUBLICATIONS.

AMES'S COMPENDIUM OF PENMANSHIP.

We have received from Prof. Daniel T. Ames, of this city, the well-known author and publisher of works on penmanship, a copy of the new editon of his compendium of practical aud ornamental penmanship. The work contains upward of 20 entire alphabets, with numerous designs for engrossed resolutions, testimonials, certificates, title-pages and monograms, together with uumerous miscellaneous designs for the use of penmeu and artists. The book is a large quarto, and has some 70 full-page plates, besides letter-press, describing the art of practical writing. In the chapter last referred to many excellent directions are given, making the book invaluable to those who are interested in penmanship either as teachers or as clerks and accountants. The question of position is carefully considered, and the subject of forming letters is discussed in a way to be of the greatest service to all who desire to acquire a neat, rapid and practical handwriting. While this work is called a new edition, it is in reality a new work, since only 13 out of the 70 plates contained in it are reprints. A feature which distinguishes this work from many others of its kind is that the plates are *fac similes* of actual handwriting. They are either photo-engraved or photo-lithographed from penwork, and are not printed from mechanically-executed engravings, as is commonly the case. This renders the work much more attractive as well as more valuable than it would otherwise be. The pen-and-ink designs, except as regards size, are a perfect reflex of the penman's skill, unaided by that of the engraver. In addition to what may be considered pure and simple penman's work, a number of alphabets are given which are used in lettering architects' and engineers' drawings, also marking alphabets for the use of those who have superscriptions to put upon packages. A very handsome collection of monograms is presented, and a judicious selection of ornamental alphabets and initial letters. The specimens of engrossing which are shown are very fine, and may well serve as models for those who have work of this kind to execute. A very fiue portrait of the late Presideut Garfield appears in one specimen, while in the directions given in the early part of the book, with reference to the position at the table and as to holding the pen, a portrait of the author appears. Both of these are excellent examples of peuwork, and have been reproduced by the photo-engraving process.



Section.—Scale, 1 Inch to the Foot.



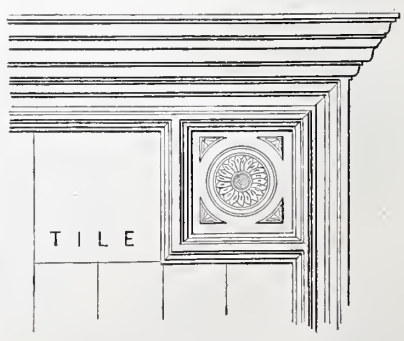
Work Above Mantel.—Scale, 1 Inch to the Foot.

A TREATISE ON CRANES. By Henry R. Towne Size, 5½ x 8½ inches; 191 pages; 83 illustrations.

While ostensibly devoted to the cranes designed and built by the Yale & Towne Manufacturing Compauy, and including the light hoisting machinery by the same makers, this work really covers so much of the ground relating to cranes and craue work that the restrictive clauses of the title page hardly need to be inserted. Almost every type of light hoisting machinery and crane is illustrated with beautifully-engraved cuts of machines and details. In regard to the latter part of the work, Mr. Towne says that it is in some measure a record of the process of reasoning and selection which resulted in the adoption of the forms and details employed in the Weston cranes, which the establishment build. Here they were untrammeled by previous positiou or bias as to the details of the work, and mouths of careful study were given to the consideration of the best forms. These, once selected, and decisious arrived at by a consideration of all known types, were subjected to the test of practice, and modifications and improvements introduced as experience was gained. It is in this review of the subject that one finds a vast amount of interesting and valuable matter, and the thanks of engineers are due to Mr. Towne for the frankness with which he has put these considerations of details on record. The engineer will put this work in his library with a feeling that it is a very valuable acquisition.

COTTAGE CONSTRUCTION FOR VILLAGE AND COUNTRY HOMES, TOGETHER WITH COMPLETE PLANS AND SPECIFICATIONS. By S. B. Reade. 134 pages, 5½ by 7½ inches; bound in cloth. Published by Orange Judd Co.

The character of this volume can be gained from the title, particularly when it is coupled with the statement that most of the plans presented were originally contributed to the *American Agriculturalist*. The author of this volume is well known to purchasers of moderate-priced architectural books by his volume entitled "House Plans for Everybody." The present volume in some respects may be considered supplementary to the former work. The illustrations consist of elevations and plans. The latter contain inside dimensions in lieu of scale. The descriptious refer to general features, for the most part, and are supplemented by brief bills of quantities, with prices. While the cost is presented in this manner for each of the designs, it is probable that the figures given are no more reliable in this case than in others, considering



Corner of Mantel.—Scale, 1 Inch to the Foot.

the different markets of the country and the constant fluctuations that are taking place, both in price of materials and labor. There is comparatively little about this book that would be interesting to architects and builders. The latter may get a few ideas from it, but they would be in want of better specifications and more complete drawings before they would be in the best shape for executing the work shown. As might be supposed from the source from which the book emanates, being a series of papers published in a journal devoted presumably to agriculture, its character fits it more particularly for the use of farmers and those who consider house plans in an amateurish sort of way. To the geueral reader who is thinking of building, and desires a book describing arrangements of rooms and the geueral appearance of houses, it is of value.

THE MODERN HOUSE CARPENTER'S COMPANION AND BUILDER'S GUIDE. By W. A. Sylvester. 210 pages, 5½ x 7½ inches, 45 plates. Published by Cupples, Upham & Co. Price, $2.

This is the third edition of a book which has been very favorably received by the building fraternity, and which has been known to many of our readers for some time past. It has been enlarged, and is now presented in a way to make it even more desirable than the second edition, which we noticed only a few months ago. The first part of the book is devoted to the consideration of mathematical problems and problems of construction, while the latter part considers the subject of estimating. Various rules useful for calculations of this kind are presented, together with tables of the utmost value in the same direction. Weights of materials, methods of using various materials, the slide rule, strength of materials and other matters of a similar character are considered. Following this is a chapter on mathematical rules, for the convenience of mechanics, in which such matters as are ordinarily learned by children at school are presented in such a way as to be of service to those whose early education has been neglected, and who in practical life find themselves brought face to face with calculations requiring more knowledge of mathematics than they have heretofore acquired. The last part in the book is a glossary of terms used in architecture and carpentry, and which is very complete considering the fact that no illustrations are employed. Plates 38 to 45, inclusive, are floor plans of houses.

HANDBOOK OF ELECTRIC TELEGRAPHY. By Thomas D. Lockwood. Size, 5¾ x 9 inches; 377 pages. Published by D. Van Nostrand. Price $2.50.

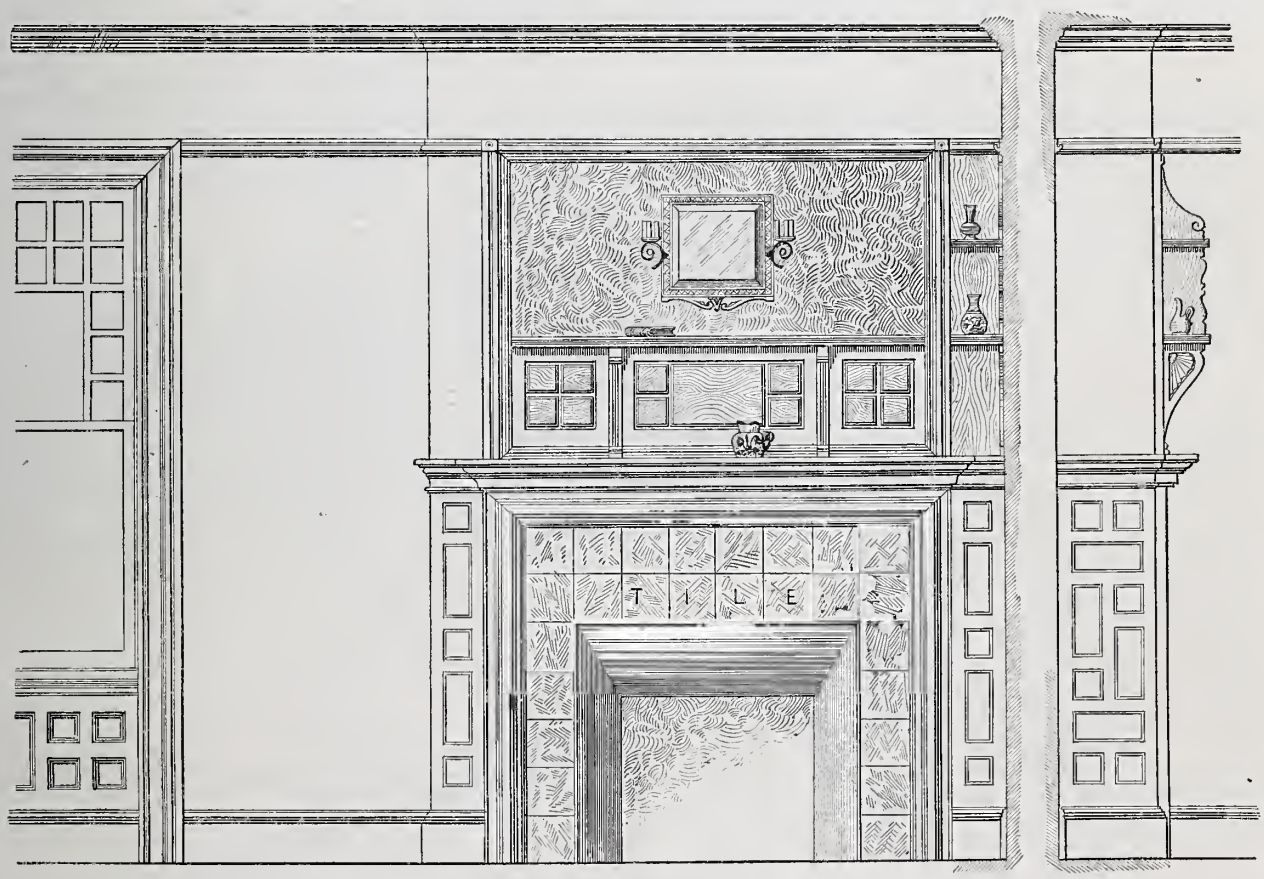
A general knowledge of the theory of electricity and magnetism is a most desirable and valuable acquirement for all who are in any way connected with the practical application of either science. This, together with the fact that but few of the books written upon the subject are adapted for self-educatiou, makes Mr. Lockwood's work specially valuable. It is arranged in the form of questions and answers, embracing 24 chapters devoted to frictional, voltaic and thermo electricity, earth currents and earth batteries, electro-magnetism and electro-magnets, and the almost numberless details directly connected with the subject. The author has endeavored to put the information in as lucid and concise form as is consistent with accuracy, and to combine brevity with completeness. A liberal use has been made of the electrical text-books and of the literature relating to kindred subjects, and also of the current electrical journals. Numerous illustrations add to the generally attractive character of the work, which, taken altogether, will very probably meet with extended popularity.

PATENTS ON INVENTIONS. By Henry Connett and Anthony C. Fraser. Size, 5 x 7½ inches, 226 pages. Published by Burke, Fraser & Connett.

Volume I of the above work, made up of eight quarterly issues (March, June, September and December, for 1882 and 1883), has lately reached us, and will, without doubt, meet with a most favorable reception. The publication, as stated in the introductory remarks in the first number, is designed for free distribution to the clients of the authors, its mission being to keep them informed of changes in laws and practice relating to patents and kindred interests. It contains interesting articles on patent law, briefs of the more important decisions, and general information on all subjects relating to the protection of inventions, designs and trademarks. Both in appearance and arraugement the volume is exceedingly attractive, and careful attention bestowed upon its contents will not be regretted.

Expanding Water Conductors.

The Austin expanding water conductor-pipe and conductor fastenings have been before the public so long that there are very few in the roofing trades or in the building business who are not more or less familiar with them. Corrugated conductor-pipe, as this article is very commonly called, is made in two different forms. One of these in its general shape is square and the other round. The latter makes an approximate star in plan on account of the corrugations. A circular which Messrs. Austin, Obdyke & Co., of Philadelphia, are sending to the trade contains on the first page a general view of both styles of pipe attached to a brick wall. In the interveniug spaces between the two views various elbows are shown, and also sections of the pipe, with illustrations of the use of the fastenings which are employed with it. Cuts are presented also giving details of the fastenings themselves. One peculiar feature of the Austin conductor-pipe is the manner in which it is attached to the walls of the building. The way in which it is managed in this respect goes far toward making it a desirable article for use, and what has proved desirable in this case we believe is equally desirable for use on pipes of whatever form or construction. Instead of the pipe being placed directly against the wall and hugged to it by straps or hooks, it is supported away from the wall, thus makiug a handsomer and more durable construction in every way. The conductor fasteuings used with this pipe consist essentially of three pieces. The fastening proper is attached to the pipe by soldering, while the shank into which it fits is driven into the wall at proper intervals. The two are connected together by means of a pin. This construction permits of the pipe being taken down for repairs, in case such a thing should be necessary; holds the pipe away from the wall, thus preventing discoloratiou in case of overflow of gutter, and gives the pipe every opportunity for expanding when subjected to internal pressure. The corrugated pipe is manufactured in lengths of 9 feet, and three different angles of elbow and shoes are provided. These are so calculated as to meet all requirements where bends and curves are uecessary in putting up the pipe. The pipe is shipped in open crates, and by nesting sizes the freight is greatly reduced.



A Study in Suburban Architecture.—Front and Side Elevation of Mantel in Chamber Over Library.—Scale, ⅜ Inch to the Foot.

CORRESPONDENCE.

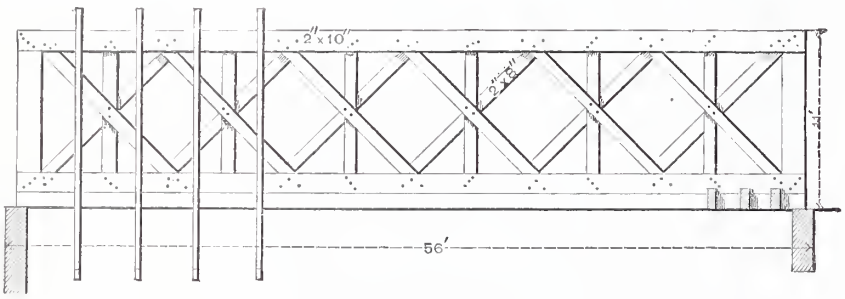
Counter in a Hardware Store.

From G. I. H., *Porter, Me.*—I have a counter to build in a hardware store, and would be glad to see illustrations of work of this kind in *Carpentry and Building*. I have no doubt that such a publication would be of interest to other readers.

Note.—We published a description of the fittings of a hardware store in our issue for May, 1883, which, perhaps, this correspondent has failed to notice. Also designs for counters and shelving in the number for March, 1883. Still, other designs would be very acceptable, and if any of our readers will undertake to supply them we shall be very glad to make the engravings and publish the same for the benefit of this correspondent and all others who may be interested.

Truss Roof for Church.

From W. H. F., *Terre Haute, Ind.*—In respouse to the question proposed by W. B. R. in a recent issue of *Carpentry and Building*, I inclose sketch of truss roof made in the general manner of the former drawing sent by me, to the conditions named by the correspondent. A truss constructed as here shown, using the material specified, will carry any load that is likely to come upon it. At the same time, it will be much cheaper than similar constructions in which truss rods and cast wall-plates and other features usually found in a regular Howe truss are employed. My way of putting up this truss would be to build a scaffold through the center of the building and then put my truss together, piece by piece, blocking up on the scaffold for the necessary camber. Block in between all braces and spike ends together thoroughly with 30d. nails Bolt all braces, and also in the center where they cross the perpendicular strut, using ½-inch bolts with 2-inch washer. The rafters, as shown in the sketch, should be about 2 feet between centers. Where the collar beams meet in the center allow them to fall below 1 inch. Size back 1 inch and nail on a strip 1 x 2 inches, passing under the chord and joining two collar-beam pieces. This will prevent plastering from cracking along the chord, and give good clinch to the mortar. I hope this construction will be found useful by W. B. R. and other readers of *Carpentry and Building*.

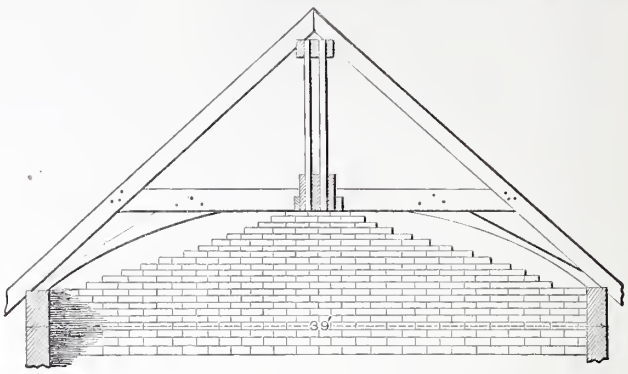


Truss for Roof of Church.—Side View of Roof Designed by W. H. F.

Tar on Shingles.

From J A., *Nantucket, Mass.*—I have had some experience in the use of tar on shingle roofs, which perhaps will be of interest. I occupy a house which was shingled with pine shingles in the fall of 1833, something over 50 years ago. After the shingles were laid a coat of tar was applied, and in a few years a second coat was given them. The shingles to-day on the east roof are in very good condition, and on the west roof are sufficient for some time to come. If any reader of the paper can tell how to make shingles last better than this I should be glad to hear it.

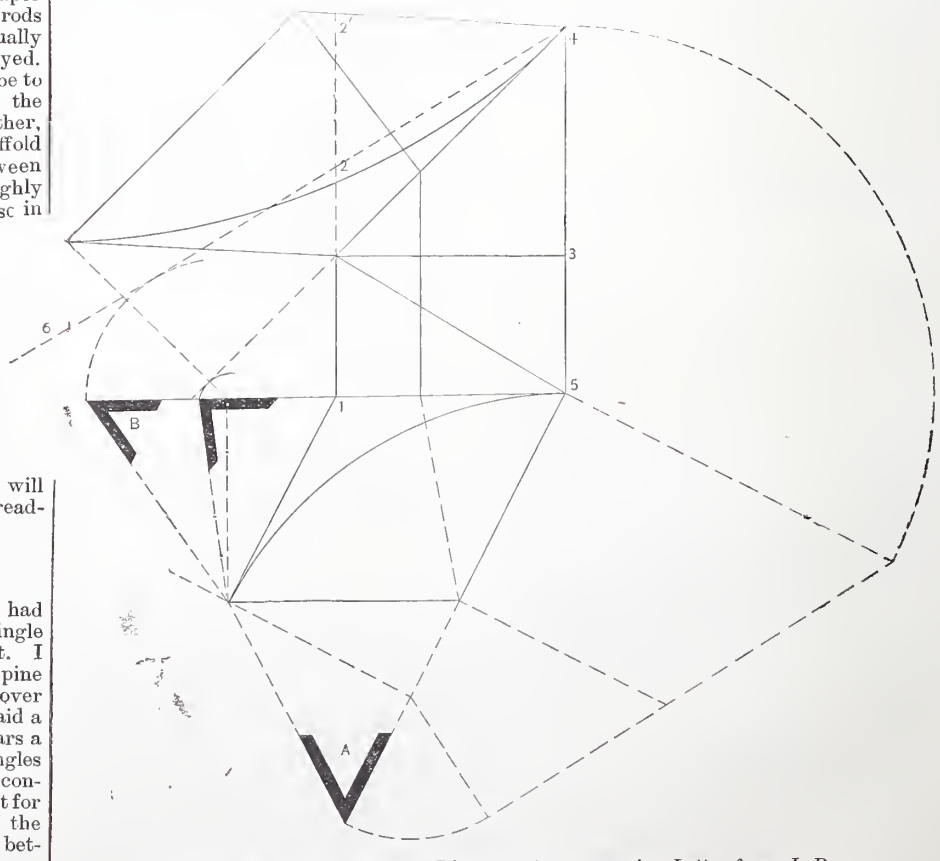
Note.—Our correspondent does not tell what kind of tar was applied to the shingles in question. From the circumstance he mentions, however, we feel safe in concluding that the tar referred to was not coal tar, which, if we mistake not, is the only material that has been mentioned in this general connection. Records of experience of this character are of great interest as well as of value to all who are interested in building construction, but to be of the highest service they should be accompanied by the fullest possible particulars. If our correspondent pleases, we shall be glad to learn from him, in addition to what he has already communicated, tho kind of tar employed and the manner of applying it—whether hot or otherwise; also some particulars with reference to the condition of the shingles—whether thoroughly seasoned before use or not. It would also be interesting to know the nature of the wear on these shingles. He mentions that one side of his roof is in better condition than the other, from which we conclude that the latter is approaching the end of its usefulness. Many practical readers will be glad to learn whether the shingles have given out in their exposed surfaces, or whether the decay has been principally in parts covered by lapping.



End View of Roof, Showing Bents and End Supports of Truss.

Problem in Hand-Railing.

From J. B., *Omaha, Neb.*—I have been looking over some of the problems on hand-railing, especially the one contained in *Carpentry and Building* for March, 1882. The latter shows an obtuse angle with a portion of a circle with two unequal pitches. The author of the demonstration of this problem has overlooked one point that, it seems to me, would prevent some of your readers from understanding how the bevel is found at A, as shown in the accompanying sketch. I have constructed a new diagram with a different pitch and with some alterations in the method, and submit it herewith. It will be understood, so that no explanation will be necessary. I have shown another system of finding the same bevel as B. Make 1 2 equal to 3 4, and 2′ 2 equal to 3 5. Produce 4 2 to 6. In practice it is not necessary to use all of the lines—only enough to ascertain how much the tangent of the face mold spreads, or, in other words, is out of square. Always use the minor axis on the rail; then we have three points by which to shape the rail.



Problem in Hand-Railing.—Diagram Accompanying Letter from J. B.

Twist in Outside Blinds.

From C. M. R., *Wheeling, W. Va.*—An outside blind that is in twist or wind the wrong way—that is, one which is inclined to hang out at the top center when closed at the bottom end—is a fruitful cause of profanity among carpenters. In order to do as much good as possible to my brother chips, I will tell them how to obviate this wholly in the construction of the blinds. Where the slats are stationary, all that is necessary to do is to put them in twist the right way, or, in other words, to so place them that the top center will strike the window frame first. This may be done by mortising the slats and the shorter styles on a slight twist. A very little will be sufficient either to overcome the

tendency of twist in the wrong direction or to cause a twist in the opposite direction, which is no fault.

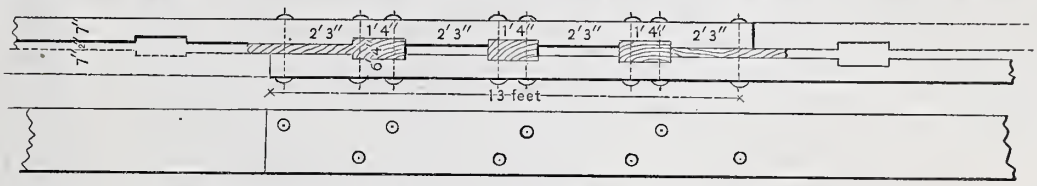
Bridge Construction.

From BRIDGE.—As one of the parties who submitted plans for a 50-foot-span railroad bridge illustrated in the February number of *Carpentry and Building*, it may not be courtesy in me to criticise the plan submitted by "Engineer," but as your specifications call for a free fight, I cannot resist the temptation to observe the established rules governing a free fight—"wherever you see a head, hit it"—and go in with the understanding that "Engineer," or some other man, may put a head on me.

In the first place, the maxim, "Never trust a single rod," has, in my experience, saved two or three serious railroad accidents, one of them to a passenger train; when the engine broke one truss-rod from a hidden defect in the iron, the other rod carried the cars across; with a single rod the engine and train would have gone through the bridge. In "Engineer's" bridge two suspension rods of 1½ inches diameter at each point, instead of one of 2 inches, would weigh but about 60 pounds additional for the bridge, and cost, at 5 cents per pound, but $3 extra, and give a greater value for strength.

I think "Engineer" should have a chromo as a premium on that chord splice. I suppose those side-bars are intended to hold the joint as a clamp. As for their strength, after deducting for the bolt holes, the united strength of the four bars in tension, at 10,000 pounds per square inch, is 97,750 pounds. The resistance offered is—bending six ¾ bolts in a pine stick—possibly 2000 pounds. Almost the entire tension strain at the splice comes upon the white-oak (presumed) clamp; this has a section of 32 square inches at the center. Estimating the truss at 360 pounds per foot, and the load at 1500 pounds, would give in round numbers about 89,000 pounds as the tension at the center of the lower chord, and give about 2800 pounds as the tension per square inch upon the oak clamp. The shoulders of the hook against the pine have an end area of 64 square inches, which gives a compression in both woods at that point of about 1400 pounds per square inch. The hook on the pine has 30 inches in length against splitting shear. The tables give 480 pounds per square inch as the splitting shear of pine; 89,000 pounds divided by 960 (the area of the two hooks) gives 94 pounds per square inch, which is a factor of about 5 for safety. From this it will be seen that the white-oak clamp of the connection shown will—and, in my opinion, does—carry the whole tension strains upon the chord, although at a greater strain than I would myself use; and so far as those side-bars are concerned, two cast washers for each bolt would answer every purpose about as well.

At the footing of the end braces, I cannot but believe your engraver has done by "Engineer" as he must have done by me—let his knife slip and cut out some lines. In mine, the splices of the lower chord are not shown in the plan. In the center stick a splice comes in each end panel. In the outside sticks there is a splice in one stick in the second panel from the end, and in the other with a depth of beam of 16 inches calls for, in the second panel from the other end. These are not shown. In "Engineer's" bridge I think there should be some dotted lines to indicate a blind footing in the chord for the brace to rest against. I cannot think any sane man would foot a brace having about 78,000 pounds horizontal thrust against a block held by two ¾ bolts vertically through the block. There are two ¾ bolts through the brace in addition, but these are set bastard, and give no support except their resistance to bending. As the plan shows it, I should be afraid to risk the truss from its own weight.



Bridge Construction.—Fig. 1.—Form of Splice Preferred by "Bridge."

There are several other weak points in the bridge that I could criticise, but I will only point out one more. In the middle panel the joints in both chord sticks come at the center. As shown by the plan, the chord as a beam supports the floor beams between the suspension rods. The load is about 32,600 pounds, uniformly distributed upon the chord as upon a beam. To carry this at 1200 pounds per square inch fiber strain, a width of solid timber of 16 inches. "Engineer" gives a stick 14 inches in width, and this is cut in two in the center.

Now, after finding all the fault possible with the designs submitted, I suppose I ought to follow with improvements upon them. To begin, in the first place, I would not, for a railroad bridge, build a strain-beam truss of three panels for a span exceeding 30 to 36 feet, and for any plan for a wooden bridge with a span of 46 feet, instead of a hight of 6 feet from center to center of chords I would use a hight of from 7 to 8 feet; but if this particular plan must be followed and improved, and use the same hight of truss and same dimensions of timber in the truss, with the four chord sticks 7 x 16 inches by 26 feet, I would splice them, so as to have one chord member splice at the center. With the other chord member I would break joints with the first, which would lap them 13 feet, and bring the joints of the last in the end panels. The clamp I would arrange as shown in the sketch, Fig. 1. To pull one stick from the other lengthwise, it is necessary to shear by splitting 48 inches of oak or 81 inches of pine. With a factor of 6 for safety, we have for the oak 48″ × 16″ × 120 pounds per square inch = 92,160 pounds. For the pine we have 81″ × 16″ × 80 pounds per square inch = 103,680 pounds. Both these are in excess of the tension of 89,000 pounds at the center of the chord.

For the tensile strength of the chord we have left a section of sound timber of 6 x 16 inches = 96 square inches, which is about 925 pounds per square inch. It was explained in the criticism that to support the floor beams as a uniform load upon the chord required a width of solid timber of 16 inches. The chord is not strong enough to carry floor beams and load safely; consequently, needle beams must be used. For these to support a load of about 60,000 pounds on track stringers, allowing the same fiber strain that we have been using as a basis, for a depth of 16 inches a width of about 18 inches is required, for which I would use two 9 x 16 packed together and swung under the chords. For the suspension rods I would use two of 1½ inches diameter, 10 inches between at the top, and spread the bottoms so as to straddle the lower chord, and also serve as a brace for the truss. For the track stringers it was shown that 16 x 16 inches was the size required for the chord, with the load covering a length of 16 feet 8 inches between supports. The track stringers will have a little less load, but I would use two 8 x 16 inches, and get them the length of two panels, and pack them so as to break joints over the needle beams.

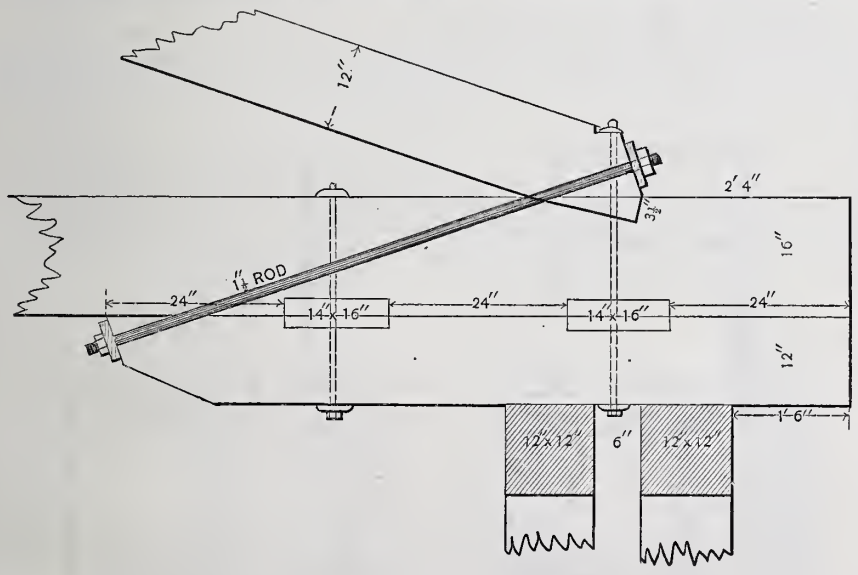


Fig. 2.—Form of Brace Footings.

Now for the brace footings—and here is where we get trouble with so flat a truss to hold the horizontal thrust of about 78,000 pounds. To foot the braces into the chord 3½ inches, and leave 28 inches of chord back of the shoulder, we get for splitting shear in the chord end 28″ × 14″ × 80 pounds = 31,960 pounds, which leaves about 46,000 pounds to be held by other means, for which I would use three rods 1½ inches in diameter, one in the center, passing between the chord sticks, and one at each side, with a wrought-iron washer 1¼″ x 3½″ x 20″ at each end of the rods. These rods must have a corbel to pull against. Arranged as shown in Fig. 2, two oak packing blocks, 4″ x 14″ x 16″, between the corbel and chord, are good for about 53,000 pounds, and the two splitting shears of pine in the corbel and chord are good for about a like amount.

For reasons it would take too long to explain, a three-panel truss really requires counter-bracing more than one of four, five or even six panels. For these I would introduce two of 4 x 6 for the outside and one of 6 x 8 to go between the 4 x 6. This, I believe, remodels the bridge submitted by "Engineer," so that in the opinion of "Bridge" it would be safe to let a train over it, and, in conclusion, "Bridge" would like to know, as a matter of curiosity, whether a bridge was ever constructed according to the plan submitted by "Engineer," and, if so, did it ever carry a train across it?

The Length of Rafters.

From G. A. S., *Adona, Ark.*—I find that the quickest way to get the length of rafters—for example, in an 18-foot building with one-third pitch—is to place the square at 6 inches for hight and 9 inches as the half width of the house, measuring the distance between the two points. This gives the required length in inches. Calling each inch 1 foot, the length of the rafter from bottom to top

is found. From the point 9 outward is the bottom cut, and from 6 upward is the top cut. The same principle may be applied to any other pitch of roofs.

Lines for a Curved Roof.

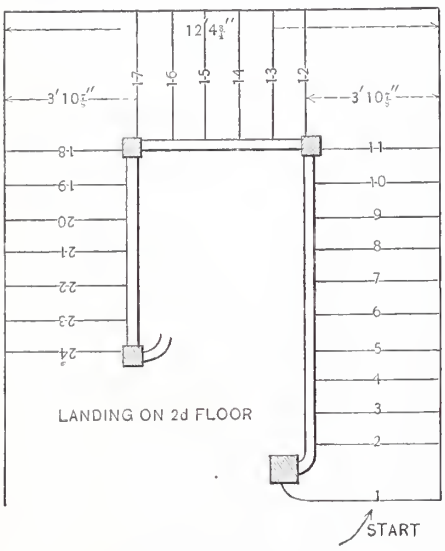
From C. B. T., *Medford, Mass.*—In obtaining the lines for a curved roof I was taught to take the curve from the hanging of a chain. A curve derived in this manner I consider very pretty for the purpose.

Amateur Striping.

From C. M. R., *Wheeling, W. Va*—Almost every carpenter has wished at one time or another that he could do a little striping on some Christmas toy or gift for the children, or for some other purposes. Any one who has a drawing pen can do a first-rate job by mixing the paint as thick or a little thicker than india-ink and using it with a pair of calipers or with a straight-edge all round the pattern in the same manner as india-ink is usually applied.

Planning of Stairway.

From J. A. C., *Taunton, Mass.*—In response to the inquiry of J. F., Central Valley, who asks for information in regard to a flight of stairs, I inclose a sketch which shows the plan I should adopt under the conditions he mentions. My plan of setting posts in a platform flight like this is to set the platform riser of the first flight on a line with the face of the finished carriages, or stringers, as we call them. I notice in his sketch that he makes six steps in his middle flight, and calls the run 10¾ inches. The whole distance is 12 feet 4¾ inches, and his platforms use up 7 feet 4½ inches, leaving for steps 4 feet 5¾ inches, or 8⅞ for each. In the inclosed sketch I make the platforms ⅞ inch shorter, and by using one less step on the middle flight have a run of 11 inches, the same as in the lower and upper flights.



Planning Stairway

Phillips' Plow Plane.

From C. P. K., *Wakefield, Mass.*—The Phillips plow plane, inquired for in the December number by A. W. E., of Brockton, N. Y., may be obtained of Charles Babson, Jr., No. 24 Congress street, Boston, Mass.

Calculating the Strength of Floors.

From A. L. F., *Hamburg, N. Y.*—I was very much interested in the article from F. F., on the "Strains in a Howe Truss," in the issue for May, 1882, particularly that part which relates to the floor system, on page 95. As I have a very limited education, I have failed to understand the method of calculation there shown well enough to make applications of it in my own work, and yet, if possible, I should like to have a method of figuring strains that I could use. I have now a weight of 43,000 pounds on the floor of a warehouse, which is supported through the center by a hemlock beam 8 x 10 inches and 28 feet long. This beam has four supports, one at each end and two between. The weight in this case I believe to be more than the rule given would allow as safe, and yet I am unable to apply the method of calculation so as to satisfy my own mind. I wish I could find out more about figuring the strength of timbers, joists, iron rods, &c.

Note.—The rule referred to by A. L. F. is quite applicable to his case, with some slight modification. F. F. states the rule correctly for a load concentrated at the center of the beam, but as A. L. F. has to deal with a uniformly distributed load, he will have to double the result to apply it to his case. Of the entire floor load of 43,000 pounds, the hemlock beam 8 x 10 inches x 28 feet, running through the center, supports one-half, or 21,500 pounds. As this stick is supported by two intermediate posts between the ends—at equal distances, we suppose—it is divided into three equal lengths of, say, 9 feet each, which in turn have to carry one-third of 21,500 pounds, or, say, 7200 pounds. Multiplying now the square of depth of the beam by the breadth in inches, and dividing by the span in feet, we have

$$\frac{8 \times 10 \times 10}{9} = 88.8,$$

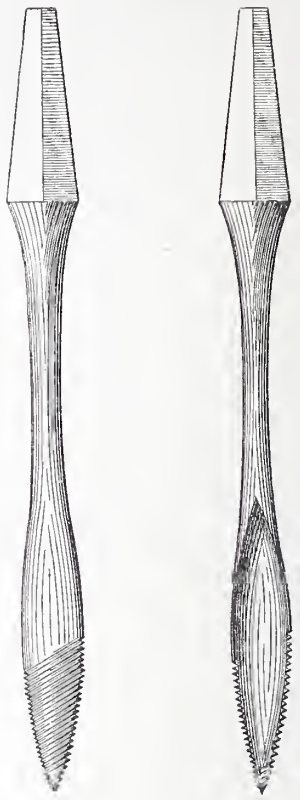
and multiplying this by 80, the constant for hemlock, we have 7104 pounds, the load which an 8 x 10 inch x 9 foot hemlock beam will safely carry at the middle, and, as it will carry double that load if uniformly distributed, the beam is good for 14,000 pounds, or nearly twice as much as required. The constant of 90 for pine and 120 for oak, as well as 80 for hemlock, are rather high, however, and apply only to well-seasoned timber. Taking the constant derived by later experiments made by R. C. Hatfield, of New York, the value of A. L. F.'s girder would be found to be about 11,300 pounds safe load—still largely in excess of his requirements.

The Contract System.

From N. F. B., *New Haven, Conn.*—I have a suggestion to make. It is this: As a means of securing good, honest work, and to prevent fraud and dishonesty, also as a measure to save human life, war should be made upon the contract system. Perfect work is impossible under it.

Gimlet Bit.

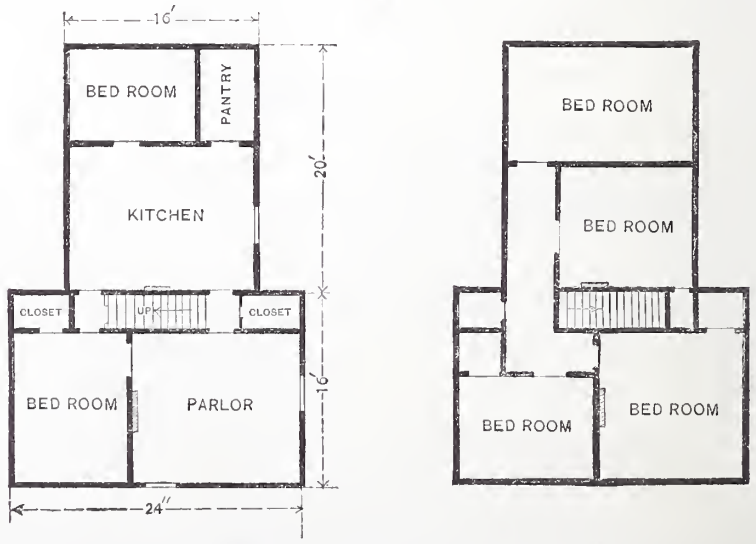
From J. J. S., *Bellville, Tex.*—I inclose a drawing of a form of quill bit which, I believe, is not in the market. I devised this form of bit about 12 years since, and at the time attempted to secure it by letters patent, but found that I had been anticipated by a similar bit as far back as 1837. The advantages which this bit possesses over the form commonly used will be seen by an examination of the drawing. It cuts a clean, smooth hole, requires no pressure on the brace to operate it, bores equally well in all kinds of timber and is easily kept in good condition. It will clean the hole of chips when the motion is reversed, which no other bit, so far as my knowledge goes, will do. If some firm would manufacture bits of this character, they would, no doubt, find a ready sale for them. No carpenter will do without them after he has once seen them in use.



Gimlet Quill Bit.—Front and Side Views.

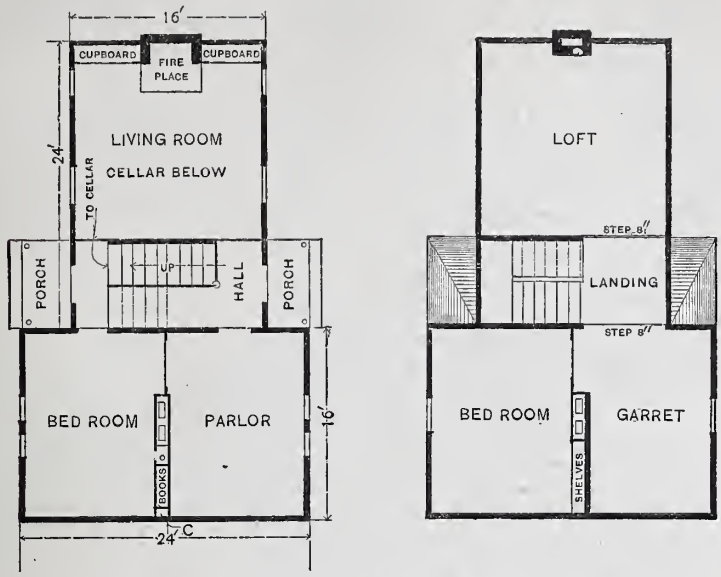
Arrangement of Rooms.

From H. H. M., *Torrington.*—Answering the inquiry of A. J. R., of Bluffton, Minn., who some time since asked for an arrangement of rooms in a frame house of ordinary construction, I inclose a sketch of floor plans, showing how I would divide the house in order to get the most room and in the most convenient form. There are many houses built in this vicinity that have nearly the same features of ground plan. The one that I send has been practically tested, and is not simply a theoretical arrangement. I shall be glad to see the efforts of other correspondents in this same direction.



Arrangement of Rooms.—Plan from H. H. M.

From J. E. H., *Edgerton, Wis.*—I inclose a plan showing a method of dividing such houses as A. J. R. describes which is in use in this vicinity. I think the plan shown

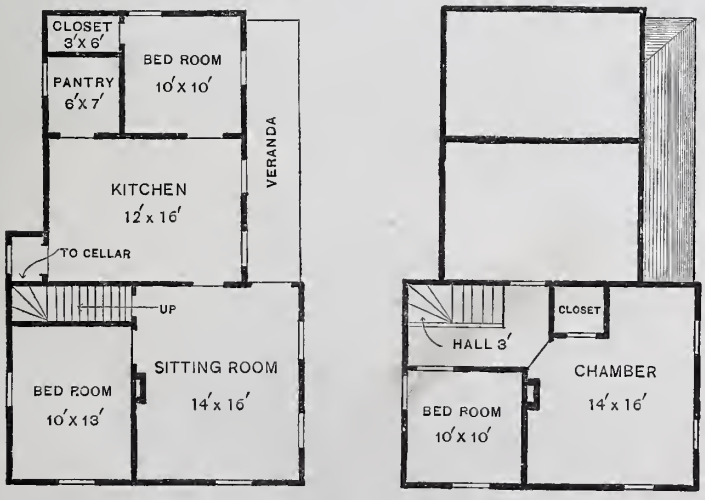


Arrangement of Rooms.—Plan Forwarded by R. J. E.

makes a convenient arrangement, and it uses all the space to good advantage. In order to get to the cellar from the kitchen under the stairs leading to the upper story, a place has to be built on for the purpose, as indicated in the plan, but such an addition is not expensive, and is convenient from the fact that shelves can be put in it, thus constituting it a closet for the kitchen.

From R. J. E., *Holly Springs, Mo.*—I inclose a sketch made in answer to the inquiry of A. J. R. in the February issue. It shows the manner in which such a house as he outlines would be divided in this vicinity. It is assumed that a family occupying such a small house will do their own work, with occasional extra help called in by the day.

From A. W., *Tiffin, Ohio.*—I am not an architect, so I shall not attempt to arrange the rooms in A. J. R.'s house as I do not see how they can be made convenient. I will, however, inclose a drawing that may be a benefit to him and others. The plan is that of a house I built for myself some time since, and many people in this section think it is very convenient for a small house. The dimensions are not the same as those given by A. J. R., but, of course, the plan might be



Plan Suggested by J. E. H.

enlarged. I think it is unnecessary for me to say much about it, as the plan shows for itself. I may say, however, that the studs in the main part are 16 feet long, and that the rear is simply an 8-foot story with a shed roof. The stairs take very little room, being made winding at the top, and their location affords a convenient inside cellarway. A house built on this plan and appropriately convenient would cost in this section between $600 and $700.

Repetition of Stair-Building Problems.

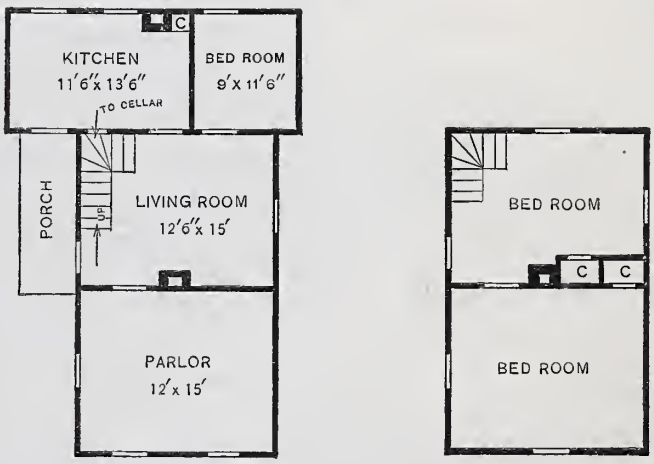
From C. D. H., *Hamilton, Canada.*—I presume that new readers, especially young men, are being constantly added to the subscription list of *Carpentry and Building*. In view of this fact, I take the liberty of suggesting the propriety of continuing information on the subject of stair-building, although in past volumes the subject has been very thoroughly considered. Inasmuch as many of the younger readers have not seen it, it might be well to repeat what has already appeared on this question.

Answer.—Notwithstanding the prominent place given to the discussion of stair-building problems in our columns ever since the commencement of this paper, the subject has not been exhausted, and we shall probably present for the future even more important information on this topic than has already been published. This answers the first part of our correspondent's question. With reference to the repetition of what has already appeared, in the interest of new readers, and more especially young men just coming into active life, we call attention to the fact that back volumes of *Carpentry and Building* can be obtained at any time, and hence we do not see the necessity of repeating what has already been given. Many of our subscribers have bound their papers from the first, and justly regard the several volumes thus added to their libraries as an encyclopedia of practical matters relating to the building trades. Each volume contains much that is of interest, and treats upon a diversified list of topics. Repetitions, however important the information, would be no advantage to those who preserve their numbers. There is always something new coming up, and in our selection of matter we carefully discriminate against those subjects which have been previously treated, always giving preference to new matter on account of its greater interest.

A Long-Armed Syphon.

From FOUNDRY, *Springfield, Mass.*—In this vicinity there is a well from which water is taken for use in a barn cellar, at which place the faucet is just 6 inches lower than the bottom of the well. The water is drawn by means of a syphon, the short arm of which is 12 feet. It is conveyed through ¾-inch lead pipe a part of the way, and ½-inch pipe the remainder of the distance. I desire to know how low the water in the well can get and yet run at the faucet.

Answer.—By the well-known principles covering the action of the syphon, the water should run from the lower end of the pipe, or from the long arm of the syphon, until an equality of level is established between the water in the well and the discharging orifice. In the sketch accompanying the inquiry from this correspondent the short arm of the syphon is shown to be 12 feet long. It is probable that there is sufficient depth to the water in the well to reach some distance up this pipe. As the discharging end of the syphon is 6 inches lower than the bottom of the well, it is probable that the syphon would discharge all the water in the well before it ceased its action, provided the short arm were lengthened to reach the bottom. Considerable length of pipe of small diameter is used in this case, and the friction of the water in it might perhaps be sufficient to overcome the action of the syphon in whole or in part before the level is reached to which theoretically it should work. Other communications on the subject of syphons which we have recently published will probably be of interest to this correspondent.



Convenient House Plan.—Contributed by A. W.

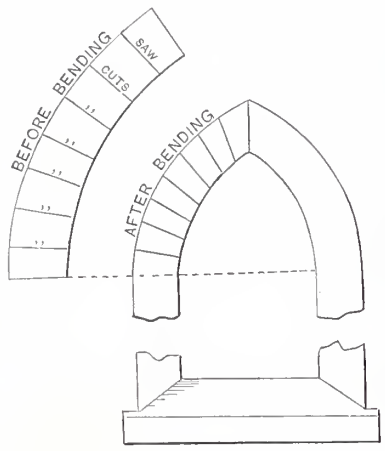
REFERRED TO OUR READERS.

Hanging Doors.

From E. C. C., *Howarden, Iowa.*—I would like to ask T. D. G., of Silver City, Iowa, for an explanation of his method of hanging doors, described a short time since in *Carpentry and Building.* I cannot see the point, and do not understand that the try-square, as represented in his sketch, is doing anything which one could not as correctly do without such assistance.

Splayed Work.

From R. D. M., *Grand Forks, D. T.*—I would like to learn from practical readers of the paper how the radius line by which the



Splayed Work.—Inquiry by R. D. M.

flaring jambs of Gothic windows are struck is obtained, so that when the pieces are sawed and bent to a flare they will fit the frame. I inclose a rough sketch of what I require. The dotted lines marked "radius line required" are what I would very much like to know how to find.

TRADE PUBLICATIONS.

Conductor-Pipe.

The Solderless Standing Seam Conductor Company, Limited, of Alleghany City, Pa., send us a copy of its revised price list of the goods it manufactures. The trade generally is so well acquainted with the octagonal pipe which this company makes, and the construction which gives it its distinctive name that it is hardly necessary to enter into a description at this time. The pamphlet first preseuts *fac similes* of the medals which have been awarded this device where it has been exhibited, and follows with a succinct statement of the advantages claimed for this form of conductor-pipe. The third page contains a general view of the pipe in position, with sections showing construction and the provision made for expansion, and the fasteners by which it is held in place. Following this is a price list and views of elbows suitable for use in different positions. A page in the book is devoted to cast-iron shields, cast-iron sewer connections and cast-iron boots of a shape especially adapted for use in connection with the special pipe Octagonal conductor-heads also corresponding in style to the pipe are shown, and galvanized wire-conductor strainers are likewise noted. The last page of the pamphlet contains circulars from various architects in Pittsburgh and Alleghany. A special sheet containing directions for putting up this conductor pipe accompanies the circular, and conveys information in such a way as to render it certain that the least experienced will be able by its assistance to put up conductor-pipe satisfactorily.

Climax Door Hangers.

We have received from S. H. & E. Y. Moore, 163 and 165 Lake street, Chicago, a descriptive pamphlet of the "Climax" door hangers and other similar goods. This firm are Western agents for some 12 or more well-known Eastern manufacturing companies covering a very large line of goods, and are also manufacturers of the line of barn door hangers above mentioned, together with Moore's differential pulley blocks and Moore's freight-car door hangers. The pamphlet is arranged in the general form of a hardware catalogue, with engravings showing the general appearance of the goods and diagrams illustrating features of construction. Several different varieties of goods are shown adapted for different kinds of tracks and different positions. The leading feature of the "Climax" door hanger is the anti-friction construction. The friction is overcome by a series of chilled rollers which surround the axle of the wheel in such a manuer as to reduce friction to the smallest possible amount. The statement is made that over 400,000 pairs of these hangers are at present in use. Moore's parlor door hangers are also arranged upon a similar anti-frictiou plan, and door hangers adapted for use upon railway cars have similar features. The differential pulley blocks made by this company have many features to recommeud them. The lifting-chain and the hand-chain work independently of each other; the hand-chain may be made to travel rapidly while the lifting-chain has the slow motion of the load it is carrying. This reduces in an important degree the great wear upon the lifting-chain and the sheaves in which it works when each chain is used for both purposes. In addition to the goods already described, a hand-hoist, with lock-brake, is shown, suitable for use in stores, mills, and also adapted to the requirements of rollers and tracks. Moore's stationary hand-hoist is also shown adapted for use over hatchways.

Fire-Proof Building Materials.

The Raritan Hollow and Porous Brick Company, with office at No. 115 Broadway, New York City, have issued a very neat catalogue or circular of their fire-proof building materials, consisting of hollow burnt clay bricks for flat arches between iron beams and for partitions, and porous terra-cotta bricks for partitions, roof lining, column fireproofing and deafening. Hollow burnt-clay bricks and porous terra-cotta bricks and blocks for the fire-proofing of buildings have come into very general use during the past six years, and their excellence as a fireproof material is no longer debatable. Many of the most important buildiugs in this city are constructed with hollow burnt-clay with flat arch brick laid in their floors, and with hollow burnt clay and porous terra-cotta brick in their partitions and roofs. This form of construction has given entire satisfaction, and bids fair to come into even more general use for the future. The Raritan Hollow and Porous Brick Company, in presenting their circular, call attention to the location of their factory which is on the Raritau River, near Perth Amboy, N. J., aud in close proximity to banks of clay which forms the basis of their manufactured product. The statement is made that during the past year very nearly 1,000,000 square feet of material, or, in other words, enough to cover 22 acres, have been manufactured in the works described. A list of prominent buildings in this city and elsewhere which this company has supplied is given at the conclusion of the introductory chapter of the pamphlet. Followiug the introductory chapter illustrations are presented of the use of the various articles made by this company, by means of full-page plates, and opposite each plate is a page of text describing the construction. Hollow brick for flat arches are first presented, following which are hollow brick and porous terra-cotta blocks for partitions. Porous terra-cotta is then considered with regard to its applicability to building purposes, and several illustrations are introduced. Among the latter may be mentioned porous terra-cotta roof lining, which forms the foundation of much of the slate that is laid on mansard roofs within fire limits in large cities. The latter part of the book contains illustrations of the means of protecting wooden beams, girders and columns. A table of weights of the various kinds of material manufactured by the company concludes the work, which will well repay perusal by our readers.

STRAY CHIPS.

Messrs. Gould & Angell, architects, have just completed a building known as Blackstone Hall, situated on the corner of Washington and Snow streets, Providence, R. I. The structure is three stories in hight, built of brick, with brown-stone trimmings. The heating is done by steam, and the ventilation is very satisfactory. The cost is about $40,000.

A decision has recently been reached in the litigation concerning hand-saw machines of J. A. Fay & Co. *vs.* Cordesman & Eagan Company. This question has been pending more than eight years in the Patent Office and various courts. It has finally been decided by the Supreme Court of the United States in favor of the latter company, and confirming the opinion of the lower courts. The decision as published is quite lengthy and exhaustive, and covers every point at issue, making a complete victory for the Cordesman & Eagan Company.

A new public-school building of pleasing appearance and of excellent appointments has recently been completed at Smyrna, Del. Mr. Graham, of Wilmington, was the architect.

A crystal palace devoted to horticulture is about to be erected in the Upper City Park of the city of New Orleans, La., from designs furnished by Mr. Arthur E. Rendle, of New York City. The entire building will he 600 feet long and 100 wide, except at the Central Hall, which is made hy a widening out of the building to 194 feet for a length of 100 feet. Rising ahove this Central Hall will he a tower nearly 90 feet in hight, also built of glass. The distinctive feature of the system of glazing employed is that, instead of being fastened to wooden frames hy means of putty, the glass is placed in horizontal metal gooves and fixed on wooden or iron purlins. The woodwork and ironwork are so entirely covered by the metal and the glass that only a narrow strip of ziuc is seen. The contract calls for a completion of the work by September 15.

A residence 25 x 62 feet in dimensions and three stories in hight is in progress of construction for Mrs. B. J. McVoy, of Chicago, Ill. The material used is Lake Superior rock-faced brown-stone, with mansard roof of red slate, while the interior fittings are of Georgia pine and gumwood. Mr. M. L. Beers is the architect n charge. The cost is estimated at $12,000.

The contract for a new court-house at Joliet, Ill., has lately been awarded by the Board of Supervisors. The building will be rectangular in shape, with pavilions at the corners, the size heing 144 x 76 feet. The exterior will be of Joliet stone, treated, for the most part, in rock face, and will present a hold and massive appearance. The design, which was furnished hy Mr. J. C. Cochran, of Chicago, is *renaissance* T e cost is estimated at $123,500.

In December last the pioneer apartment house in Washington, D. C., was completed. The site on which the structure stands extends 218 feet on Fourteenth street and 217 feet on Vermont avenue. The building is six stories in hight, conveniently arranged, with plenty of light, fire-proof in all essential parts, and is known as the "Portland." The first story is reached hy three main entrances from both adjoining streets, while two sets of main stairs lead from the first to the sixth story. There are no studded or lathed partitions in the building, light walls, composed of fire-proof hlocks, being subhstituted. The exposed woodwork of the interior is framed of combinations of cherry, oak, ash and white pine, with occasional frieze ornamentation in color, all oiled and rubhed to dull faces. Messrs. Cluss & Schultze furnished the plans and superintended the erection. The enterprise represents an investment of something over $350,000. Mr. Edward Weston, of Yonkers, N. Y., is the owner.

he Dakota Capitol Building, in progress of erection at Bismarck, D. T., is inclosed, and promises to be one of the finest structures in that section of the country. "Cream colored" pressed brick from Sims, D. T., with terra-cotta and stone trimmings, are the materials used in its construction. The building is almost a counterpart of the Minnesota State House, at St. Paul, mention of which was made in *Carpentry and Building* for Decemher, 1882. Mr. L. S. Buffington furnished the plans. The superintending architect is Mr. W. L. Dow, and the master mechanic Mr. E. G. Carter.

The Buffalo, New York and Philadelphia and New York, West Shore and Buffalo Railway companies are erecting at Buffalo, N. Y., a passenger depot and office building that promises to he one of the finest in the country. The main building has a depth of 116 feet, while the principal front is 204 feet. The exterior is mainly of Buffalo pressed brick, laid in red mortar, with molded brick and terra-cotta trimmings. The moldings are galvanized iron, and the courses of Ohio sandstone. The columns and roof of the portico are constructed entirely of iron. The center of the structure is three stories in hight, with an iron truss elevated roof. On either side of this the walls are carried up four stories, and are surmounted by a gabled roof with a tower. The interior will be finished throughout in hard maple and cherry, while the waiting-room on the first floor will he laid with an artificial stone in handsome patterns. The basement will he largely devoted to restaurant, dining-room, &c., while the first floor will be given up for passenger purposes. The upper floors will be used for offices, and will he conveniently arranged, The edifice was designed hy Mr. Blanchard, who is the architect of the New York, West Shore and Buffalo road.

Mr. Joseph Labodie is putting up a very fine rssidence at Galveston, Tex. The building is 40 x 70 feet in plan, 2 stories in hight and contains 10 rooms. It is constructed of brick, in the French *renaissance* style of architecture. The plans were furnished by Messrs. Palliser, Palliser & Co., of Bridgeport, Conn.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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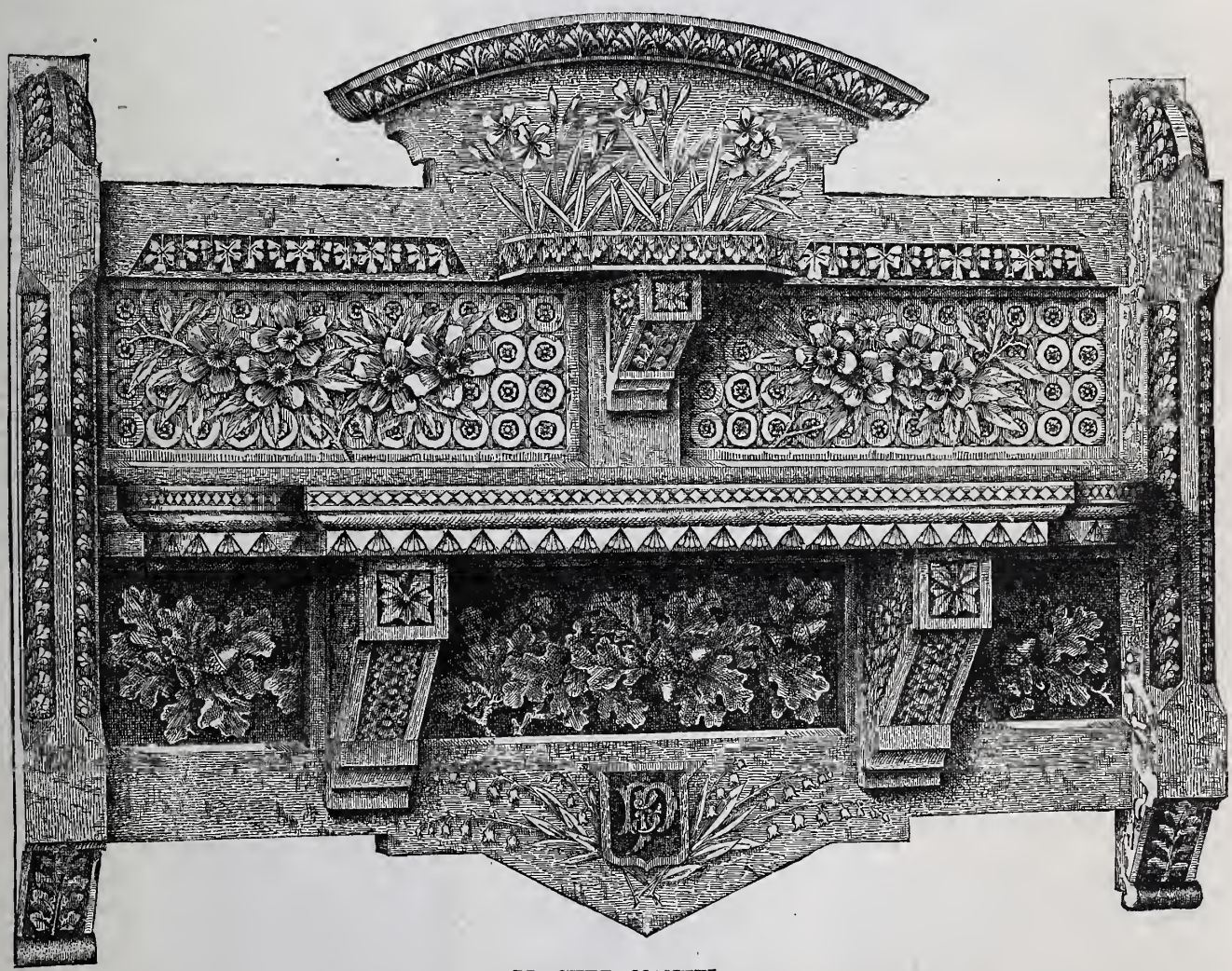
A Bracket Mantel.

Our readers will recall that in previous volumes we have illustrated various pieces of wood-carving executed by the pupils of the School of Design of the University of Cincinnati, under the direction of Mr. Benn Pitman. Conspicuous among these were specimens of the decorations of Mr. Pitman's residence, including the dining-room door and casing, sitting-room mantel and a mahogany bookcase. Each of these illustrated in a striking manner the originality of Mr. Pitman's style and the success with which he has worked out his own conceptions of American decorative art—something that is in no respect a copy of what other nations and races have done, but, instead, a direct outgrowth of a knowledge of American needs and culture. The design of a bracket mantel upon this page is a pleasing addition to the general collection, and, representing as it does still later effort upon the part of the designer and still greater skill in treatment and management, exemplifies very happily the mature fruits of a school in native decoration whose success in its own peculiar field is as pronounced as that of American literature or American illustrated art. Mr. Pitman's definition of his work appears in the following words: "The progress sought has been based on a discriminating knowledge of traditional art expression, on an appreciation of the relative and lasting value of Christian (Gothic) art forms, as compared with pagan (classic) art, on the scrupulous avoidance of meaningless and absurd forms, and, above all, on a reverent love and faithful interpretation of Nature's forms and their adaptation to the needs and necessities of to-day." From the outset Mr. Pitman's efforts have commanded attention. His own enthusiasm has been communicated to his pupils, and the reputation of his school has become world-wide.

Mr. Pitman has proceeded in his efforts upon the principle that all art worthy of the name—that appeals to the eye—must fill the two prime conditions of good construction and good decoration. He believes that while it is man's province to construct, it is equally woman's province to decorate. While men have no time, as a rule, to devote to art study and practice beyond acquiring such proficiency as has a fair commercial value, women have more leisure, and in many cases can pursue the study of art from pure devotion—or, if they undertake it as a means of livelihood, are likely to be more conscientious in their work, and more painstaking in all matters of detail. With these facts in mind it does not seem strange that nine-tenths of the artistically decorated work that has been exhibited by Mr. Pitman's pupils during the past 10 years should have been executed by girls and women. The articles made by Mr. Pitman's students are, as a rule, finished with an amount of taste, care and elaboration that a manufacturer, even if he were able to command the necessary skill, could not afford to expend upon articles made for sale. Accordingly, the work of these art students has a distinctive value of its own.

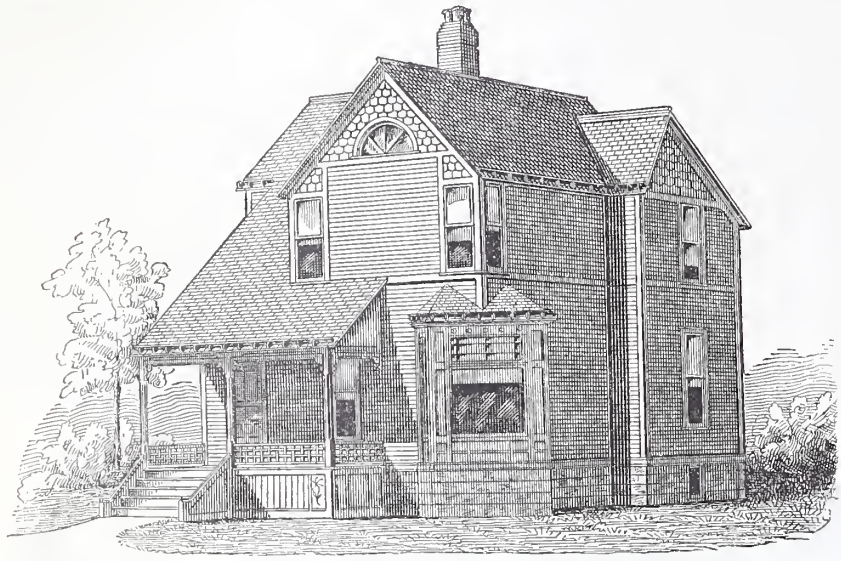


BRACKET MANTEL.

(Designed by Benn Pittman. Carved by Pupils of the Cincinnati Art School.)

The constructive features of the accompanying design will be readily understood and need not be described in detail. The length is 4 feet 6 inches and the hight 3 feet 6 inches. The decoration at the top, immediately over the small shelf, is oleander incised or sunken. The two panels at the sides of the central bracket show a diapered background. The three panels in the lower part show oak leaves and acorns cut 1¼ inches deep, while the decoration on the lower rail represents Alpine bells incised. The monogram in the shield indicates the designer. The upright stiles are 3½ inches wide and 4 inches deep. They are strong both in appearance and in fact, but are not so large as

to look clumsy. The decorations on the stiles, on the arched cap molding, on the lower part of the upper rail, on the edges of the shelves and on the brackets are for the most part conventionalized leaf forms. The whole combines to form a rich article for home decoration. This style of bracket mantel is perhaps better adapted to a bedroom than anywhere else. Still, it would look well in a small sitting-room. A fitting



Fourteenth Competition.—Perspective View of Design Submitted by D. S. Hopkins, Grand Rapids, Mich.

accompanyment in the way of finish around the fire would be a decoration of tiles, or it might be simply painting with floral designs.

NOTES AND COMMENTS.

In another column in this issue we present a paper entitled "Adaptation in Architecture," from the pen of a writer with whom our readers are already somewhat acquainted from former contributions to this journal. The writer approaches his subject in a spirit of earnest nquiry, and, tracing the general principle of adaptation through historical periods, makes an excellent point at the close with reference to the "American style" of architecture, something which students fondly hope will yet appear, and which, it is clearly shown, is an impossibility in the form in which it is commonly expected. The paper is readable throughout, and contains many features of value to students of architecture and all who are interested in building construction.

The following description of the Chelsea apartment-house, now approaching completion in Twenty-third street, between Seventh and Eighth avenues, this city, written by the resident correspondent of a Western paper, will be read with interest. In most particulars it is correct, although there is a manifest tendency toward exaggeration: The lot measures 175 feet front on Twenty-third street by 100 feet in depth, and cost $190,000 a year ago when it was bought. The actual building measures 175 feet front by 80 feet in depth, and is 11 stories high. Each floor above the ground floor is divided into 10 apartments of from four to nine rooms each. Every room in the building opens on the outer air. Four elevators carry people up and down, one for servants and tradespeople, one for furniture and two for tenants The ground floor is divided into four large stores on Twenty-third street, and a fine restaurant, 50 feet by 80, where the tenants can take their meals if they want to. Each apartment, no matter how small, has a bath and closet, hot and cold water, electric light and steam heat. In the apartments having kitchens the arrangements are wonderful. The coal is contained in a bin about 2 feet deep, 5 feet wide and as high as the ceiling; this bin is built right against the coal elevator, and has two openings, one in the kitchen at the floor, with a slide like that of a chicken coop, and another at the top of the ceiling, outside in the elevator shaft. Each box will hold a ton. The coal is put on the elevator, which rises until it is on a level with the top door of the box; it is dumped in and fills the box to the ceiling. The range is so fixed that it cooks by steam almost as well as by coal, and even roasts meat by steam. The refrigerator is a novelty. Altogether there are 67 of them in the building, and each one is kept cool by a coil which receives a current of freezing liquid from a tank in the cellar. The plan is the same exactly as that of heating by steam, only instead of heat the refrigerator receives cold. The contract is to the effect water must freeze in the refrigerator if it is desired, the degree of cold being regulated by a cock, as with steam. The cost to each tenant of running this cooling apparatus is not expected to be more than 2 cents a day for each refrigerator, which, of course, is one-fifth or tenth the price of ice for the same service, to say nothing of the trouble saved by not having to handle ice. The number of stockholders or apparent owners in this building is about 100. The rent of the stores, restaurant and of some studios in the eleventh story is expected to about pay the running expenses and taxes. The entire investment will be about $700,000, so that the average cost of apartments is about $7000, some costing as low as $4000, and others as high as $12,000, the cost depending upon the number of rooms, &c. The actual yearly cost to the stockholders will depend a good deal upon how well the stores and spare apartments rent, but so far the rents offered for them have been far beyond the prices expected by the building company. This, concludes the writer, is the latest development in the flat-building mania, which promises to make New York a city of 20-story buildings within the next 100 years.

Perspective View of Design by Chas. J. Williams, Dayton, Ohio.

Every visitor to New York during the last few years has been impressed with the enormous hight of the prevailing style of building in this city. Hight seems to be the leading characteristic, whether the buildings are of the tenement class or for business purposes, or of the class known as flats and apartment houses. With the greatest care taken in such matters as fire-proof roofs, fire-proof cornices, and so-called fire-proof construction in the interior, the danger from fire, even though the conflagration is restricted to the contents of the buildings, is so great, owing to the fact of the buildings being out of the reach of the streams of fire engines, that they have long been considered unsafe. The Fire Department have protested against them, but no attention has been paid to the remonstrance either by the city authorities or those private capitalists who invest their money in such enterprises. The outcome has been an appeal to the Legislature, and this body has been urged to enact a law limiting the hight of buildings to 70 feet on streets and avenues not exceeding 60 feet in width, and to 80 feet on streets and avenues which exceed the above limit in width. As illustrating the need of some such law, it may be mentioned that there is at present in course of erection near the Park, in this city, a flat or apartment house that is to be 15 stories high, and there is talk about another which, it is said, will throw even this into the shade.

The question of insurance against fire is one which concerns every business man and every householder. There are few at the present time who are so improvident as not to have a policy of fire insurance upon their dwelling, store, household goods or merchandise, as the case may be. In effecting an insurance a premium is paid, the rate depending somewhat upon the location of the property and nature of the risk, as well as the standing of the company issuing the policy. Inasmuch as this amount is usually charged up as an expense, very little attention is paid to it beyond the endeavor to effect the arrangement upon the most economical basis possible. It is seldom considered merely as a contribution to the funds for repaying the losses from fire sustained by the community at large, and yet that is exactly what it is.

Zinc Roofs in Europe.

A young German architect who visited this country a short time since, and who gave our building construction very careful examination and study, after his return to Dresden wrote a letter discussing zinc roofs in Europe, comparing them particularly with tile and slate. We reproduce the principal parts of the letter in question as likely to be of interest to our readers ·

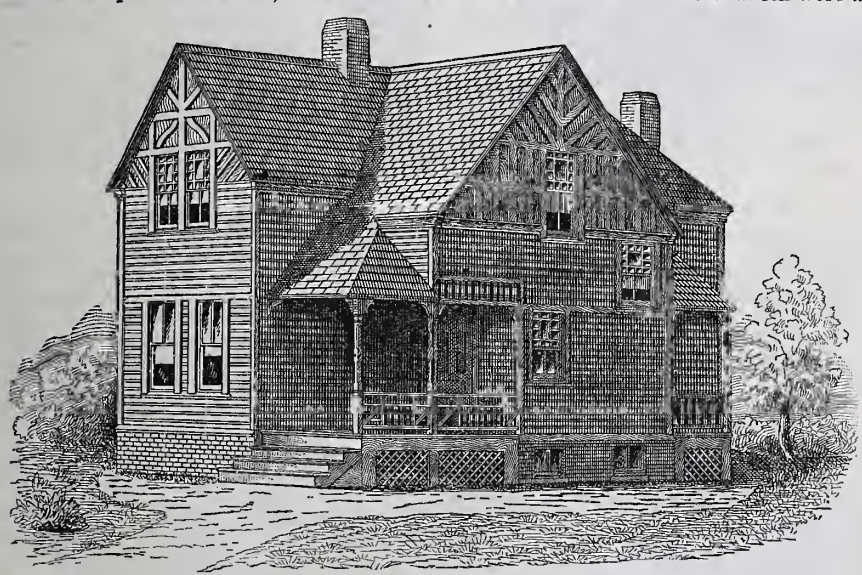
"In a former letter I attempted to make some comparisons between the various materials used in this country for roofs, demonstrating in some respects that zinc, in point of quality, price and durability, was preferred over other sheet metals. I now wish to call attention to a comparison of it with tile and slate, from a European point of view. In planning a building, the roof is a very important part in regard to cost, and it always requires much consideration and forethought to prevent this item becoming too expensive. Great care must be taken to make the surface to be covered as small as possible, and to prevent the roof becoming too ponderous, so as to avoid a massive subconstruction. Finally, the roof must not require much money or trouble to keep it in repair.

"A tile roof should pitch from one-half to one-third the width of the building, and will last 25 years. A slate roof from one-third to one-fifth, while, in the case of a zinc roof, one-ninth of the width is sufficient if the roof is carefully laid. Roofs of porticos, balconies, &c., which are nearly flat, cannot be covered with a better material than zinc. The less the pitch of the roof, the smaller its surface. Take, for instance, a roof of an ordinary building, 60 feet front and 44 feet deep, including projections, the surface would be, for a tile roof, with a pitch one-half the width, 3720 square feet, while at one-third of the width it would equal 3180. The average would be 3450 square feet. A slate roof with a pitch one-third of the width would equal 3180 square feet, and at one-fifth the width would equal 2830 square feet. The average of this would be 3000 square feet; while for a zinc roof to cover the same size building, with a pitch of one-ninth the width, it would only require 2700 square feet. Therefore, for a building of 2640 square feet area a zinc roof is 750 square feet, or about 22 per cent., smaller than a tile roof, and 300 square feet, or 10 per cent., smaller than a slate roof. The difference in weight of these materials is considerable. Zinc suitable for roofing weighs per square foot, 1 pound; slate, 6 pounds, and tile, 16 pounds. The weight of 3550 square feet of tile roof would be 55,200 pounds; the weight of 3000 square feet of slate roof would be 18,000 pounds, while that of the zinc roof is only 2700. In wet weather, tile and slate roofs absorb more or less water, sometimes making the weight double the amount given in the calculation.

"According to this, the advantages of a zinc roof are as follows: First, it being so light, it requires no extra strength in roof, saves much timber, and the walls in the upper part of the building can be lighter than the main walls. The savings derived from these circumstances are sometimes worthy of notice, especially when timber is scarce. The pitch of a zinc roof reduces the length of the rafters, the surface to be covered is smaller, and the roof is not so much exposed to the wind as one of tiles or slate. A zinc roof, when well put on, will require no repairs for 25 years. On the other hand, tile and slate roofs always want more or less attention, and in time cause more or less expense. In case of fire, zinc forms an excellent protection, and will resist the flames longer than any other material. True, the metal becomes heated, but it does not crack and fly about, as slate and tile are apt to do. These considerations show that zinc is a first-class roofing material. Should a zinc roof give dissatisfaction and trouble, it is due to inferior workmanship or to too light a material being used."

Fourteenth Competition.

The contest in designs and plans of $1500 houses resulted in many respects very similar to that of the $800 houses, the particulars of which were recently laid before our readers. All the better designs submitted by the most careful calculations run in cost above the specified limit when estimated by prices ruling in the markets of New York and the East generally. If the exact limit of cost had been adhered to in deciding this competition, it would probably have been necessary to return to the authors of the efforts submitted all of those which were at all desirable for publication in our columns or creditable to the architectural profession. This state of affairs was in part anticipated in the wording of the original advertisement, and competitors at that time were assured that, upon whatever basis the decision was reached, the various studies would be estimated by a common standard of cost. The Committee of Award state in their report that most of the designs, they believe, can be built for about $1500 in the cheapest markets of the country; and, further, it is their opinion that, with perhaps one or two exceptions, all of the really desirable designs would cost about alike if built in the same locality and under the same circumstances. Based upon these conditions, the committee have made an award in which, we believe, substantial justice has been done to all competitors. It is also evident that very desirable plans have been secured by this contest for publication.



Fourteenth Competitiion.—Perspective View of Design by John. L. Weess, Bridgeport, Conn.

The three successful competitors are D. S. Hopkins, Grand Rapids, Mich.; Charles J. Williams, Dayton, Ohio, and John L. Weess, Bridgeport, Conn. We present the perspective views of these three studies here with, and also the elevations, plans and details of Mr. Weess's effort:

The following particulars with reference to the study by Mr. Weess, the elevations, plans and details of which are presented on the following pages, are gained from the brief description submitted with the drawing, and prepared for the use of the Committee of Award. The aim of the author has been to produce a compact arrangement of plan combined with the greatest convenience in the location of each room, closet, door and opening, thus giving the greatest possible utility to the whole plan, and at the same time arranging the exterior so that it may also present attractive features. The author draws particular attention to the arrangement of entrances both front and rear, and also to their connection with the rooms and the easy access afforded to all the rooms, and to the stairs leading both to the second story and to the cellar. An abundance of light is supplied to each room, while at the same time the number of windows in the whole building is not large. The plan is such as to adapt the house to the requirements of a comparatively large family, since it affords four bed-rooms on the second floor, with an abundance of closet accommodations. The following is the bill of quantities submitted by Mr. Weess in connection with this design:

Bill of Materials.

PRELIMINARY.

125 yds. Excavation.

MASONRY.

25 perches Stone.
7200 Brick.
431 yds. Plastering.

CARPENTRY.

Sills 4 x 6:
Four 14 ft. each.
Six 12 ft. each.
Two 13 ft. each.
Two 9 ft. each.
Girders 6 x 8:
Two 14 ft. each.
Joist 2 x 8:
Twenty-two 13 ft. each.
Twenty-two 14 ft. each.
Twenty nine 12 ft. each.
Thirteen 20 ft. each.
Ceiling Joists 2 x 4:
Thirty 16 ft. each.
Veranda Sills 4 x 7:
Two 12 ft. each.
One 16 ft.
Veranda Joists 2 x 7:
Four 8 ft. each.
Seven 12 ft. each.
Posts 4 x 6:
Twelve 15 ft. each.
Studding 2 x 4:
250 16 ft. each.
Studding 2 x 3:
Eighty 16 ft. each.
Rafters 2 x 5:
Forty 11 ft. each.
Six 22 ft. each.
Eight 14 ft. each.
Hip and Valley 2 x 8·
Two 28 ft. each.
Four 16 ft. each.
Plates 2 x 4 double:
Eight 14 ft. each.
Six 12 ft. each.
Four 13 ft. each.
Four 9 ft. each.
Girts 1 x 4:
100 ft. in length.
Ridge Trees 1 x 10:
75 ft. long.
7500 ft. Sheathing.
2500 ft. Clapboards.
1000 ft. Shingling Lath.
2000 ft. Flooring.
175 feet 1⅛ Flooring.
75 feet 1⅛ Plank for Steps.
2500 feet ⅞ Pine, Cutting up.
14,000 Shingles.
500 feet Ceiling Boards.
150 feet Wainscoting.
Stairs, Seat, &c.
1 Mantel.
2 Outside Doors.
18 Inside Doors.
6 Cellar Windows.
19 Double-hung Windows
76 Axle Pulleys.
19 Sash Locks.
100 Sash Cord Irons.
350 feet Sash Cord.
76 Weights.
2 Porcelain Knobs
18 Mineral Knobs.
12 Locks.
2 Ives' Bolts.
6 Stove Collars.
5 doz. Wardrobe Hooks.
1 Sink.
1 Pump.
20 pairs Butts, 3½ x 3½.
10 pairs Fast Butts, 2 x 2.
5 gross ⅞ Screws.
2 gross ¾ Screws.
10 feet Iron Soil-pipe.
5 feet Lead Waste-pipe.
1 Lead Trap.
1 Vit. Trap.
50 feet Vit. Drain-pipe.
Tin, 14 inches width, for valleys, &c., 20 feet.
Labor.

PAINTING.

Paint, 40 gallons.
Lahor.

NAILS.

75 pounds 6d. Nails.
80 pounds 4d. Nails.
Two kegs 8d. Nails.
One keg 10d. Nails.
One keg 8d. Box Nails.
50 pounds 20d. Spikes.

Building Contract.

S sued B for $492.60, the balance due him for building a two-story brick house, and B made a counter claim for defective material thrown out, and money expended in repairing the unskillful work of S. The contract price was $2535, and the plaintiff had been paid $2042.40; the counter claim was $1985, which the defendant got a judgment for. The defense to the counter claim was a most novel one: That the plaintiff had "no experience in laying foundations, as the defendant knew." The case—Sherman *vs.* Bates—was carried to the Supreme Court of Nebraska, where the judgment was affirmed. Judge Maxwell, in the opinion, said: "A party entering into a contract to construct a building thereby agrees that all parts of the structure shall be put up according to the agreement. As a defense to inferior workmanship he cannot say, 'I am not a mason, or carpenter, or tinsmith; therefore I am not liable for defects caused by unskillful or careless workmen.' The question is not one of skill on the part of the contractor, but of compliance with the contract. If a con-

tractor agreed to erect a building in a certain manner, he must comply with the agreement, and no plea of a lack of skill of himself or any of his workmen or sub-contractors will constitute a defense for a failure to comply with the contract.

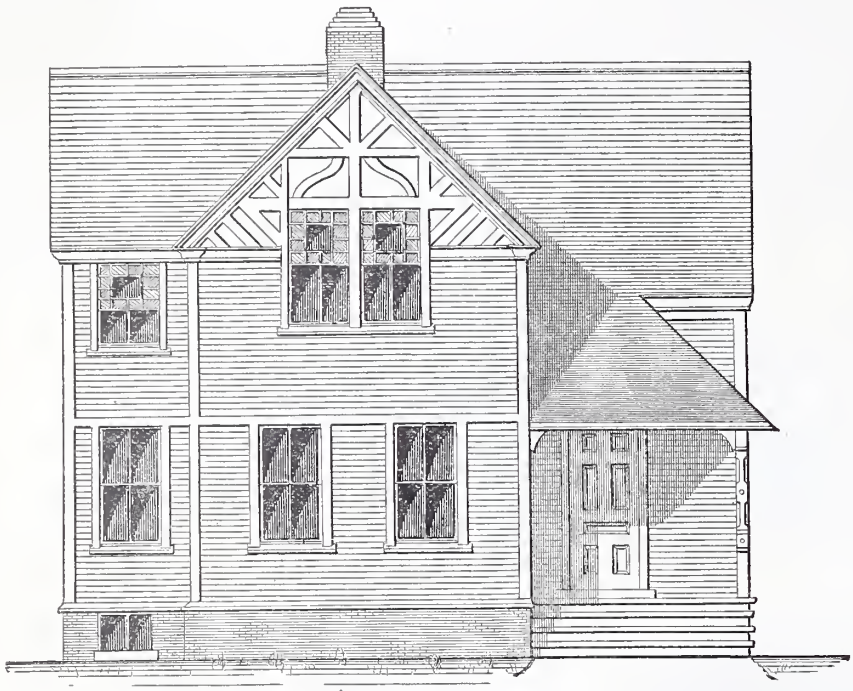
Adaptation in Architecture.

Probably there are very few people who have not at some time or other noted the fact that a building which looks well in one locality looks totally different in another. It is not an infrequent occurrence that a man about to erect a residence sees somewhere a neat and tasty design, and, being pleased with its appearance, proceeds to obtain plans which shall embody "not every single feature, you know, but the general expression of the whole." After the building is completed, the result is in nine cases out of ten very disappointing, and the maker of the plans is blamed—blamed justly, too, to a certain extent, inasmuch as he ought in the beginning to have made clear to the intending builder the reasons why it would not be pleasing when done. He should have explained that the site and surroundings required a structure which should be in harmony with them, and that a building designed for another situation would, unless surrounded by precisely the same conditions, be entirely out of place here. Two examples of such mistakes occur to us as we write. In a busy New England city there stands a picturesque wooden dwelling, which, if situated in a suburban neighborhood and surrounded by trees, would, with its quaint balconies, oriel windows and shingled sides, give a most pleasing effect; but, standing as it does in a cramped yard within 50 feet of one of the principal business streets of the town, the impression conveyed is most painful. Again, in a Western city there stands a brick schoolhouse which, if seen only from a distance, would have a charming appearance, but, being within perhaps 100 feet of one of the most frequented avenues, and being wholly lacking in detail, it seems sadly out of place.

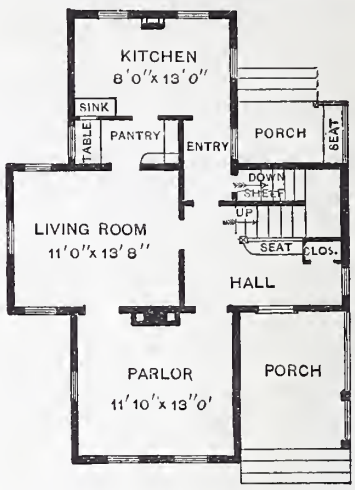
Ever since mankind first began to learn the art of building, this great principle of adaptation to place has been recognized by the most advanced in the arts of design and construction. Even before men had advanced sufficiently to reason why a building looked well in one place and badly in another they knew it to be so, and instinct and necessity helped them to avoid mistakes. We are told that "necessity is the mother of invention," and, as each of the ancient nations which made any pretension to architecture was obliged largely to originate its own style, it is more than probable that stern necessity was at the bottom of their originality.

One point which forcibly strikes every student is that the system in use in any one of the nations of antiquity was admirably adapted to the conditions of nature and the needs of the people existing therein. Take, for example, the structures erected by the Egyptians, which are, perhaps, the most ancient in existence. The habitable portion of the country consisted principally of low, level strips of land adjacent to the Nile, with few hills excepting back among the mountain ranges; and the builders soon learned that under such conditions a pyramidal form was most pleasing. Aside from the mere question of looks, there were other reasons for choosing this form. We find the Egyptian rulers ever striving to make their works as nearly everlasting as possible; and when we remember that it has been truthfully said that the most enduring structure with which man is capable of opposing the elements is a pyramid of earth with sides sloping at a gentle angle, we see at a glance the wisdom of their choice of form. In all probability the immense blocks of stone were substituted for earth in order to offer more effectual resistance to human marauders. Of course, from the very nature of things, it was impossible to compel the Pyramids to do duty as temples; but almost universally through buildings of the latter class, whether erected before or after the construction of the Great Pyramids, do we find adherence to the principles of the former.

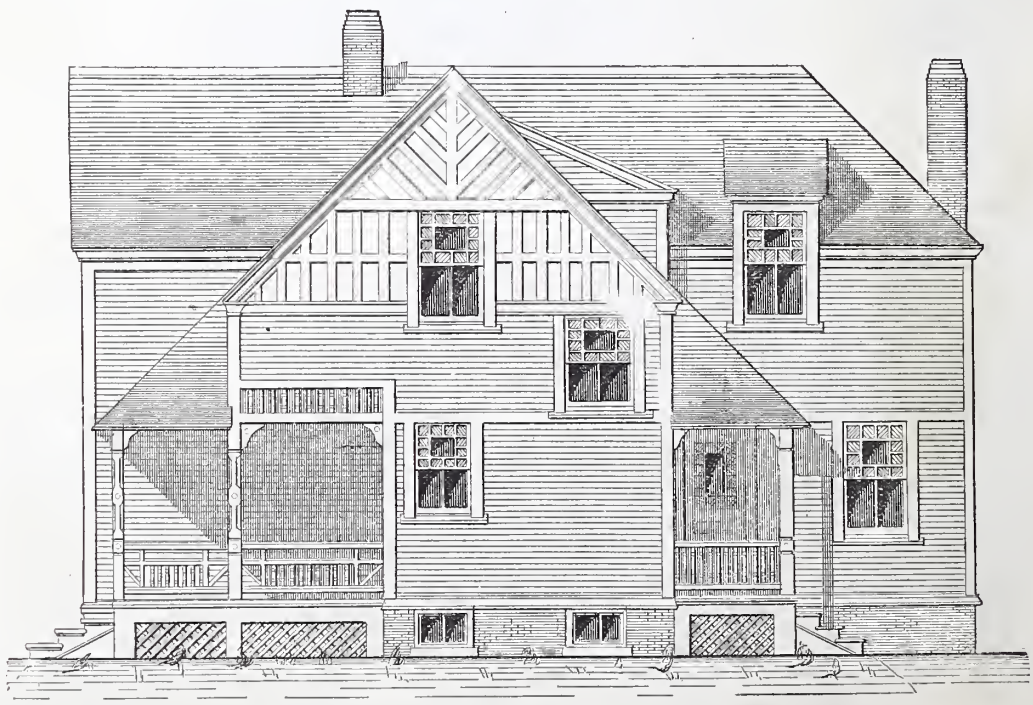
Passing along a little further we come to India, where the climate is much the same as in Egypt in many respects, but where the other conditions are very different. It is rather difficult to assign a valid reason for the existence of those vast rock-cut temples, which, hewn as they are from the living rock, have no parallel in the world's history; but their very difference from any other known work tends to prove the truth of our theory—that nothing else would have been so nearly adapted to the needs of the country. In Greece, the home of classical architecture, the conditions differed from either of the examples already cited. The climate



Fourteenth Competition.—Front Elevation of Design by Mr. Weess.—Scale, ⅛ Inch to the Foot.



First Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.



Side Elevation.—Scale, ⅛ Inch to the Foot.

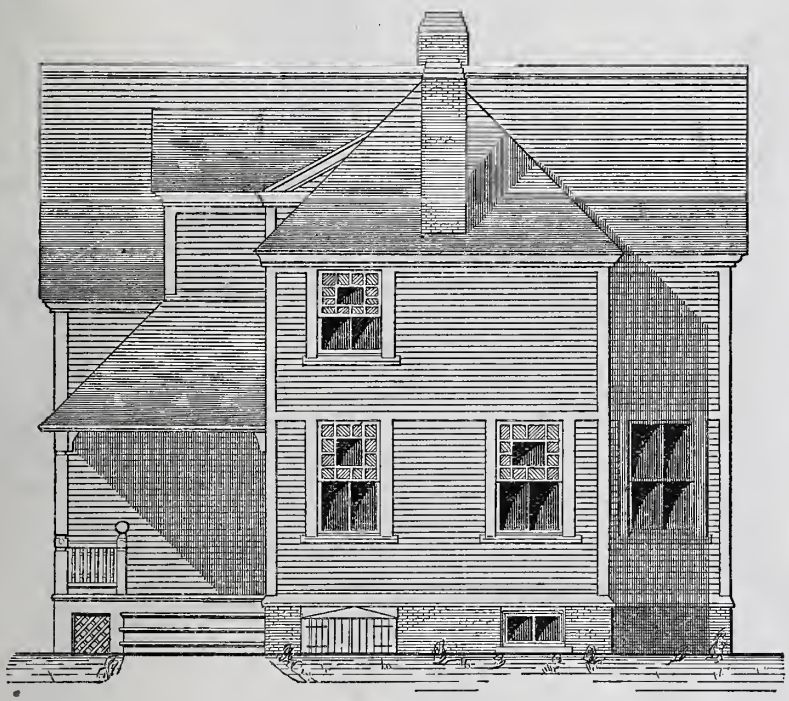
was mild and delightful, and the builders were not obliged to guard against either the burning sun of Egypt or India, or the snows and chilling winds of the northern countries. The surface of the country was rather broken, and contained many small elevations which they delighted to crown with temples. Their chief building-stone, marble, seemed exactly suited to the climate, and gave an effect of solidity combined with liveliness which could be obtained with no other material by builders among whom the arch and its possibilites were unknown.

The Gothic system, on the other hand, came into existence in a cold northern climate where there was much to contend with in the shape of ice and snow and heavy rains, and was designed to meet the exigencies of such regions. The Gothic builders knew better than to use white marble and smoothly-cut surfaces, as did the Greeks. Instead, they made use of a tougher material, with surfaces often left rough where exposed, in order that the elements might leave fewer traces of their destructive work. Their skies were not brilliant enough to permit the shutting out of a large portion of the light, as was customary in more southern countries, and we find all of their cathedrals designed with large and numerous windows in which the direct sunlight was softened—not excluded—by bits of glass of many colors. On account of the absence of earthquakes and similar disturbances, they were able to rear those lofty arches and slender columns—so delicately poised that they seemed liable to fall at any moment, yet so skillfully built that after the lapse of centuries they appear as strong as ever—the admiration and delight of modern artists. Even in China—"the home of the earthquake"—we find a corroboration of our theory in the pagodas and temples, whose elastic timber frames enable them to remain upright through shocks which would prove certain destruction to structures of stone.

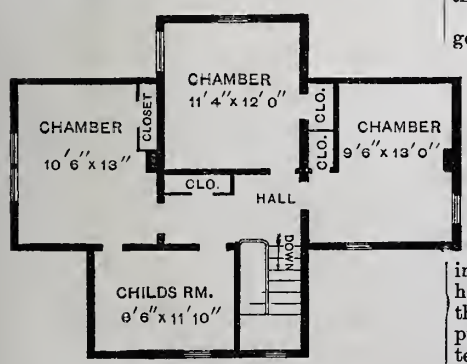
Thus, briefly, we have attempted to show that in each of the ancient nations the prevailing style of building was better suited to the wants of that nation than was any other then in existence. Nowhere do we find traces of any Indian or Egyptian buildings having been introduced into Greece, although we are quite certain that the Greeks were acquainted with Egyptian methods. Nor did any of the tribes of the Northern countries attempt to import Greek or Roman styles, although they frequently wandered as far south as Rome or Athens. No, they knew better than to compel a structure designed for one country to do duty in another where all conditions were totally different, and it was left for more modern builders to undertake, with such results as the semi-classical St. Paul's in comparatively cold and smoky London, and the multitudes of structures with fluted columns, low roofs and pedimented gables scattered all through the northern cities of Europe and America.

So far we have been dealing entirely with generalities; now let us see if we cannot gain a little information from particular classes of buildings, and from parts of the same. Nearly all ancient structures of note were divided into two classes—those for religious purposes and those for defense. Of the former we have already spoken in a general way, and we will turn our attention to the latter. In the warmer climates works of defense seem to have consisted chiefly of immense walls surrounding the cities, with here and there a citadel or keep; but among the feudal lords of the north other conditions prevailed, and gave rise to the castles scattered all through Great Britain, Germany and France. Investigation shows that these castles almost invariably crowned some eminence—usually rocky and difficult of access—and that, while almost devoid of outward ornamentation, their outlines partook largely of the spirit of their broken and irregular sites, forming a most picturesque aspect. Their builders understood that their work was to be seen principally from a distance, and disposed of their masses in such a way as to obtain the desired result without recourse to detail. Later on, after the dwellers in cities had become wealthy, through success in their business pursuits, they, too, began to turn attention to the building of substantial residences. Do we find many castellated dwellings lining the streets of Germany or England? No, far from it. The designers knew that the city walls would furnish all necessary defense, and that, as the buildings were to stand close upon the street, they must be able to bear close inspection. Hence we find everything, even to the most minute details, wrought out with the greatest care.

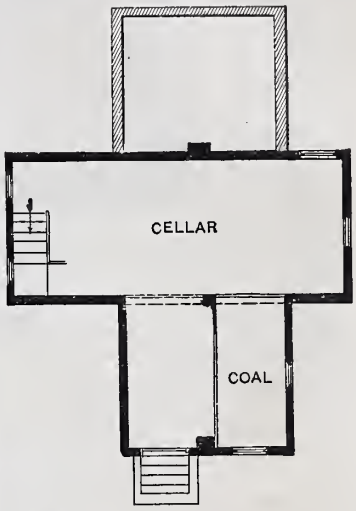
If we examine closely the moldings, finials, oriels or dormers of one of these old buildings, we find that no other forms would have filled the places so well as those used. Perhaps the contrast between the two kinds of effect of which we have been writing can nowhere be seen to better advantage than along the River Rhine. Crowning almost every hight along its banks are still to be seen the remains of the homes of the petty princes, accessible by a single narrow way, without outward ornament of any kind, yet so arranged as to be beautiful even in their decay; while nestling at the foot of the



Fourteenth Competition.—Rear Elevation.—Scale, ⅛ Inch to the Foot.



Second Floor Plan.—Turned to Agree with Side Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.



Cellar and Foundation Plan.—Turned to Agree with Rear Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.

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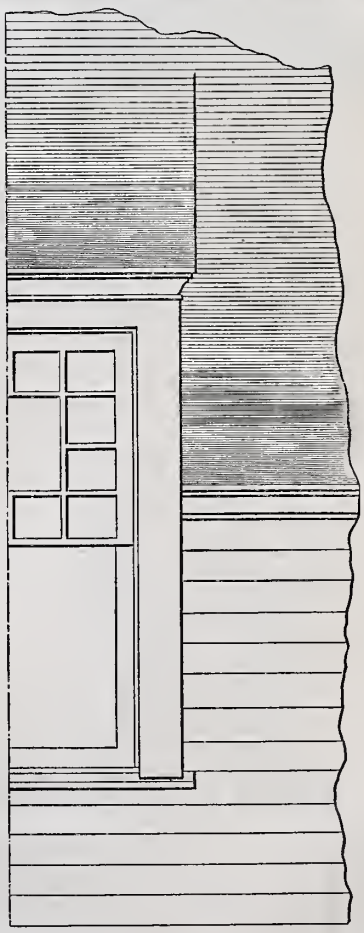
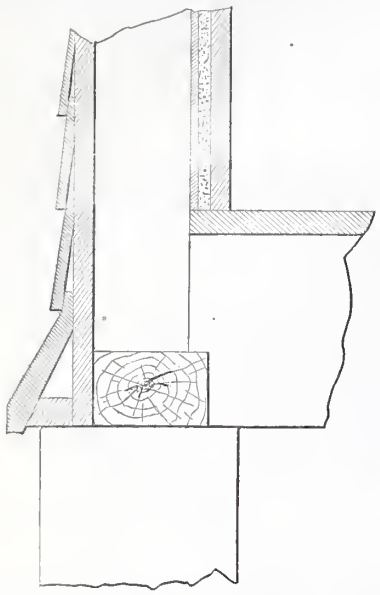
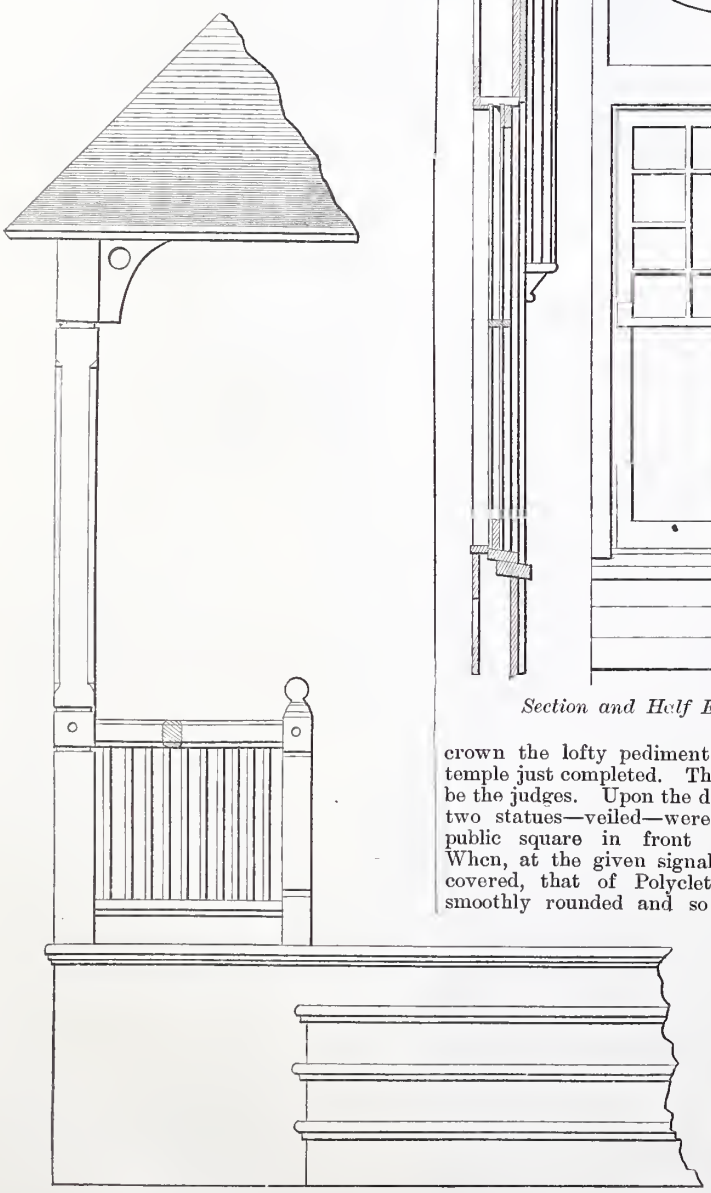


Half Elevation of Dormer.—Scale, ½ Inch to the Foot.

cliffs under the shadows of these same castles, we find those beautiful German cities, along whose every street stood and still stand the dwellings of the merchant princes,



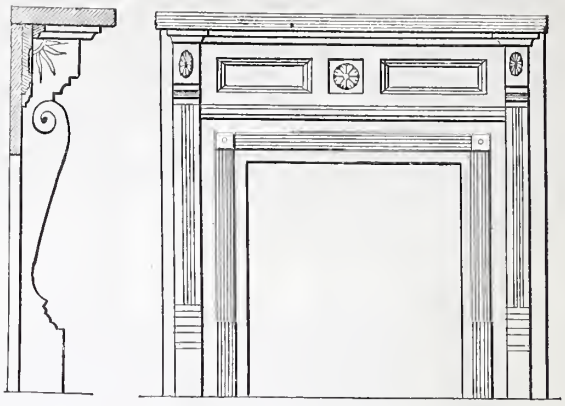
Fourteenth Competition.—Design by Mr. Weess.—Section Through Water-Table, Sill, &c.—Scale, ½ Inch to the Foot.



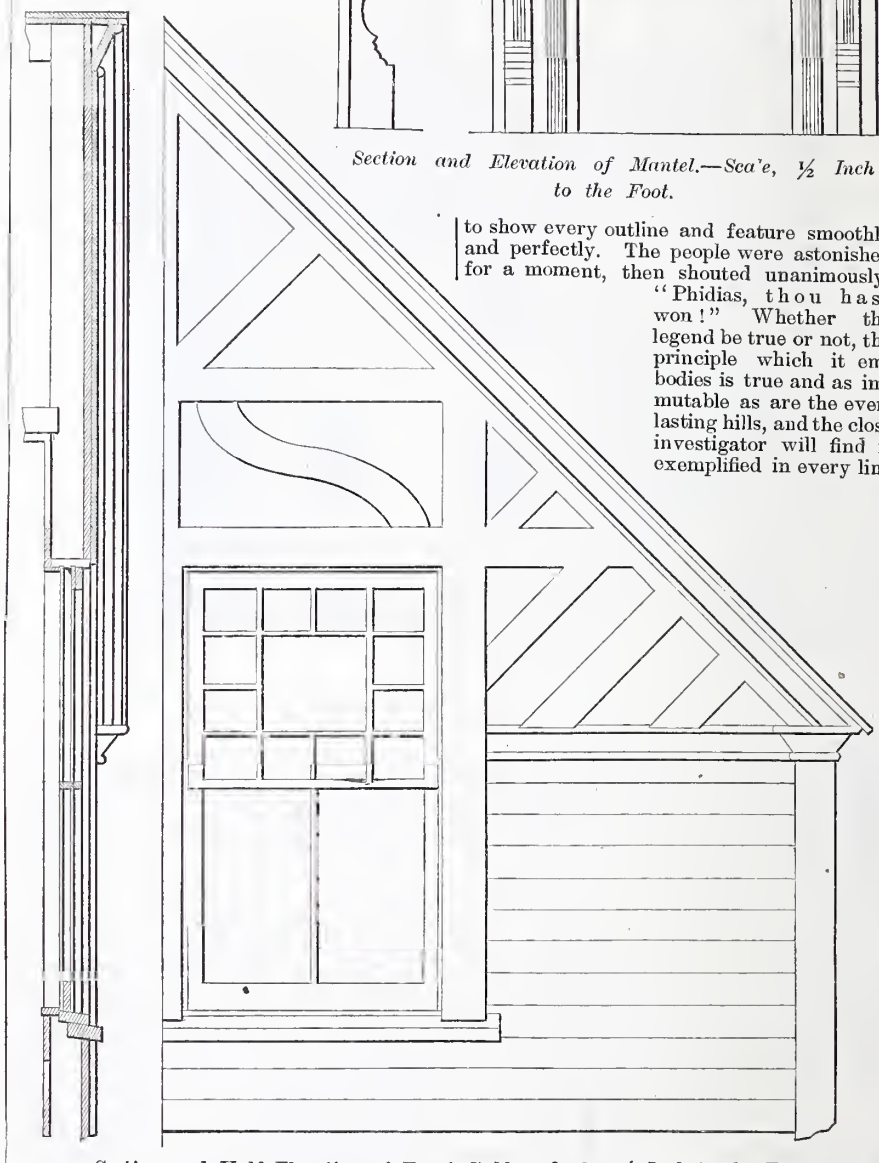
Partial Elevation of Rear Porch —Scale, ½ Inch to the Foot.

designed to be seen by passing crowds every hour of the day, and having every bit of molding or carving wrought out with infinite care and pains.

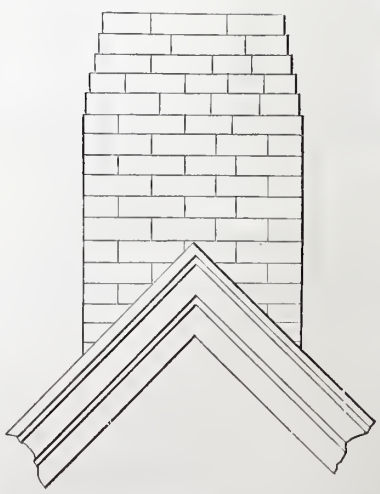
Looking again, we see that work designed for use at an elevation of 40, 50 or 100 feet was never used near the level of the eye, and that anything suitable to be seen closely was not sent up aloft. This is one of the most important laws of design, and should never be lost sight of. There is an ancient legend to the effect that two of Athens' greatest sculptors —Phidias and Polycletus— were once invited to compete for the honor of making the statue of Jove which was to crown the lofty pediment of a magnificent temple just completed. The people were to be the judges. Upon the day appointed, the two statues—veiled—were brought to the public square in front of the temple. When, at the given signal, they were uncovered, that of Polycletus appeared so smoothly rounded and so beautifully life-like that it was almost impossible to believe it to be the work of mortal hands, while that of Phidias looked rough, angular and crude by comparison. At once the shout went up "Polycletus, the prize is thine!" But, Phidias, standing beside his handiwork, simply said, "Let them be hoisted to their places." The workmen at once complied, when it was seen that the smooth and perfect work of Polycletus had dwindled to insignificance and appeared a shapeless mass against the sky, while the other, toned down by the distance, seemed to show every outline and feature smoothly and perfectly. The people were astonished for a moment, then shouted unanimously, "Phidias, thou hast won!" Whether the legend be true or not, the principle which it embodies is true and as immutable as are the everlasting hills, and the close investigator will find it exemplified in every line and ornament of ancient work. Thus we have followed this idea of adaptation



Section and Elevation of Mantel.—Scale, ½ Inch to the Foot.

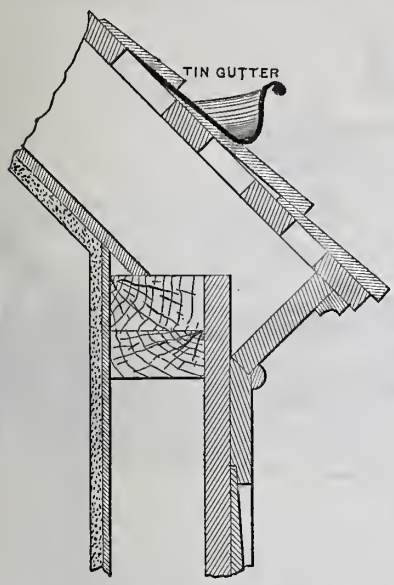


Section and Half Elevation of Front Gable.—Scale, ½ Inch to the Foot.



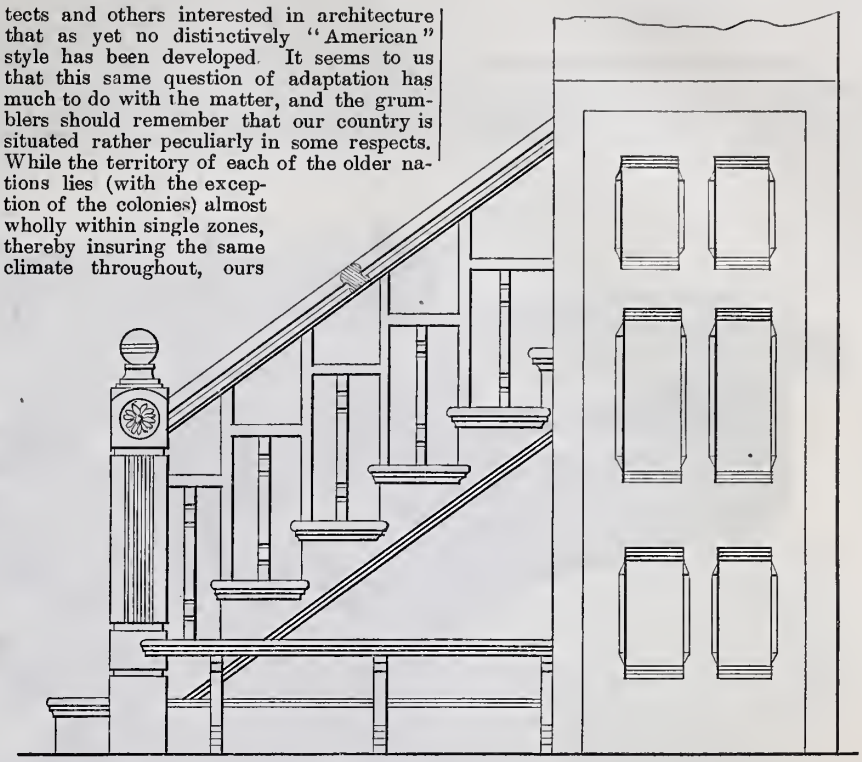
Elevation of Chimney.—Scale, ½ Inch to the Foot.

through a few of its various stages, and have seen what was at first a mere instinct, originating in necessity, grow in length and breadth until it became a law governing not only the general style of a nation, but each individual work and portion of the same.

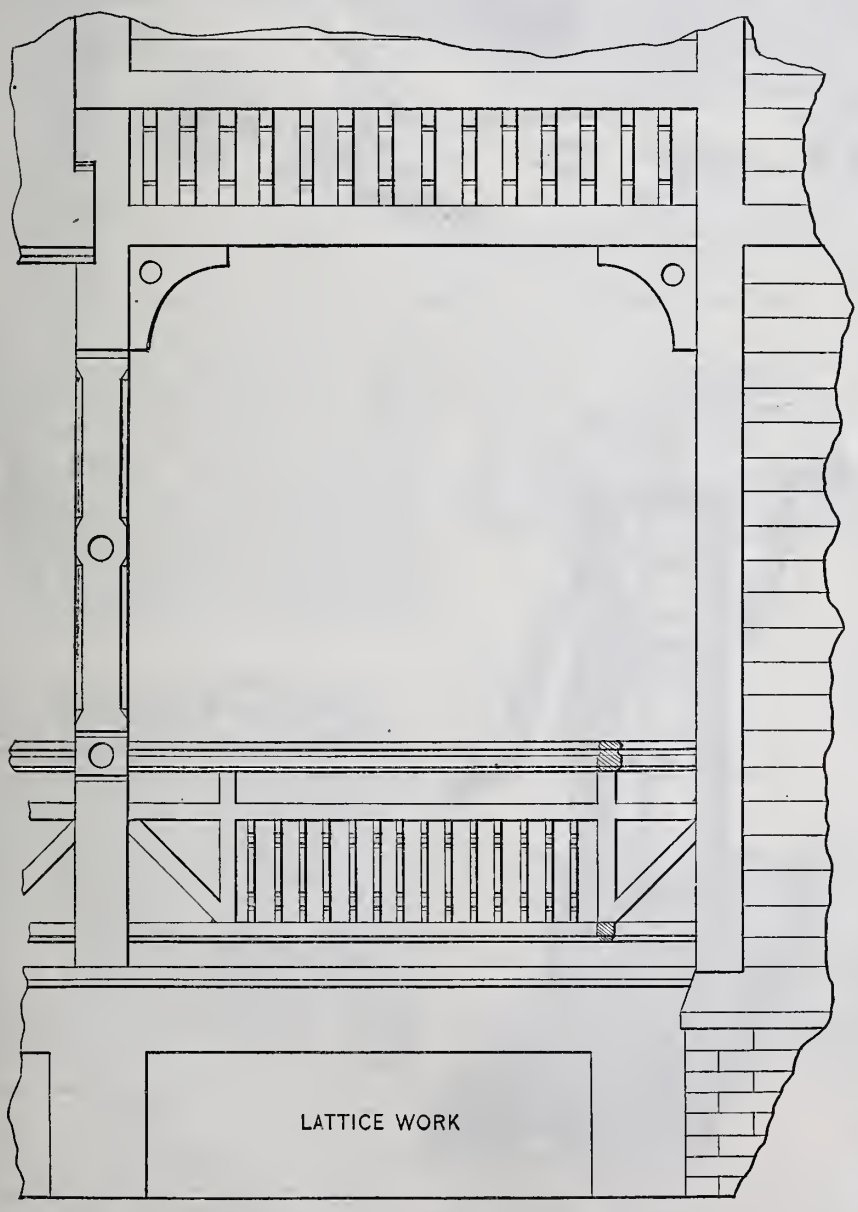


Fourteenth Competition.—Section Through Cornice.—Scale, 1½ Inches to the Foot.

tects and others interested in architecture that as yet no distinctively "American" style has been developed. It seems to us that this same question of adaptation has much to do with the matter, and the grumblers should remember that our country is situated rather peculiarly in some respects. While the territory of each of the older nations lies (with the exception of the colonies) almost wholly within single zones, thereby insuring the same climate throughout, ours

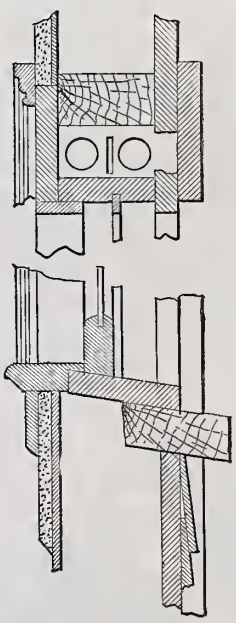


Elevation in Hall Opposite Front Door.—Scale, ½ Inch to the Foot.



Details of Front Porch.—Scale, ½ Inch to the Foot.

One more point and we will close this somewhat rambling paper. It has come to be a standing complaint among our architects and others interested in architecture that as yet no distinctively "American" style has been developed. It seems to us that this same question of adaptation has much to do with the matter, and the grumblers should remember that our country is situated rather peculiarly in some respects. While the territory of each of the older nations lies (with the exception of the colonies) almost wholly within single zones, thereby insuring the same climate throughout, ours extends from a northern latitude in which winter reigns from November until March to the semi-tropical tropical regions of the South, were frost is never known; and any style developed in the North would be as much out of place and as incongruous in the South as would a Gothic temple upon the Acropolis of Athens. Nor would a system originating in the South be any better suited for use in the North. To be sure, there are isolated examples of old Gothic work scattered through the more southern portions of Europe, and comparatively modern imitations of Greek and Roman work can be found in abundance in the northern parts; but, however much intrinsic merit these



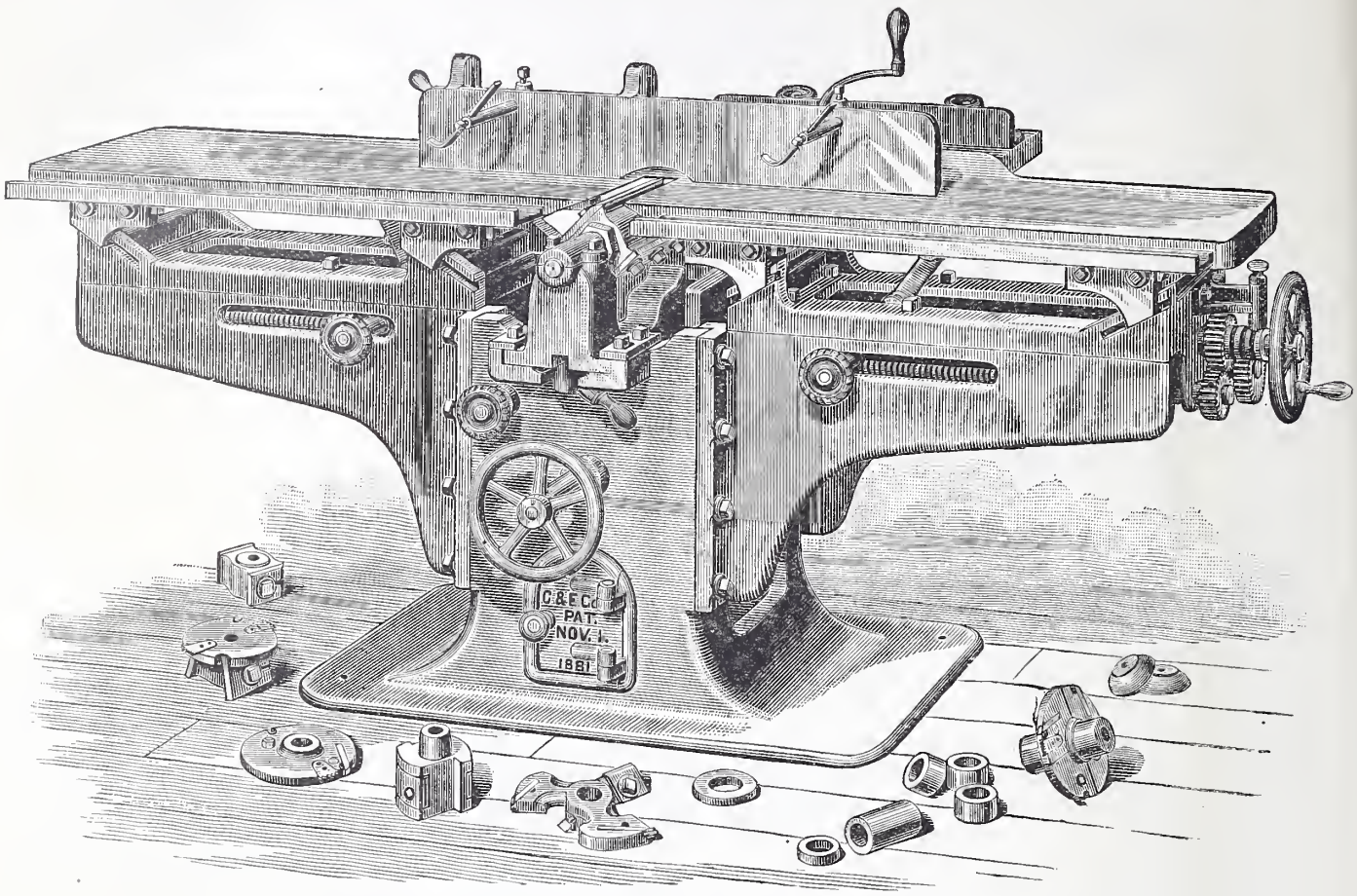
Sections of Window Finish.—Scale, 1½ Inches to the Foot.

structures may possess, there is always a sense of their being out of their element. Hence, while we fervently say God speed the day when our architecture shall display something of originality, we think it will be a long time before the cry for "the American style" will be answered; for, as long as natural laws render it impossible for an object to be both black and white or hot and cold at the same moment, just so long will those same laws prevent the invention of any one style which shall be thoroughly adapted to the requirements of regions in which the natural conditions are diametrically opposite.

NOVELTIES.

"Universal" Wood-Worker.

In Fig. 1 of our "Novelties" this month is shown a new and improved machine of the class known as "Universal" wood-workers.



Novelties.—Fig. 1.—"Universal" Wood-Worker, Built by the Cordesman & Egan Co., Cincinnati.

It is a recent production of the Cordesman & Egan Company, of Cincinnati. It is an improvement on the machine built by them which last year received the highest medal over all competitors at the Cincinnati Industrial Exposition. One of the features of special importance is the method of raising and lowering the tables, either separately or together. This is accomplished by means of a hand-wheel placed on the operating side of the machine. By revolving this wheel either or both tables can be moved up or down, the edge of the table always keeping a proper distance from the head. The movement is on a circle around the head. By means of the hand-wheel shown in front, both tables are raised or lowered together in a straight line. In order to have free access to the head for whetting the knives, changing the heads or putting on a saw, the tables are capable of being moved a considerable distance from the head. To do this it is only necessary to loosen the small hand-wheels shown at the front of the machine. There are various other desirable features in design and construction about this machine which our practical readers will perceive upon inspection of the engraving. The company inform us that the demand for this machine is large and steadily increasing, and that the machines have given satisfaction wherever tried. The particular point which the manufacturers point out in this machine as being of special value and novelty is the connected and movable bearings, which are adjustable laterally across the machine in dovetail slides, by means of a hand-wheel in front. Thus, when the operator has the fence set for doing work, he can adjust the head to a positive certainty to the very line wanted—a point which is much appreciated by all classes of wood-workers. A boring machine and routing table having a very large range of work is attached to this machine when wanted. A fence for angle-boring is fitted on the table, with stops for spacing the holes and routing.

The "Ajax" Boring Machine.

R. L. Orr & Co., Limited, Pittsburgh, Pa., are introducing a new self-withdrawing wood-boring machine, a view of which is presented in Fig. 2 of the engravings. This machine is warranted by the makers to do all that other wood-boring machines accomplish, and is claimed to have several important advantages peculiar to itself. An important feature is that it does not require a special auger. Any auger of the kind

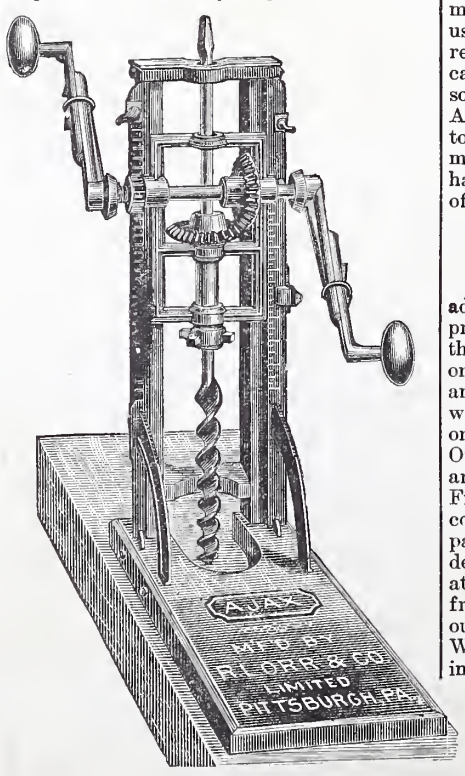


Fig. 2.—The "Ajax" Wood-Boring Machine.

commonly used by carpenters and car-builders, or in any wood-boring machine, may be used, and even an ordinary brace-bit may be employed. It makes no difference whether the shank is long or short, round or square. The machine is simple, thoroughly constructed, and is not liable to get out of order. It is shapely in its parts and well finished. It is made interchangeable, so that if any member is broken it can be readily replaced. It is adjustable so that it may be used either upright or inclined. It can be set to bore any depth of hole, and, when the required depth is reached, the auger is withdrawn quickly by the same motion and without stopping. When not in use it folds together very compactly, thus requiring comparatively little space in a carpenter's chest. The arms are adjustable so that different leverages may be obtained. A gauge for marking the depths of the holes to be bored is placed on one side of the machine, and in other respects the device has been well calculated to meet the wants of builders who employ such tools.

New Rain-Water Cut-off.

It is hardly necessary to argue about the advantages of rain-water cut-offs at the present time. Their use is so general and their utility so manifest that there is but one side to the question. Still, there is choice among the different devices for this purpose which are now before the public, and new ones are occasionally being added to the list. Our attention has recently been drawn to an article of this kind made by W. F. B. Fischer, Springfield, Ohio, and which is covered by recent United States and Canada patents. The special advantages of this device to which the manufacturer directs attention are that it can be operated in freezing weather, and that it can be cleaned out without taking down to get at the inside. When the cut-off is open the hand can be inserted for the purpose of lifting out leaves and other rubbish that may have accumulated. The cut-off differs from many in common use in the fact that it has an open outlet at the side. When closed the water has a direct course through the spout. When open a side outlet is provided, throwing the water into a trough or into an open hopper connected with the drain-pipe, as circumstances may determine. When closed the device looks like a part of the conductor.

When open it is a cut-off without extra elbows, and its construction is such that it may be used in any position. If a roof is dusty the water should be cut-off from the cistern until the dirt has been thoroughly rinsed from the roof. By admitting water to the cistern under these circumstances only pure, clean rain-water will be saved, and the annoyance of frequently cleaning the cistern will be avoided. If the cistern is large it is good policy to save water during the cool months and to cut it off during the warm months. A cut-off becomes a necessity to avoid an overflow when the cistern becomes full, and its employment has the advantage at all times of giving perfect control of the cistern.

A New Drive Screw.

Many of the coach or lag screws now in use by railroad companies, telegraph companies and car builders are driven into the wood without the boring of a hole, instead of being screwed in. Heretofore coach and lag screws, whether intended to drive or screw into the wood, have commonly been made with conical or conoidal points of various shapes and angles, the base of the point being equal in diameter to the shank of the bolt, including the thread. When such screws are driven into the wood they tear and lacerate the fiber to a greater or less extent, according to the shape and size of the point, and when driven into a hole of the size of the shank at the bottom of the thread there is no guide by which an equal pressure or bearing can be insured all around the hole. The consequence is frequently that a bolt when thus driven will not align properly, and will lose much of its holding power, while in soft, spongy wood it often fails to hold at all, and can be as easily withdrawn as a nail. The drive screw represented in the accompanying cut, Fig. 3, is designed to avert these objections, and was patented November 27, 1883, by T. J. Bray. This new drive screw is made with a point the base of which is of the same diameter as the shank of the bolt, *not* including the thread, and with a cylindrical part between the base of the point and the commencement of the thread, which acts as a guide or lead upon entering the wood. The thread of this screw is made ratchet shape, so that, after the cylindrical portion of the shank above the point has entered the wood, the thread may follow along, separating the fibers without lacerating them, thus making the hold of the thread very secure in the solid wood. These screws, it is claimed, can be very readily driven into hardwood, and by their use, instead of the common screw, which has to be turned in with a wrench, very much labor be saved. This patent is owned and the screws are manufactured by Oliver Brothers & Phillips, of Pittsburgh, whose headquarters in New York are with the Henry B. Newhall Company, at No. 105 Chambers street.

Novelties.—Fig. 3.—New Drive Screw.

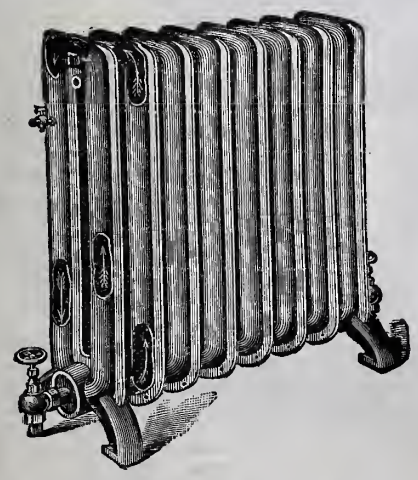


Fig. 4.—Loop Radiator, Made by the Detroit Steam Radiator Co., Showing Circulation.

Steam Radiators.

The Detroit Steam Radiator Company, No. 129 Griswold street, Detroit, Mich., are introducing a new form of cast-iron steam radiators suitable for use in heating public and private buildings, railroad cars, steamboats and the like. The radiators are made in various forms adapting them to the different uses above mentioned and to the different positions in which they may be placed.

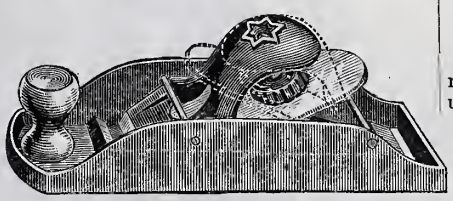


Fig. 6.—Double-End Block Plane.

Several unusual varieties of design are shown in their catalogue, among which may be mentioned a radiator, for dining-room use, constructed with a closet which serves as a dish-warmer. Another form is adapted to be placed in front of the window in a room, for which purpose it is cut away at the center, bringing the central parts up to the level with the window-sill, while on either side the radiator is of full hight. This construction does away with the unseemly coil of pipes that is occasionally used in front of windows in offices and hotel rooms. The special features of construction in this radiator will be understood by an examination of Figs. 4 and 5 of our engravings. The former represents a loop radiator without a top, and with the walls broken away in such a manner as to show the course of circulation. Fig. 5 shows a horizontal section through the radiator at the line of nipples, and also shows the circulation. The radiators made upon this principle are adapted to both high and low pressure systems of heating. The construction, it will be seen, is upon the same principle as that of the coil. A diaphram separates one leg of the loop from the other, so that steam entering passes up one leg to the top of the loop, down the other leg to the opposite side of the diaphram, thence into the next loop, and so on through the radiator, thus securing perfect circulation and an immediate heating of the whole radiator. The action of this device is noiseless, for the reason that each section is constructed with a drain passage at the bottom in such a way as to leave little or no accumulation of water from condensation for the steam to come in contact with, thereby preventing the cracking and snapping noise frequently experienced with common radiators. Various other advantages are pointed out in the company's circular, among which may be mentioned that, in case of damage by frost or otherwise, radiators made upon this principle can be easily repaired without removal from the building.

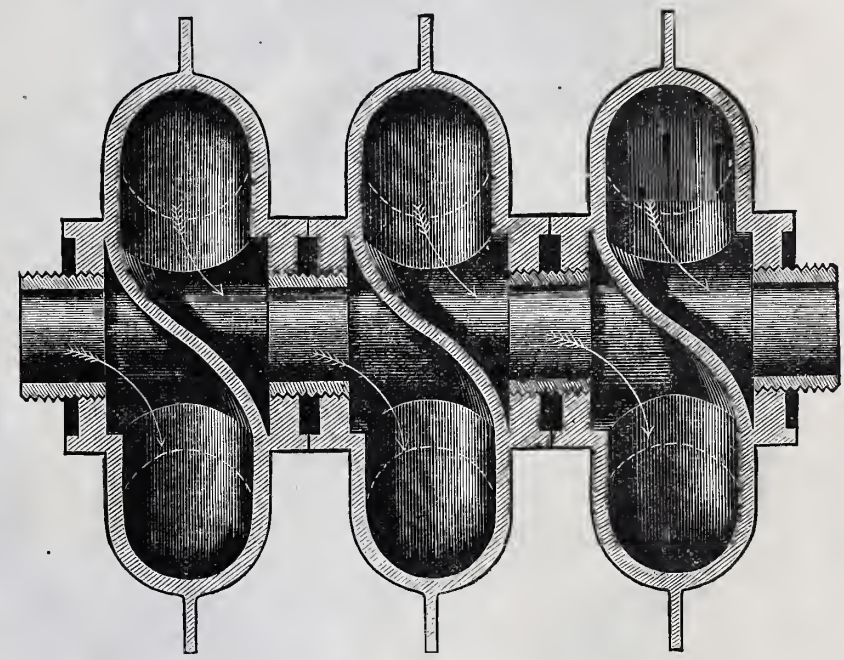


Fig. 5.—Horizontal Section Through Radiator at Line of Nipples, Showing Circulation.

Improved Planes.

There are shown, in Figs. 6 and 7, two new planes which have recently been put upon the market by the Stanley Rule and Level Company, New Britain, Conn. Fig. 7 illustrates what is known as Traut's adjustable beading, rabbet and slitting plane. This tool embraces in a compact and practical form several distinct articles. There is a beading and center beading plate, a rabbet and filletster, a dado, a plow, a matching plane and a superior slitting plane. The manufacturers assure us that in each of the several forms the plane will do perfect work, even in the hands of ordinary mechanics, while in the hands of experts it becomes still more useful. The simplicity of construction and adaptation of parts render it very easily understood and managed. Each plane is sent out accompanied by seven beading tools, ranging from ⅛ to ½ inch in size, and also by nine plow and dado bits,

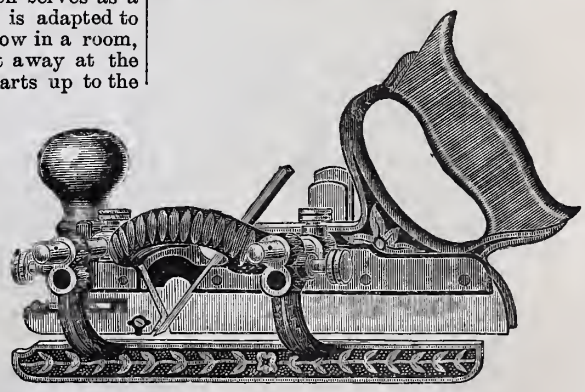
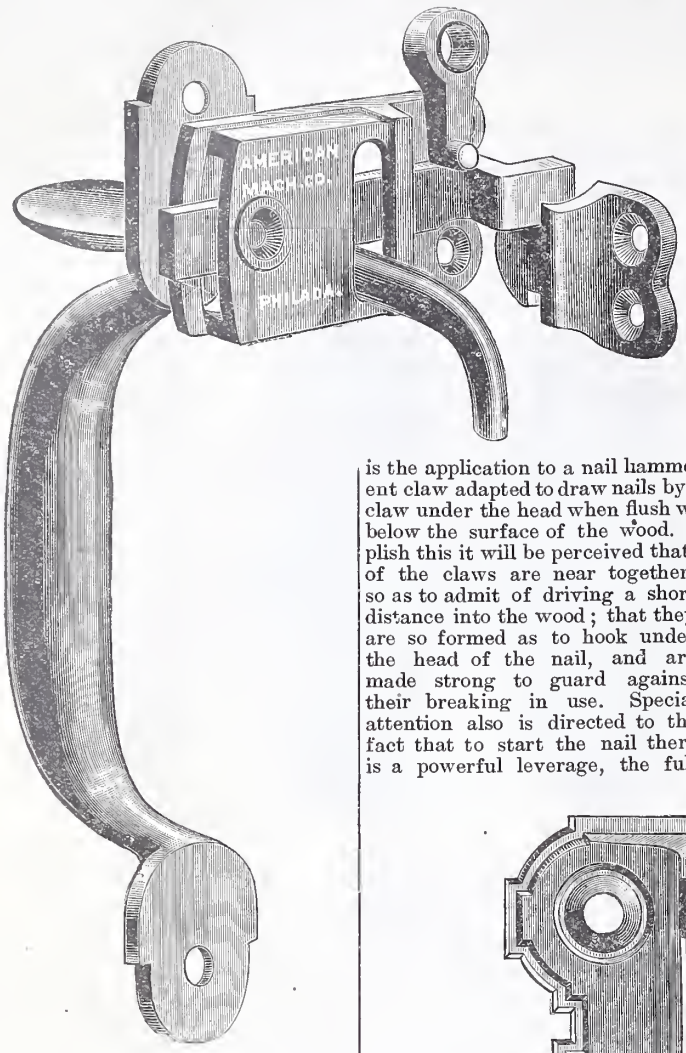


Fig. 7.—Traut's Patent Adjustable Beading, Rabbet and Slitting Plane.

ranging from ⅛ to ⅞ inch in size. There are also sent a slitting blade and a tonguing tool. The tool shown in Fig. 6 is described as a double-end block plane. It is provided



Novelties.—Fig. 8.—The Crown Screen-Door Latch.

with two slots or cutter seats. It may be used as a block plane, or, by reversing the position of the cutter and clamping wedge, as shown by the dotted lines in the cut, it

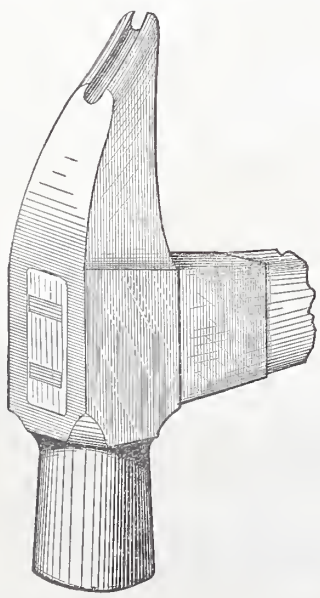


Fig. 9.—The Hammer Nail Puller.

can be used to plane close up into corners and other places difficult to reach with ordinary tools. Both of these articles are sold through the regular hardware trade.

The Hammer Nail Puller.

The illustration shown in Fig. 9 represents a combined hammer and nail puller, made under a patent of July 30, 1878, by George B. Curtiss, 95 Chambers street, New York, by whom it is now for the first time put on the market. The special feature in this tool is the application to a nail hammer of a patent claw adapted to draw nails by driving the claw under the head when flush with or sunk below the surface of the wood. To accomplish this it will be perceived that the points of the claws are near together, so as to admit of driving a short distance into the wood; that they are so formed as to hook under the head of the nail, and are made strong to guard against their breaking in use. Special attention also is directed to the fact that to start the nail there is a powerful leverage, the fulcrum being at first very near the end of the claws, but as the nail is lifted, and less power is required, it gradually moves toward the handle and face of the hammer. It is claimed that in this way ease and rapidity of working are secured. The manufacturer's directions for the use of this nail puller are as follows: To draw nails, set the claw close to the head of the nail, with the handle well down, and strike on the face a smart blow with a mallet. Use the claw to pry off the hoops. To draw finishing nails, set the claw across the grain against the side of the nail. Other advantages claimed for this article above other nail pullers are that it is practically noiseless in operation, and as a first-quality cast-steel adze-eye nail hammer is guaranteed to be equal to any that have been made.

Nine buildings forming the principal business blocks of Tacoma, W. T., were destroyed by fire on the 13th ult., involving a loss of $175,000. Preparations for rebuilding a number of them are already under way.

Screen-Door Latch.

Fig. 8 shows in a very complete manner a screen-door latch, called the "Crown," manufactured by the American Machine Company, corner of Lehigh avenue and America street, Philadelphia. The special features to which the makers direct attention are the simplicity of this device, its practicability and its cheapness. The engraving represents the parts in their relative positions as they would be applied to a door. It will be noticed that the door can be locked from the inside by simply dropping the catch shown above the latch. The need of an effective fastening of this kind adapted for use on screen doors has been felt by all carpenters and builders who have had occasion to put up work of this character. It would seem, from inspection of the article here shown, that the wants of builders in matters of this kind had been very carefully studied, and that they had been met with a considerable degree of success.

The Nickel Spring Hinge.

A new form of spring hinge which the manufacturers, the Ohio Butt Company, No. 51 Dearborn street, Chicago, are now offering, possesses features which are likely to make it popular with builders and all who have occasion to use such an article. The general appearance of the hinge, which is seen in Fig. 10, shows that it is neat and compact. The manufacturers claim for it that it is made out of fewer pieces than other spring hinges, that it has less complicated mechanism, no weak parts to break, and no defective fastenings. Considerable time has been spent in perfecting this hinge, and, in the light of long experience in manufacturing other patterns of spring hinges, great care has been taken to get all the parts properly proportioned, of ample strength, and in all respects well adapted to withstand the strains of every-day use. This hinge holds the door closed or wide open, as may be desired, but its construction is such that it cannot hold the door slightly ajar. The greatest force of the spring is exerted when the door is tightly closed. A special feature of the hinge is the absence of a pintle. The parts are so arranged that the spring moves after the manner of an eccentric as the door is opened, passing a neutral point when the door has moved through an arc of something more than 90°. Forward of the neutral point the strength of the spring is exerted to close the door, and after passing the neutral point its tendency is to open the door. The hinge is fitted and put together in the fac-

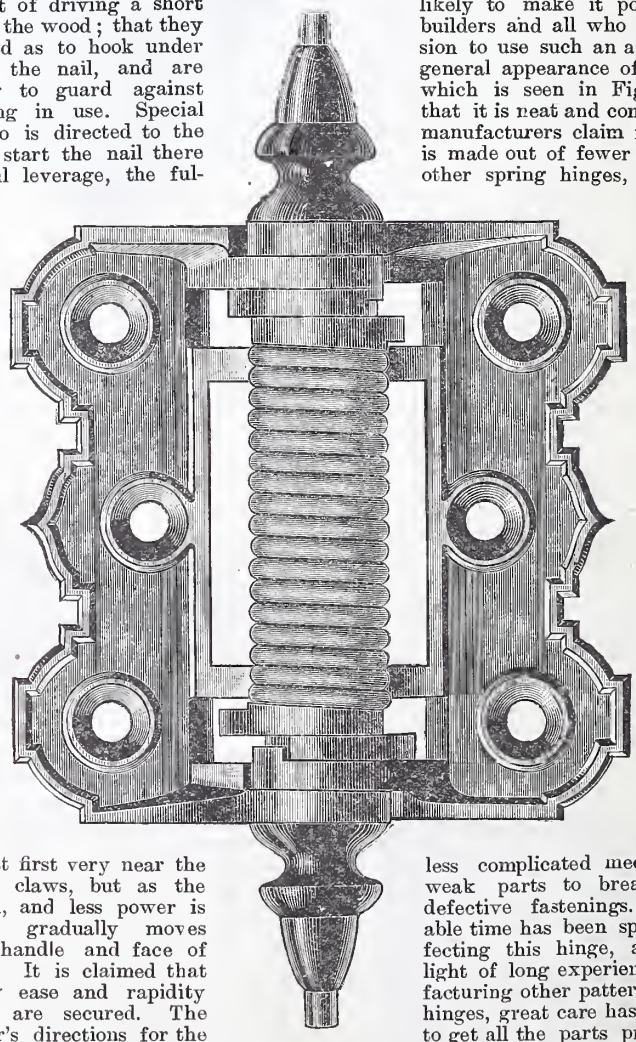
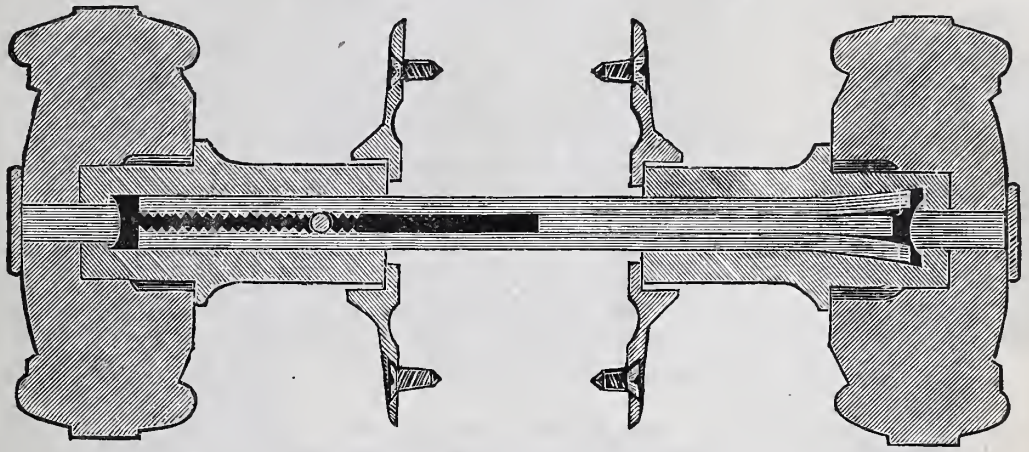


Fig. 10.—The Nickel Spring Hinge, Made by the Ohio Butt Co.

tory, and is ready for use without further adjustment. The manufacturers claim that the spring will retain its tension and do its work perfectly until the hinge is worn out. Two styles are made, one finished in black japan and the other in copper bronze.

The Gonne Door-Knob.

The Climax Door Knob Company, of 119 Fort street, Detroit, Mich., are directing the attention of architects and builders to a new construction in door-knobs, the merits of which may be judged from Figs. 11 and 12 of the engravings. One end of the spindle is permanently fastened into one of the knobs by spreading and riveting. This is accomplished by a pin which is inserted between the two thicknesses of Norway iron of which the spindle is composed. The opposite knob is made adjustable to fit different thicknesses of doors, by means of a number of small grooves formed upon the inner surfaces of the two portions of the split spindle, and a brass pin which, as shown in Fig. 12, is driven through them. By this means very slight variations in thickness are fully provided for, and a ready means is afforded of removing the knob from the door should such a course ever be necessary. The pin acts as a key to force the sides of the spindle up tight to the sides of the neck. The engraving also shows a section of the roses which finish the opposite sides of the door around the spindle, and the mode of fastening them in place. The knobs, as shown in the cut, are fastened to the sockets by rivets which are finished with plated heads. A special advantage to which the manufacturers call attention is the rapidity with which these knobs may be applied. The statement is made that these knobs can be applied to doors four to one faster than knobs of other construction. It is obvious from the engravings that the annoyance of rings or washers for the purpose of adjusting knobs to the thickness of doors is entirely overcome by this device. These knobs are arranged to be suitable for all kinds of locks, and when once in place are not liable to get out of order, no matter how hard the usage.



Novelties.—Fig. 11.—The Gonne Door-Knob, Made by the Climax Door-Knob Co., Detroit.

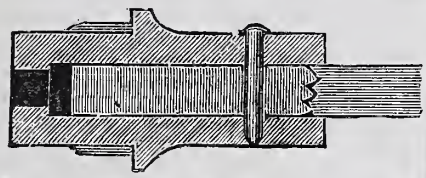


Fig. 12.—Section Through Spindle.

Tilting-Top Saw Table.

Messrs. Goodell & Waters, of 3100 Chestnut street, Philadelphia, are introducing a tilting-top saw table of the kind shown in Fig. 13 of the engravings. This machine is designed for a large variety of work, slitting, cutting, grooving, mitering and other similar operations. It possesses many conveniences not found in other machines. The saw mandrel is hung on a casting swung on the counter-shaft. It can be raised and lowered at will by the hand-wheel in front. The table can be tilted to any required angle without interfering with or stopping the saw. The table is iron, planed perfectly smooth, and is fitted with square or bevel gauges. The capacity of the machine is such as to carry an 18-inch saw. The counter-shaft is attached to the main frame and has tight and loose pulleys 10 x 4 inches. The machine is calculated for a speed of 750 revolutions per minute. Referring to the engraving, it will be noticed there is a graduating index at the side of the machine. By this the exact angle at which the table is set with the saw is indicated, thus facilitating adjustment without the necessity of testing the angle by a set square or some similar device.

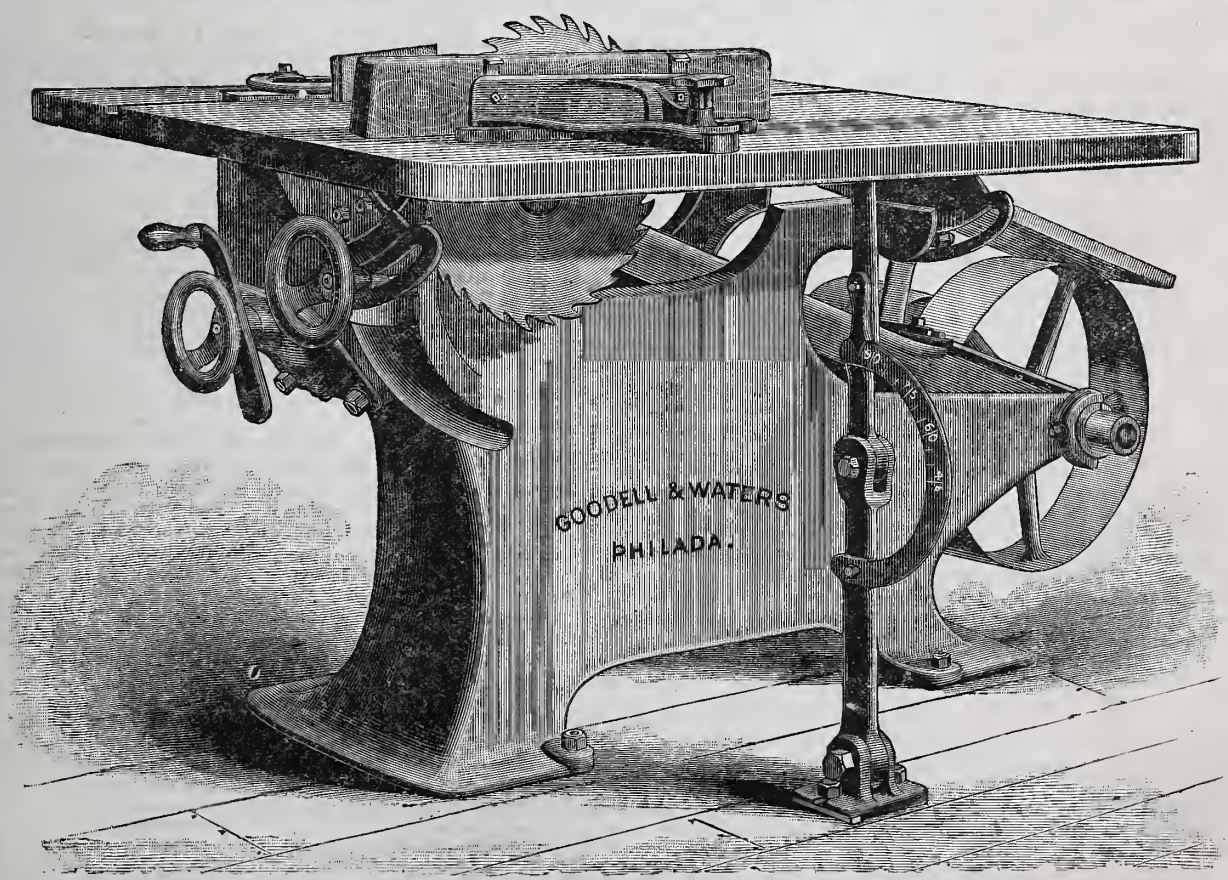
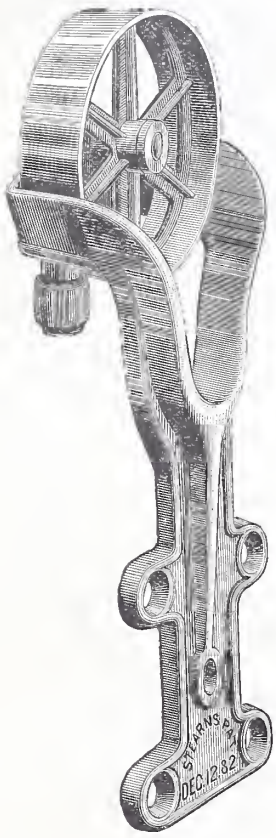


Fig. 13.—Tilting-Top Saw Table, Built by Goodell & Waters, Philadelphia.

The Stearns Barn-Door Hanger.

Another addition to the large assortment of barn-door hangers now before the public has been made by Messrs. E. C. Stearns & Co , of Syracuse, N. Y. The general appearance of this article may be gained by inspection of Fig. 14 of our engravings. The manufacturers describe it as the only hanger made having a hardened bearing and a wheel turned and finished perfectly. The small roller, shown in the illustration at the



Novelties.—Fig. 14.—Barn-Door Hanger, Made by E. C. Stearns, & Co , Syracuse, N. Y.

back, prevents any side friction. Our readers generally will appreciate the neatness of the design and the care with which the parts have been proportioned so as to obtain the greatest strength at points where it is needed.

TRADE PUBLICATIONS.

Structural Decoration.

Some months since we noticed a neat little pamphlet bearing this title, issued by the H. W. Johns Manufacturing Company, of New York. This little work has proved so acceptable to the builders and house owners whose attention has been called to it as to exhaust several editions. Recently tbe work has been revised and enlarged, but the special features which we took occasion to strongly commend in our first notice have been retained, although greatly improved, and in their present form are very likely to make this edition even more valuable than its predecessors. The special lines of goods described in this little book are the prepared paints for which this company are famous. These, as our readers know, are made of various shades and colors, adapting tbem to use almost everywhere. Particular attention has been given to the production of tbose particular shades which are at present so popular, and which are a conspicuous feature of the so-called "modern antique" houses found at all the watering places, and, indeed, in every town and city in the land. The sample cards which have been issued to show these colors are very attractive, and, in a way, serve a very good purpose; but they fail to show in au effective manner good combinations and pleasing contrasts—as, for example, in body colors and trimmings. This, however, has been accomplished in the present work. The sample pages of colors, of wbich there are several in each copy, are arranged in a way to practically illustrate harmonies and contrasts, and thus the reader is furnished with a treatise on house painting at once effective and cheap. Few people of even educated tastes and fine perceptions are able, without long practice, to select colors for a building which, when applied, will come up to expectations, especially in the case of the style in which buildings are now so commonly painted. The art of successful combination comes only by long experience. But by this little book the novice is afforded the help of the best experience of a long and successful business. With its aid, accordingly, there is far less danger of poor selections than by the old methods. The plan of thus representing colors in the way they would be used in practico has proved so invaluable to the company as to warraut its being both patented and copyrighted. The other features of the book, which consists of 48 pages, in a neat imitation red-leather cover, are engravings of various public and private buildings upon which the paints have been used, and testimonials from people—almost everywhere—who have employed them. The book is well worth the trouble of sending for by any one who contemplates painting his house or even his front fence.

Iron Railings, Fencing, &c.

We have received from the Composite Iron Works Company, Reade and Church streets, an advance copy of their catalogue of patent composite iron railings, gates, &c. The catalogue is one of the finest devoted to this line of goods that it has ever been our pleasure to examine. In size it is approximately 10 x 14 inches, contains some 75 pages, aud is printed upon a fine quality of book paper, the illustrations being of unusual excellence and clearness. By referring to some features of its contents, we think we shall be able to give our readers a general idea of its excellence. On the inside title-page a view of a gateway on Boston Common is presented. This work was erected by the Composite Iron Works some time since, and serves in this connection as a very pleasing introduction to the line of goods shown. The second page is devoted to a description of composite chilled ironwork, and is illustrated by a diagram showing the construction employed in railings, gates and other work. Following this is a general view of the establishment of the company at Long Island City, L. I. A second illustration shows an interior view of the foundry, and represents workmen engaged in various kinds of work, from blacksmithing to "pouring off." The scene is animated, and is well calculated to impress the reader with the magnitude of the establishment described. The succeeding page shows still other views in the works of the company, wherein various lines of work are being performed. On tbe fiftb page the catalogue proper commences, and it and succeeding pages contain a large assortment of gates, fencing and railing, embodying the construction peculiar to this company. Among the specialties may be mentioned composite lawn fence, hurdle lawn fence, iron lawn guards and wire-cloth netting fence. Following the latter are a number of designs of pipe railing suitable for cemetery work and similar places. A large assortment of designs of iron posts are next presented, following which are representations of a folding safety gate which this company manufacture. Two pages are devoted to views of wrought-iron gates erected for James Gordon Bennett at Newport, R. I., and William Astor, at the same place. We mentioned these two designs some time since from proofs of the plates. Several designs of heavy wrought-iron and composite iron gates are next presented, showing work adapted for use in almost every possible situation. Cast-iron railings for stoops of city houses, and wire area gates and cast-iron railings for city yards, in rustic and other designs, complete this part of the book. Some designs of circular stairs, wrought-iron shutters and wrought-iron doors are next given; then several designs of iron veraudas and iron summer-houses, which in turn are followed by lawn goods, embracing fountains, settees and iron tree guards. Four designs of opera chairs are shown, some iron bedsteads are given, and the book closes with illustrations of window guards, and opera-house gates so constructed as to fold out of the way when not in use. The letter-press and illustrations are handsomely executed, and the book is one that will give pleasure to all who have occasion to examine it.

Portable Houses.

We have received from Messrs. Sherman & Brower, No. 100 Cbambers street, New York, a circular describing portable houses for export for railroad and private use. There seems to be a growing demand for portable houses of this character, and, accordingly, the announcement that a business of this kind is conducted in this city at the present time will be of interest to many of our readers who have already written to us inquiring about such matters. One design and three plans of portable cottages are shown on the circular in question. The plans represent, respectively, a two-room house, a three-room house and a four-room house. The latter is 27 feet 6 inches by 32 feet in size. The front is finished with an extension of the main roof that covers the sidewalk. The principal room in the house is 12 feet by 15 feet 6 inches. This extends through the central portion, and is entered by doors from the opposite sides, and is provided with two windows. Along one end is a room 8 feet wide by 15 feet 6 inches long, having windows at both ends and side, while at the opposite end of the building two rooms are provided 8 feet wide by 12 feet long, each having two windows. The general dimensions of tbe houses above given include the covered walk. The circular states that the houses described are constructed of the best seasoned timber, and that the parts are numbered and fitted, and are so packed as to be shipped under the general classification of timber. They are furnished with all hardware and nails necessary for making a complete house. They are particularly adapted for warm climates or for summer-houses. They combine the advantages of good workmanship, convenience in erection and a great saving of cost over the ordinary supply to be had in a new country.

The Air Brush.

The Air Brush Manufacturing Company, of Rockford, Ill., send us their illustrated catalogue and price list describing their air brush, which is now rapidly winning its way among artists, expediting their work and giving satisfactory results. The application of the brush, though the latter is in itself a mechanical device, cannot be said to be mechanical, performing as it does the same office as brush or pencil, and the more skilled the artist the more satisfactory the work done. As to the general arrangement of the appliance, its application and advantages and the kind of work for which it is adapted, the catalogue in question will be found to give full particulars. Descriptive extracts are furnished from various trade papers.

White Crockery Wash-Tubs,

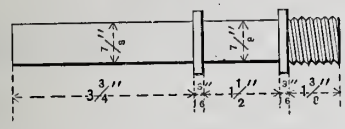
The Stewart Ceramic Company, of 312 Pearl street, New York, have issued a neat little pamphlet descriptive of the Morahan solid white crockery stationary wash-tubs. It contains a concise statement of the objections to wooden wash-tubs, of the defects of soapstone, slate and cement tubs, and the advantages claimed for the solid white crockery tubs. Succeeding pages are devoted to price lists, directions for setting and finishing, together with illustrations showing the appearance of the tubs in position. In addition to wash-tubs, solid white crockery sinks for butler's pantry and kitchen use are shown. Tbese goods have been very favorably known to the trade for some time past, and, we learn, are meeting with a large sale.

A prominent insurance expert a short time since, in discussing the general question of roofs from an insurance man's standpoint, asserted that tarred paper should be seasoned for at least eight months before being laid. During the process of seasoning it acquires certain properties that render it far more valuable for use than in the condition in which it is first manufactured.

Construction of a Cheap Lathe.—V.

MANDREL DETAILS.

Taking now the headstock proper—"the fast headstock," as it is usually termed—let us first make its mandrel (Fig. 25). Get a piece of 1-inch round steel rod 7 inches long; on this have two collars welded out of ¼-inch square rod, and at a distance of 1⅜ inches between, the inside of the first ring



Construction of a Cheap Lathe.—Fig. 25.—Headstock Mandrel.

being 1½ inches distant from the end. Center-pop each end, and in that end into which the back center will run drill $\frac{1}{16}$-inch hole about $\frac{3}{16}$ inch or ¼ inch deep, using a fiddle or archimedean drill for the purpose. This hole insures concentric wear in the mandrel end by acting in the function of a guide to the steel point of the dead center (Fig. 26), which, in the absence of the hole, would grind the mandrel end eccentric (Fig. 27).

Chuck between dead points, using the carrier (Fig. 28), and turn the end which is

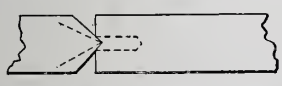


Fig. 26.—Properly-Arranged Mandrel and Dead Center.

to receive the rigger to ⅞ inch diameter. Use a tool shaped like Fig. 29, taking a rough cut first, afterward a fine one. Then change ends, putting the part just turned into the carrier, and turn the portion that runs in the brasses, the collars and the screwed part to dimensions (Fig. 25). Then, if your borrowed lathe is suitable for screw-cutting, having the necessary change wheels, cut a deep thread of 8 to the inch on the nose of the mandrel, using a tool like Fig. 30. A chasing tool run along half a dozen times will impart a finish to it. If, however, no screw-cutting arrangement is available, it is better to have the mandrel and chuck-screws cut by a ma-

Fig. 27.—Improper Mandrel, Showing Eccentric Wear.

chinist than to use stocks and dies. Now slip the front collar or the nose of the mandrel into one of the holes of a cone-plate (Fig. 31). Put a drill ⅜ $\frac{1}{32}$ inch diameter into the slide-rest, and drill a hole with it 1⅜ inches deep into the mandrel nose; cut ½-inch thread with ordinary taps, the taper one first and the stump afterward. Now file a flat ¼ inch wide for the key of the rigger, reaching to within ⅛ inch of the collar, and hand the mandrel over to the

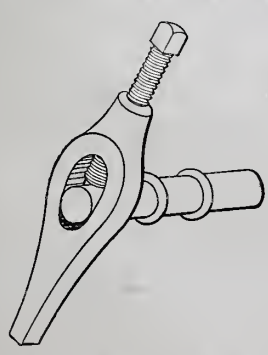


Fig. 28.—Carrier for Mandrel.

smith to be hardened where the point of the back center runs.

For the back center, turn down a piece of steel to ½ inch diameter by 2¾ inches long, tapering the end which forms the center to an angle of 45° or thereabouts. Screw it about ¾ inch from each end; then have the point hardened. Provide a couple of nuts for it (Fig. 32). Make the rigger of hard-

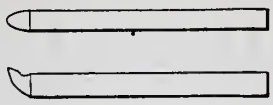


Fig. 29.—Tool Used in Turning Up the Mandrel.

wood—a piece of any dry hardwood will do — oak, ash or beech. Prepare two metal disks, either cast brass or cut out of plate (Fig. 33), 2½ inches diameter by ⅛ or $\frac{3}{16}$ inch thick; drill a ⅞-inch hole in the center of each; also three holes, countersunk for wood screws, on a circle 1¾ inches diameter. File a keyway in each, ¼ inch wide by $\frac{3}{16}$ inch deep, or, rather $\frac{1}{32}$ inch less than $\frac{3}{16}$ inch in one

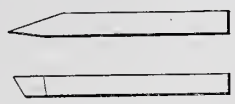


Fig. 30.—Screw-Cutting Tool.

plate, $\frac{1}{32}$ inch more than $\frac{3}{16}$ inch in the other, to give the necessary taper for the wedge. These plates will be let into the block of hardwood intended for the rigger. Prepare the stuff to 6 inches diameter by 2¾ inches thick in the rough; screw it on the face-plate; bore a ⅞-inch hole through it, using the gouge and the corner of a side-chisel. Turn a recess 2½ inches diameter to a depth equal to the thickness of one of the disks, hammer the disk into place, and screw with ¾ inch or 1 inch screws. Rough down the wooden block to 5⅝ inches diameter, take it off the plate, and rechuck by the finished face. Let the second disk into the other side, keeping the keyways in line with one another; remove from face-plate, drive tightly on a mandrel, and turn the two speeds to dimensions, not forgetting the slight rounding (Fig. 34). Cut keyway through the wood from plate to plate, file a key out of ¼-inch iron or steel rod to dimensions (Fig. 35),

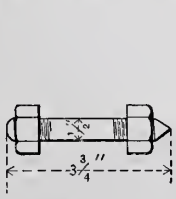


Fig. 32.—Nuts for Back Center.

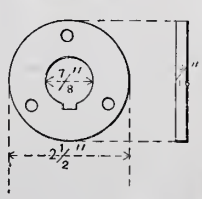


Fig. 33.—Metal Disks.

and key rigger in position. Place in headstock, of which Fig. 36 now presents a sectional appearance.

(To be continued.)

Painting Iron Roofs.

The principles underlying the best practice in painting iron roofs and sheet-metal work generally are not unlike those necessary to be observed in painting structural iron work. This phase of the subject has been very carefully studied by engineers, so that there is little room for speculation. The value of

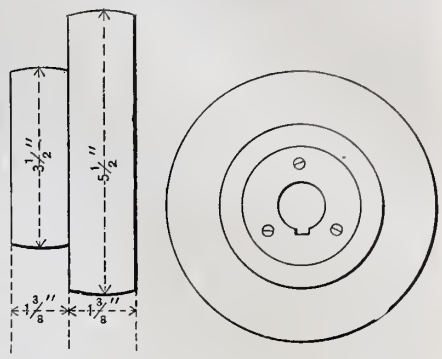


Fig. 34.—Cone Pulleys.

red lead as a preservative for iron has been generally accepted. Wrought iron requires a hard and elastic paint which will hold itself together even if the scale beneath gives way. The following experiments, made under the auspices of the Dutch State Railroads, may be instructive. Iron plates were prepared for painting as follows: Sixteen plates, pickled in acid (hydrochloric), then neutralized with lime (slaked), rinsed in hot water, and while warm rubbed with oil. The same number of plates were cleared of scale, so far as it could be removed by brushing and scraping. Four plates from each set were then painted alike, namely, four plates with coal tar and four plates with iron oxide, A, another set with iron oxide, B, and the remaining set with red lead. They were then

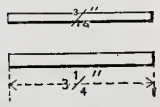


Fig. 35.—Key for Pulleys in Fig. 34.

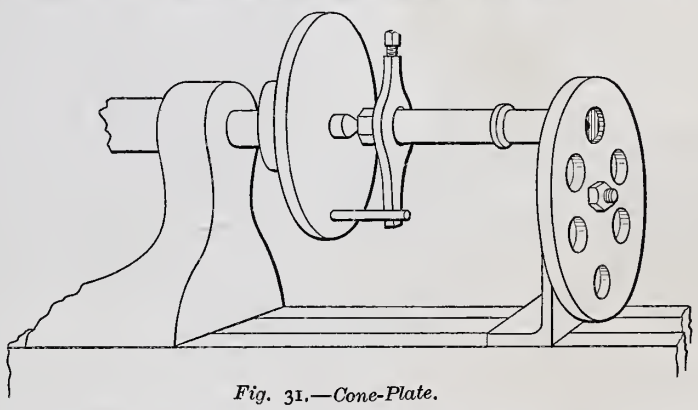


Fig. 31.—Cone-Plate.

exposed three years, and the results observed were as follows: The coal tar on the scrubbed plates was quite gone; that put on the pickled plates was inferior to the others. The iron oxide A on the scrubbed plates was inferior to the

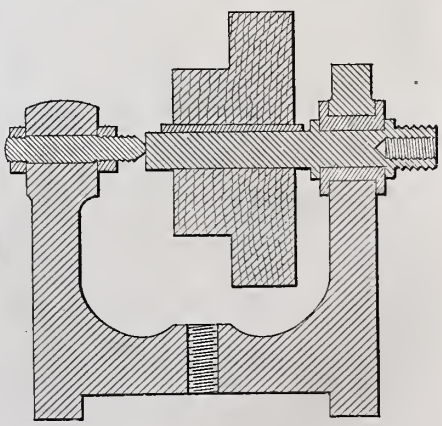


Fig. 36.—Section of Headstock.

other two, while on the pickled plate it held well. The oxide B was found superior to that of A, but inferior to red lead, while the plates covered with red lead stood equally well on both prepared plates, and were

superior to all others. From these results it is evident that pickling the iron removes all the black oxide, while scrubbing does not. It is also shown that the red lead unites with oil to form a hard, oxy-linseed oil acid soap, a harder soap than that given by any other combination. The red lead is shown by those experiments not to give way under the scaling. It is more adherent to the surface, more elastic and cohesive. On the Cincinnati Southern Railroad, experience extending over some years has shown that red lead has proved the most durable paint in the many miles of iron trestle and bridge-work. It is found that the iron oxide is washed away by the rain and perishes in spots, although a valuable paint if frequently renewed. Red lead, on the other hand, is more expensive than iron oxide.

Referring to white lead as a material for painting iron, one authority observes that "white lead should not, if possible, be used in priming iron, nor in any priming coat; moreover, it is a less desirable overcoat than iron oxide." The class of iron paints compounded of ores of natural iron rust, combined with clay or some other form of silica, are very useful, as they contain no water nor sulphuric acid. Magnetic oxide, or pure iron oxide, is an excellent protection for iron, says one writer; it is impossible to scrape it off. It is also of value in woodwork, and resists the action of salt water and sulphurous gases, so destructive to most paints. There is no doubt the great protective element in paint is the oil, and the conditions required for success are stated to be to prevent the drying part of the oil from becoming hard dry; the soft-keeping, non-drying acids must be kept from flying away in such a quantity as to reduce the oil to a brittle mass. In other words, the elastic qualities of the oil must be protected from the action of the oxygen.

Water Supply for Country Dwellings.

BY A COUNTRY PLUMBER.

(Concluded from page 2, January.)

IX.

We have now to consider the capacity of different sizes of pumps. The following table shows the quantity of water discharged at each stroke by a single-acting pump of given diameter. The figures denote gallons or decimals thereof. Double-acting pumps would discharge double the quantity:

LENGTH OF STROKE IN INCHES.

Diameter of cylinder. Inches.	3	3½	4	4½	5	6	7	8	9	10	11	12
2	.039	.046	.052	.058	.065	.078	.092	.105	.119	.132	.143	.159
2¼	.051	.057	.066	.074	.083	.103	.115	.135	.152	.169	.186	.203
2½	.062	.071	.081	.092	.102	.124	145	.160	.187	.208	.226	.251
2¾	.077	.09	.102	.116	.128	.154	.18	.205	.231	.257	.282	.308
3	.089	.102	.117	.132	.148	.178	.209	.239	.27	.306	.326	.362
3¼	.107	.125	.143	.161	.179	215	.25	.285	.323	.359	.394	.43
3½	.121	.139	.159	.187	.208	.242	.281	.326	.375	.415	.45	.492
3¾	.139	.159	.183	.207	.231	.278	.32	.374	422	.47	.509	.565
4	.162	.189	.216	.243	.266	.325	.38	.432	.487	.532	.591	.65
4½	.206	.241	.275	.309	.344	.413	482	55	.618	.688	.757	.825
5	.247	.283	.325	.368	.41	.495	.57	.665	.75	.835	.905	1.02
5½	.308	.359	.411	.462	.514	.617	.719	.822	.925	1.02	1.13	1.23
6	.355	.407	.468	.529	.59	.713	.835	.958	1.08	1.22	1.3	1.45

The above will prove substantially correct, but it should be borne in mind that these are maximum quantities. Practically, there would be a loss of from 5 to 10 per cent. by unavoidable waste and failure of plungers to discharge the full capacity of the cylinders, and other causes. It will be observed that a 3-inch single-acting pump working on a 5-inch stroke discharges .148 gallon at each stroke, which at 30 strokes per minute would amount to 266 gallons per hour. The maximum speed of a 10-foot windmill is actually about 45 revolutions per minute; hence a 3-inch pump on a 5-inch stroke connected to a 10-foot mill would discharge about 400 gallons (less loss) in one hour if running at full speed. Very few mills run at full speed for five consecutive minutes, owing to obstructing timber, buildings or hills. Some will not run in a storm at all, while others are so regulated or constructed that they will not run at full speed constantly during a storm. A 10-foot Halladay mill having a fair exposure recently made the following speed. The revolutions are given for each minute for ten consecutive minutes:

Minute. 1 2 3 4 5 6 7 8 9 10 446-10
Rev....47 45 43 43 47 43 43 45 46 44 = 446 Total.

Larger mills run proportionately slower; 12-foot averages about 40 revolutions per minute, 13-foot averages about 37 revolutions per minute, and larger still less. Manufacturers claim higher speeds, but it would not be safe to base calculations on the maximum speed of a mill. Usually each mill has provision for connecting pump on different lengths of stroke, but all mills of the same size do not have the same length of stroke. The Halladay 10-foot has 4, 5 and 6 inches, and the 13-foot 5, 6, 7 and 8 inches. The 12-foot Stover has 3, 3½ and 4 inches. A 12 foot mill attached to a 3-inch pump working 6-inch stroke and 40 revolutions would, according to table of capacities, elevate 427 gallons per hour; thus, $3'' \times 6'' = 178 \times 40 = 7.12 \times 60 = 427$. The cylinders of pumps intended for use with windmills are usually so made as to permit of any length of stroke to

Table showing the diameter of wind-wheel, revolutions per minute and different lengths of stroke, together with the size pump that is recommended to use with each for various depths of wells.

Diameter of wheel.	Revolution per minute	Different lengths of stroke—inches.	Pump to Use when Elevation is 10 feet.	20 to 25.	30 to 40.	50 to 60.	75 to 80.	100.	125.	150.
8	54	3½. 4. 4½	3 S.A.	2½ S.A.	2¼ S.A.	2 S.A.	.....	.....	.....	.....
9	52	3½. 4. 4½	3½ S.A.	3 S.A.	2½ S.A.	2¼ S.A.	2¼ S.A.	.....	.....	.....
10	50	4. 5. 6.	3¾ S.A.	3½ S.A.	3 S.A.	3 S.A.	2½ S.A.	2½ S.A.	2¼ S.A.	.....
12	48	5. 6. 7. 8.	5 S.A.	3¾ S.A.	3½ S.A.	3½ S.A.	3 S.A.	3 S.A.	2½ S.A.	2¼ S.A.
13	46	5. 6. 7. 8	5 S.A.	5 S.A.	3¾ S.A.	3½ S.A.	3½ S.A.	3 S.A.	3 S.A.	2½ S.A.
14	42	6. 8. 9. 10	4 D.A.	3 D.A.	5 S.A.	3¾ S.A.	3¾ S.A.	3½ S.A.	3½ S.A.	3 S.A.
16	40	8. 9. 10. 12.	5 D.A.	4 D.A.	4 D.A.	3 D.A.	3 D.A.	3¾ S.A.	3¾ S.A.	3½ S.A.
18	37	8. 9. 10. 12	6 D.A.	5 D.A.	4 D.A.	4 D.A.	3 D.A.	3 D.A.	5 S.A.	3½ S.A.
20	34	8. 9. 10. 12.	2 5 D.A.	6 D.A.	5 D.A.	5 D.A.	4 D.A.	4 D.A.	3 D.A.	3¾ S.A.
22	32	8. 9. 10. 12.	2.6 D.A.	2.5 D.A.	6 D.A.	6 D.A.	5 D.A.	4 D.A.	3 D.A.	3¾ S.A.
25	30	12. 15. 18.	2.18 S.A.	2.16 S.A.	6 D.A.	6 D.A.	5 D.A	5 D.A.	4 D.A.	3 D.A.
28	28	12. 15. 18.	2.22 S.A.	2.20 S.A.	2.5 D.A.	2.5 D.A.	6 D.A.	5 D.A.	5 D.A.	4 D.A.
30	26	12. 15. 18.	2.24 S.A.	2.22 S.A.	2.6 D.A.	2.5 D.A.	6 D.A.	6 D.A.	5 D.A.	5 D.A.

"S.A." Single Acting. "D.A." Double Acting.

about 8 or 9 inches. A 3-inch is amply large to pump the water estimated (1000 gallons per day). The elevation from source of supply to cistern or tank will determine the size of the windmill. We will assume, as an illustrative case, that our estimated consumption of 1000 gallons per day must be elevated 100 feet, and having found that a 3-inch single-acting pump is capable of discharging far more than that quantity, the question arises, What size windmill must we employ? We have said, use a pump and mill having a capacity of about double the estimated consumption. It has been found by experience that a 13-foot mill has about double the power of a 10-foot, and a 16-foot rather more than double the power of a 13-foot, but we need better data than that.

The United States Wind Engine and Pump Company, of Batavia, Ill., have recently prepared a convenient table of capacities of mills and pumps working to different elevations, which we append:

It will be noticed in the above table that in some instances the same pump is recommended for different sized mills where the elevation is the same. This is because there are so few different sizes of pumps, compared with the number of mills and the several elevations of water named. In such cases, therefore, the smaller mill would be put on a shorter stroke than the larger. For instance, take the 22-foot mill, well 50 feet deep; the pump recommended is 6-inch double-acting, and the same for a 25-foot mill. In such a case we should give the 22-foot mill a 15-inch stroke, and the 25-foot mill an 18-inch stroke. The length of stroke, however, would in a measure depend upon the location for wind. In certain localities where the winds are strong, the mills might be given their longest stroke when attached to the pumps named. All the different sizes of pumps enumerated are especially adapted to windmill use. Where water is to be drawn by suction, or forced long distances, due allowance should be made for friction on the inside of the pipe. Generally speaking, the bore of the pipe should be one-half that of the pump, but in case of a double-acting pump and long lateral distance, it is advisable to have the bore of the pipe one size larger than one-half the bore of the pump, as, for instance, 6-inch double-acting pump, 4-inch pipe, &c. Where long suction pipes are necessary, or where the water has to be lifted or forced to a great elevation or lateral distance, air chambers are indispensable, but as it is always advisable to locate the pump as near the source of supply as possible, they are not as often required on the suction pipe as on the discharge.

By considering this table in connection with the previous one, showing the quantity of water discharged by different sized pumps, we can readily determine what size mill to use to elevate a given quantity of water to any elevation to 150 feet. The above table shows that a 3-inch pump, when elevation or depth of well is 100 feet, would require either a 12-foot or 13-foot mill. As both these mills have the same length of strokes—namely, 6, 7, 8 and 9 inches—it may be inferred that the pump would be connected to the 12-foot mill on the shortest stroke, while the 13-foot mill would be capable of operating it on a longer stroke. With the foregoing tables before us, it should not be difficult to decide that a 13-foot mill should be used to elevate the quantity we have estimated to 100 feet. If we attach the pump on shortest stroke, the mill will run in lighter wind than when placed on longer stroke, but will not pump as much water in a wind of sufficient force to run the mill to maximum speed. The maximum speed of a 13-foot mill in foregoing table is 46 revolutions per minute. At 23 (one-half), a 3-inch pump on 7-inch stroke would discharge 285 gallons. Making liberal allowance for waste and leakage, we should get full 250 gallons per hour (the estimated

quantity); therefore, we should use a 13-foot mill, 3-inch pump, and attach it on the 7-inch stroke, to obtain the 1000 gallons in four hours' easy pumping.

As this is no treatise on windmills, but rather upon the erection of them and the arrangement of pumps, we have avoided saying anything about the relative value of different kinds of windmills or manner of their construction. A few words, however, may not be out of order. While there are many different kinds or patterns of windmills, all are constructed on one of two very different principles—namely, those governed or controlled by centrifugal force, weights being attached to the sails or fans, which are secured to the arms or spokes by pivots, causing the sails to present more or less surface to the wind, according as the mill runs at a greater or less speed. Such mills are called "sectional wheel" mills, and always head directly to the wind. The other class are generally called "solid wheel" mills, the sails being firmly attached to the arms or spokes, and do not "govern" themselves, as that term is generally understood, but rather automatically stop running when a storm is encountered. The wind-wheel and vane, or rudder, are not set at right angles to each other, as is the case with the sectional wheel mills, but have a joint or hinge on the vane arm and turn-table which is set at a slight angle with or to one side of the wheel and crank-shaft, and held in this position by a weighted lever. When the force of the wind becomes dangerous to the mill this lever is caused to rise by the pressing of the wheel and vane upon it, and the joint or hinge permits the wheel to lie flat alongside the vane and stop running. Such mills do not head directly to the wind, but obliquely.

The Building Trades.

In accordance with the plan we have followed for several years past, we have recently invited correspondents in every city, town and village in the country to give us the information at their command relating to the present condition of the building trades, the present rate of wages paid mechanics in the various lines, and the prospects for the season both with respect to the work to be done and rates of wages. From several thousand letters received in answer to our request for information, we have attempted to arrange what may be called a bird's-eye view of the entire country, showing in a single article the general conditions and prospects of the business in all the different sections. It is manifestly impossible, within the largest space we could devote to this subject, to enter very much into details. The land is too broad, and there are too many important towns to be considered, even to permit of giving all the more prominent ones the briefest mention. We are obliged, therefore, to consider the country, for the most part, by its great geographical divisions, with more specific mention of States and neighborhoods, and only occasional allusions to those cities and towns the condition of the building trades in which deserves special mention. Those of our readers who have gone to great trouble to give us full and accurate reports of their own communities must not suppose for an instant, because they do not see any mention of their places by name, that their work has been in vain. Every report we have received has been carefully considered and systematically tabulated with others from the same general neighborhood, and each, however unimportant in itself considered, has entered into the sum of our calculations, just as each individual brick forms a part of a completed structure. We could no more spare a single report we have received, without loss, than could individual bricks be taken from a wall without weakening it. We take this occasion to return thanks to all of our subscribers who have so kindly aided us in the enterprise.

Commencing with the New England States, we find that at the present time the majority of the mechanics in each of the building trades in them are employed, and that their prospects for steady work during the season are fully up to the average of past years. Wages are reported as very generally satisfactory, and rule about the same as last year, with an upward tendency in some instances. The work in hand and in prospect is both repairs and additions and new buildings. It is evident that this important section of country, while experiencing no very marked booms, is steadily pursuing the even tenor of its way. The average wages of carpenters throughout the State of Maine is about $2 per day, with higher rates in the more important cities. Stone masons average about $3. These figures are not materially changed in New Hampshire. In Vermont the rates for carpenters are about the same, but masons seem to be getting from 25 to 50 cents per day less than in Maine. In all the more prominent manufacturing towns in Massachusetts there seems to be a better outlook for work at present than last year at this season. Wages are expected to rule about the same as at present. Carpenters are getting $2.25 to $2.50, with higher rates in Boston and other important cities. Stone masons range from $2.75 to $3.25, the most frequently recurring rate in our reports being $3. The conditions in Connecticut are very much the same as in Massachusetts, but in Rhode Island the prospects, outside of one or two important centers, are less promising, and wages rule at least 25 cents per day less than last quoted above. In Providence it is estimated that the season's business in all respects will be about the same as last year.

The general impression of our correspondents throughout the State of New York is that the building business this year will be about the same as last year. New York City, on account of her position as a trade and financial center, goes on building without regard to times or seasons. Her builders are busy now and have been well employed all winter. Wages in all the trades rule higher in this city than throughout other portions of the State, with perhaps the exception of one or two other large cities, but the increased cost of living more than makes up the difference to the mechanic. Single men may do well in the large cities, but every man of family should rejoice when he is in work at fair wages in the smaller country towns. The average wages of carpenters throughout the State is about $2.25. Some are receiving less, and very few get as much as $2.75. Masons average $2.75 and $3. Albany and the towns in the immediate neighborhood are paying $4, and Buffalo $3.50.

Our reports from Pennsylvania are not quite so encouraging as those from New York. Wages rule at about 10 per cent. less than the rates named for the Empire State—excepting, of course, in the large cities. Philadelphia has one or two very large enterprises under way, and Pittsburgh is probably doing an average amount of building this year. Many of the towns from which we have heard consider the outlook rather discouraging. New Jersey may be described as partaking in some measure of the spirit of the two great States to which she is immediately contiguous. Some towns report prospects excellent and wages good, while others are less hopeful. It is estimated that there will be about the usual amount of building in the various watering-places for which the New Jersey coast is becoming so famous.

Following down the Atlantic seaboard, we find that in Maryland, Delaware, District of Columbia and Virginia the prospects for the season depend in a great measure upon the location. We have the least satisfactory reports in number from Maryland, but, from those we have received, wages seem to rule low, and the prospects are not very flattering. Baltimore, like all other large cities, is doing some building, while the growth of the National Capital, which has already become almost proverbial, is still going on. While there is an absence of very important enterprises at the present time, the general growth of the city, as shown by the erection of dwellings and business buildings, indicates substantial progress. All the towns in Delaware from which we have heard consider their prospects good. Mechanics are fully employed, and wages average about the same as the rates quoted for the State of New York. In Virginia the rates are about the same, and mechanics are busy. In Richmond a large amount of new work is in progress.

There is no particular activity in building matters in either North or South Carolina. Probably an average amount of repairs and some little new work will be undertaken—enough in the aggregate to keep the mechanics of these States fairly busy through the season, but not enough to require any outside assistance. In Georgia, on the other hand, notably in her leading towns and cities, the indications are very favorable. A very large amount of work is already under contract and more is contemplated. Brick masons are getting from $2.50 to $3.50 per day, and carpenters of real ability from $2 to $3 per day. In Florida, outside of the few towns which have become popular as health resorts, there is very little doing. Bricklayers in Jacksonville are reported worth $3 to $3.50 per day, and carpenters $2.50 to $3, with an upward tendency in both cases. Alabama presents a fairly favorable prospect for home mechanics, but there is very little real activity. Carpenters' wages are quoted from $2 to $3. Some of the towns in Mississippi report the prospect at the present time better than a year since. Wages range about as quoted for Alabama. Louisiana shows very little activity throughout the State at large. New Orleans is at present doing more than usual, growing out of the preparations that are being made for the Cotton Centennial, which opens in that city next December, but wages have not been materially influenced by it. Arkansas is making progress in the way of material prosperity. According to the reports from that State, a number of new buildings will be erected during the present season. Wages remain about the same as during last year. Tennessee presents a far more cheerful outlook than most of the Southern States. Chattanooga, Knoxville, Nashville and Memphis are all apparently prosperous, and each reports the building business as likely to be better than last year. This spirit of improvement prevails to a certain extent in other portions of the State. In the cities named masons are quoted at $3.50 to $4, and carpenters from $2.25 to $3. All the mechanics are at present fully employed. Our reports from Kentucky indicate that rather more building will be done in that State the present year than last. The prospects are very favorable in Louisville, and it is supposed wages will continue during the season at about the same rates as were paid last year. Wheeling, W. Va., as well as other Ohio River towns, is recovering from the disastrous flood of the early spring, which destroyed so much property. The prospects throughout other portions of the State are not much different from former years

The three central States, Ohio, Indiana and Illinois, are about alike in their building prospects at the present time. About half of the towns from which we have heard report more building in contemplation than a year since, while the remainder think it will be somewhat less. The work is about evenly divided between additions and repairs and new buildings. Throughout Ohio stone masons seem to average $2.50 per day, with rates varying from $3 to $4 in Cincinnati, Cleveland, Toledo and the other larger cities. Carpenters are similarly quoted at $2.25 to $2 50 as the general average of the State. The rates are about the same for Indiana, with a rising tendency in those sections where business is the best. In Illinois about the same conditions prevail. Building is active in Chicago, and wages in all the trades rule higher in that city than in other portions of the State. Rates in Springfield are also above the average. Michigan indicates a fair degree of activity. Wages rule about the same as in Ohio and Indiana, with less difference in the larger cities. Detroit anticipates a larger business this year than last, and yet the wage quotations for that city average lower than for most other places of its size. Masons are receiving $3 to $3 25, and carpenters $2 to $2.50.

The great Northwest, which has been so rapidly filling up the past few years, and of which the daily papers are never tired of giving famous accounts, might be expected to present a more favorable outlook than is indicated by our reports. It appears that mechanics throughout Wisconsin, Minnesota, Iowa and Nebraska are receiving from

5 to 15 per cent. more than their fellows employed in the Central States, but that outside of some of the leading cities the building business is far from booming at the present time. Only a portion of the mechanics in the building trades were employed at the date of our advices, although it was very generally expected all would find work a little later in the season. For the most part it is expected wages will remain at about present quotations during the summer. It is to be remembered, when considering this section of the country, as well as others which are in process of being settled, that the character of the buildings at first demanded are upon the cheap order, and that it is only after a time that the services of the better grade of mechanics are demanded in the erection of more commodious dwellings, of schoolhouses, churches and other public buildings. Of course, there are exceptions to this general rule, and St. Paul and Minneapolis, Minn., are notable examples in point. These places, which from their age should be scarcely more than villages, are veritable cities, growing with almost unparalleled rapidity. Both have doubled in population within the past three years. The building business in both of them is very active, and seems likely to continue so for some time to come. The buildings erected are of the most substantial character, rivaling those of the older cities of the country in their dimensions, appointments and cost. Wages rule a little higher in them than in the other towns of the State, and yet fully as many mechanics seem to be on hand as are required. A few other important towns throughout this general section of the country present a fair degree of activity. Our remarks about the buildings first required in new sections of the country apply with special force to the Territories lying west of the States we have just described. A few towns have fitful spells of building, and pay high prices for labor, but in general there is comparatively little to be done. In the mining regions there is always work in progress in the prosperous towns and very little anywhere else. Wages in Montana for carpenters are quoted at $4 to $5 per day, and for stone masons and bricklayers $5 to $7 per day. Cost of living is believed to be proportionately high. Very little new work is contemplated. In the State of Colorado masons get $3 to $3.50, and carpenters $2.50 to $2.75. The outlook, especially in Denver, is less favorable than a year since. Missouri and Kansas, on the whole, seem to be more favored than some of the States east of them. More work than last year is reported from almost every town from which we have heard, and mechanics are at present fully employed. St. Louis is paying $4 to $4.50 to masons, and from $2.50 to $3.25 for carpenters; $3 seems to be about the average of the State for the former and $2.25 for the latter. Building in St. Louis, Kansas City and other points is reported exceptionally active. Wages throughout Kansas seem to average a little higher than in Missouri, and all the more important towns seem to be fairly active.

The building outlook in Utah is pronounced very poor indeed. Salt Lake City is decidedly dull. Wages are merely nominal, and many mechanics are out of employment. Very little is doing in New Mexico. Ranching does not seem to demand any very large towns or very many buildings of any kind. Our reports from Arizona are meager, and such as we have received indicate that the general outlook is discouraging. Nothing very promising reaches us from Nevada. Quotations of wages in both of these Territories are more than double the rates that are current in the Eastern and Middle States, and still there appears to be very little doing. In California the outlook is far more promising. Considerably more building will be undertaken this year than last year. Mechanics at present are very generally employed. Masons are getting from $3 to $5 per day, and carpenters from $2.50 to $4, according to location and activity of trade. Oregon sympathizes somewhat with California, and gives indications of healthy growth and development.

We must not neglect the Lone Star State. It is important for its size and the great possibilities that are locked within it, waiting only the proper key for their development. Our reports from Texas, without an exception, are favorable. In most of the older towns more building will be done this year than last year. Wages rule about midway between the figures of the Middle and Eastern States and the high prices of the Territories and mining districts west of it. Carpenters are quoted at $2.50 to $3, and bricklayers at $3 to $5.

In general, it may be said that there will be a fair amount of work to be done this year in all sections of the country. There does not seem to be any likelihood of material change in wages from present rates There are no apparent causes for great strikes, and there are very few disturbing elements in the building trades in sight at the moment. It would seem to be a favorable time to invest in buildings, so far as labor is concerned. While very few mechanics have any special cause to rejoice at the present situation, equally few have any great cause to complain. The year, in point of building, so far as can be judged at the present time, will be about up to the average in all respects.

What Constitutes a First-Class Building.

The New York Board of Fire Underwriters have agreed upon the following as their standard of a first-class building, with the charges named for variations therefrom:

Standard Building.—1. Walls of brick, of the thickness required by the present building law (Section 6), with projections to receive the beams, and coped. Charge for deficiencies: If of stone or iron, or if the walls be of less than the standard thickness, 5 cents per $100 of insurance; if without projections, unless the walls are of sufficient thickness to admit of 12 inches of brick between the ends of the beams on each story, 5 cents.

2. Roof of iron or copper upon iron rafters, and without skylights; or of brick or the patent roofs approved by the board. Charge for deficiencies: If metal, slate or tile on wooden rafters, or of composition approved by Committee on Surveys, 5 cents; if composition not approved, 10 cents; if skylight through roof only, unless said skylight is of heavy glass, at least ½ inch in thickness, in iron frame or with iron shutters, 5 cents.

3. *Area.*—There shall not be more than 5000 square feet of ground covered by the building, unless it be subdivided by one or more party walls extending from the foundation to and through the roof, and coped. Charges for deficiencies: For every additional 2000 square feet or fraction of 2000 square feet, or space between walls, 5 cents.

4. Shutters of iron or other fireproof material, approved by the Committee on Surveys, having suitable iron frames to all windows, except the first floor front, to be placed either inside or outside, at least 4 inches from any woodwork and from the window frames and casings, unless they be of metal. The center row of shutters on the front, above first story, to be so arranged as to be opened from the outside. All shutters must be closed at night. Charges for deficiencies: If without approved shutters to rear or side windows, not opening on the street, 10 cents; if without approved shutters to front windows, 5 cents; if without approved shutters to side windows, 5 cents; rolling iron shutters to doors and windows, unless they can be opened from the outside, 5 cents. No charge is to be made for the absence of shutters in warehouses having a space of 125 feet in front. Storage stores are to have double shutters on front, rear and sides; storage stores not having double shutters will be charged in addition to the schedule rate of 5 cents. Single shutters only will be required in storage stores fronting on the water or having a space of 125 feet in front.

5. Parapet walls to be at least 4 feet high above the roof, 12 inches thick and coped, and to have openings above the roof suitable for fire defense. If without 4 feet of parapet walls separating the building from adjoining buildings, a charge of 10 cents will be made for the deficiency.

6. Cornices and gutters of brick or of metal, if secured to the building by metal fastenings only and without backing of wood; if gutters or cornices are wood, a charge of 10 cents will be made for the deficiency.

Standard Building Rule 7 requires floors to be without skylight, elevator or hatchway openings, and a charge of 10 cents will be made if there are skylight openings through one or more floors, unless with iron frame and heavy plate glass not less than ¼ inch in thickness, or having iron shutters or suitable trap doors. Hatchway openings not provided with trap doors as approved by the Committee on Surveys will be charged for at the rate of 10 cents additional. An extra charge of 20 cents will be made for open elevators. Rule 8 requires that stairways shall be closed, subject to the approval of the Committee on Surveys, and if not so closed a charge of 10 cents will be made for the deficiency. Rule 9 fixes the standard hight of buildings at 60 feet, and for every 10 feet or fraction thereof in excess of 60 feet in hight up to 80 feet a charge of 5 cents will be made. Over 80 feet for every additional 5 feet or fraction thereof, 5 cents will be charged. The standard width of streets is fixed by Rule 10 at 50 feet, and warehouses on streets less than 50 feet in width will be rated 10 cents additional. Rule 11 deals with buildings having mansard roofs, and defines the standard as follows:

If constructed entirely of iron and covered with slate or metal, or lined by fireproof material and approved by the Committee on Surveys, and having walls through the roof and coped, no wood being used in its construction, and there being heavy iron shutters to all openings, they will be subject only to charge for hight, which from the main cornice to the top of the roof shall be added to the hight of the building below the main cornice in determining the entire hight of the building. Charges for deficiencies: Mansard roof varying in any particular, to be subject, in addition to the charge for hight, to an extra specific of 50 cents; if over 70 feet in hight, the addition to be 100 cents. A semi-mansard roof is intended to apply to such roofs as have been altered in part or half a story added, or with frame structures upon the roof, which cannot be strictly ranked as mansard roofs, and are subject to an additional charge of 25 cents.

An additional rate is also to be charged for external exposures.

How to Boil Linseed Oil.

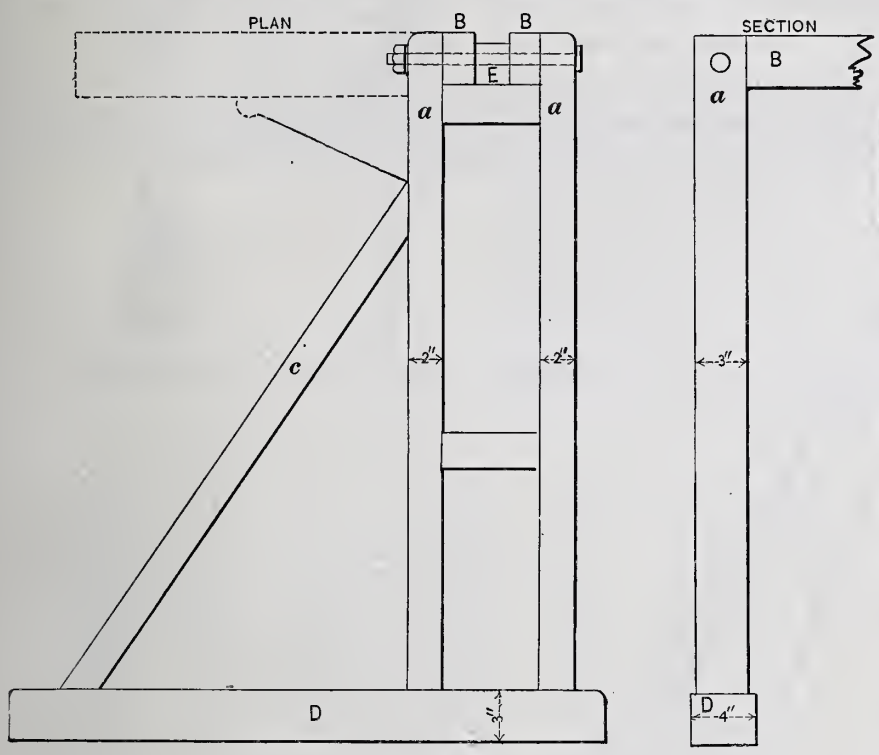
The *Carriage Monthly* gives the following directions, which may be of service to some of our readers: First be sure that you have the pure linseed oil. There is much sold as such manufactured out of peanuts. The test is simple. Nut oil has a sharp, acid taste, smells just like sour peanuts, is darker and thicker than the other oil, has a clinging tendency when rubbed on the finger, dries with a gloss even in priming coats, and is very much given to gumming up when sanded. Pure linseed oil has a bright amber color, runs freely, sparkles when flowing from the can, tastes smooth and mild, and has the smell of a flaxseed poultice. When you are satisfied that you have the genuine oil, and wish to boil it thoroughly, first take, say, about ½ pound of red lead and the same quantity of sugar of lead; put into 5 gallons of the oil, and place over a slow fire, so as to boil evenly. Do not let your fire get either too hot or too low; keep an even temperature, if possible; coke or charcoal is preferable to either hard or soft stonecoal. Avoid a wood fire, as, after the oil gets to boiling heat, a sudden flame shooting up might ignite the entire lot. Let it boil seven hours full; the red lead and sugar of lead will then become dark brown. Stir all the time while boiling slowly, and only one way; do not change the direction of the stroke or you will burn the oil, just as you would starch. After you have taken it from the fire, cover it up and let it stand to cool off, say, over night. The sediment will settle; pour out the oil and strain; your oil is boiled, and a better article you could not have, as all the fatty substances are destroyed. This is the English method, used in all the carriage factories in the United Kingdom.

CORRESPONDENCE.

Lathe Construction.

The publication of the series of articles on lathe construction now running in our columns, from an English contemporary, has called forth some criticisms and suggestions. As likely to be of interest to our readers, we shall reproduce some of the more salient points of the letters.

A correspondent, over initials "T. A. D.," writes with reference to the frame, which we published in our January number, as follows: "I hope the author of the paper on making cheap lathes will not feel offended if I suggest that the standard shown on the inclosed sketch would afford a firmer and better support to his lathe-bed than that described. The sizes of the timbers are the same, viz., 3 x 2 inches, with the exception of the sole-piece D, which is 4 x 3 inches; but they are framed together with their widest sides parallel to the lathe-bed, and the mortises are draw-bored and pinned instead of being wedged. It will be seen that the lathe-bearers rest upon the upper rail, but between the two uprights A A, being held firmly in their place by a ⅝-inch bolt passing horizontally through the lot. They are, of course, kept apart by distance-piece E, which should be about an inch lower than the surface of the bed, to allow of the headstock sliding over it if necessary. The strut C adds considerably to the rigidity of the framing, and at the same time permits of the two standards being connected at the back by strong diagonal braces or ties, which very necessary portions of the frame-work do not appear to be provided for in your correspondent's sketch."



Lathe Construction.—Criticism by T. A. D.

Another correspondent, writing over the initials "O. J. L.," suggests "that it is the best practice in lathe construction to fit bed inside and between standards, with tenons and bolts; but if the bed answers as stated, or is less trouble to fit, as must needs be so with the standards designed as shown, I have no fault to find. I make the suggestion because it seems advisable, and because the plan of fixing bed is not the generally accepted one."

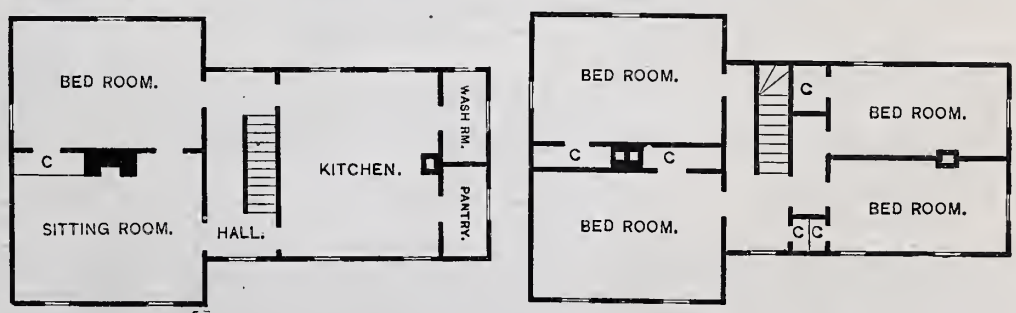
Referring to the foregoing, the author of the series of papers on the lathe writes that the design would answer well for a large, heavy lathe. It would be equally suitable for a small one in the matter of rigidity, the only drawback being that it makes the lathe stand out further from the wall than the form of frame recommended. This is an objection of some weight where only a small workroom is available. With reference to diagonal braces, the author refers to Figs. 13 and 14, and to the paragraph in which these cuts are described, from which it will be seen that diagonal braces have been provided.

Bridge Construction.

From A. F. H., *International Railway, Me.*—I have taken much interest in looking over the plans of the railroad bridges presented in the February issue. There are some things about them that I do not exactly like. The plan presented by "Engineer" I do not think a safe one for a railroad bridge, for if any one of the truss rods should break, the bridge would go down. The chords are made up of double strands, and they do not break joints. I think a much stronger bridge, both vertically and laterally, would be made if the strands broke joint and run by 15 or 20 feet. The hooks of the splice blocks, where the blocks are made of the same material as the chords, should be about the same length as those of the chords, but the plan shows the hooks of the chords not half the length of those of the clamp. The foot of the braces should toe into instead of being scarfed on to the surface of the chords. The bolts that go through the foot of the braces should be at right angles to the braces instead of right angles to the chords. My experience is that a bridge of this kind should be 15 feet in width in the clear. The bridge floor presented by "Bridge" is safer with long ties for the rails, instead of fastening them to the stringers, particularly in the case of the train leaving the track. In the bill of timber for track stringers in both plans the sticks are all of the same length, so as to come together on the middle floor timber of the bridge. It makes much stronger flooring to have the stringers break joint and run by 10 or 15 feet, instead of all meeting on the same floor timber. The plan of the bottom chords of the design submitted by "Bridge" I think would make a better job if there were some 5-foot clamp blocks put in at the joint of the strands. As there are so many lives at stake on our railroad bridges, I think we should look sharp for the weak points in them when building.

Arrangement of Rooms.

From H. H., *Warren, Ohio.*—I inclose a drawing showing "A. J. R.'s" house divided into three rooms on the lower floor and four on the second. The rooms on the lower floor consist of living-room and bedroom, with kitchen in the wing. The hall between is 6 feet wide. Back of the kitchen is a pantry and washroom. A closet is provided for the bedroom by utilizing the space beside the chimney. The communication with the cellar is intended to be under the chamber stairs.



Convenient House Plans.—Arrangement of Rooms by H. H.

Painting Tin Roofs.

From W. R., *Shenandoah, Pa.*—I would like to learn the opinions of practical men of experience in the trade, as well as that of the Editor of *Carpentry and Building* with regard to painting tin roofs on the under side. The style of roof that I have reference to particularly is laid with flat seams, soldered. Can the roof be soldered as strongly and firmly when the sheets are painted as when they are left unpainted? Will the solder run into the seams as well when paint is employed, and make as strong a job, as when the seams are clear of paint? I am referring to the average job of roofing, for example, on a house where there is no special presence of steam, dampness or fumes from chemicals calculated to destroy the roof.

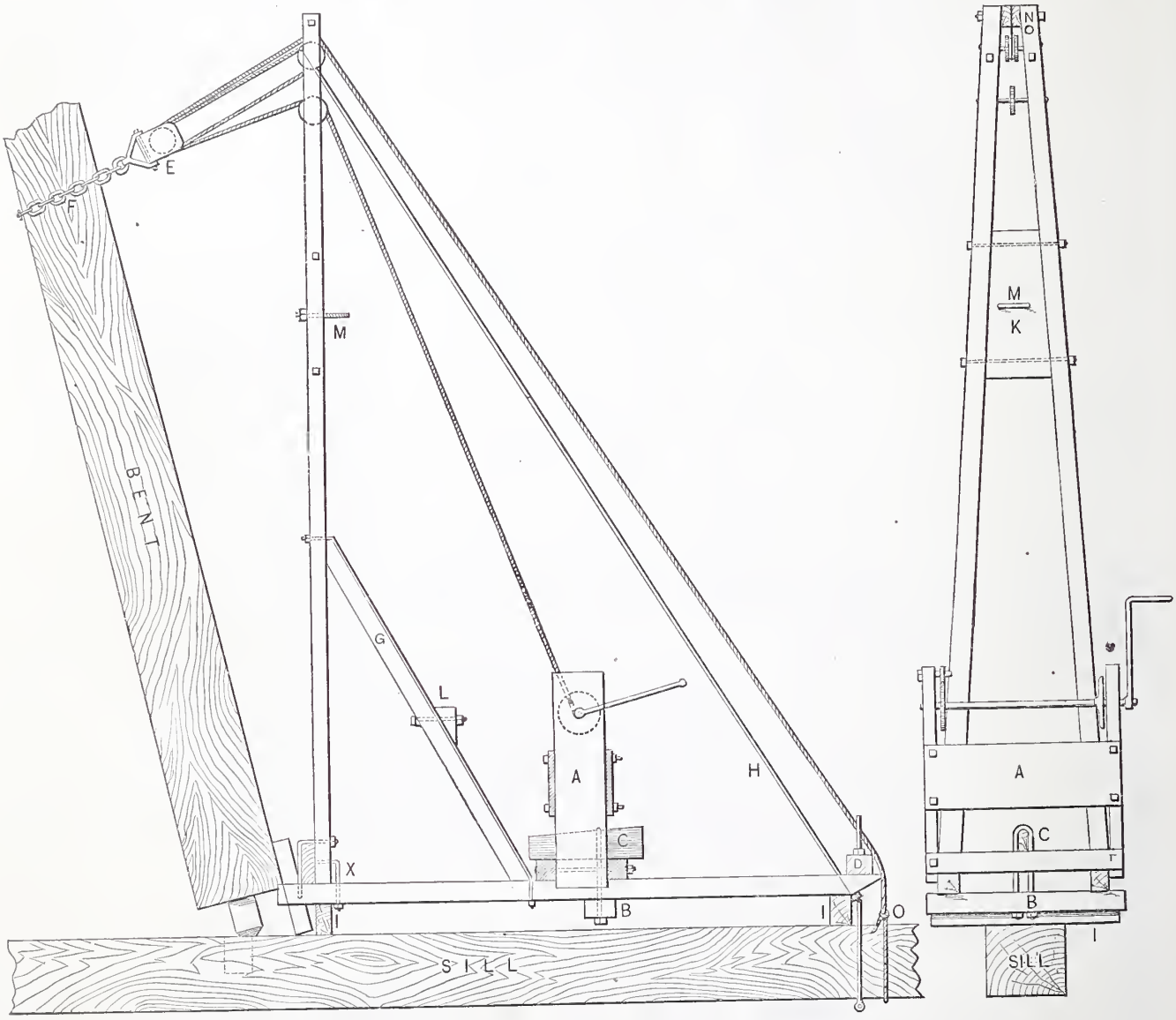
Answer.—So far as our own opinions go, we admit that we have for a long time been skeptical as to the advantage of painting tin roofs upon the under side. Perhaps we should qualify this and say we have been skeptical as to the utility of this work as commonly performed. Our correspondent hits the nail directly upon the head when he calls attention to the difficulty of soldering seams where the presence of paint is encountered. Owing to this difficulty, it is the habit of many tinners to comply with the specifications under which they are working, or the local customs of their community, by painting the center of the sheet only, taking care that the paint does not extend into the seams. Our readers will bear us out in turn that for the most part tin roofs give way at the seams, and not in the central portions of the sheet. Accordingly, daubing a little paint on the middle of the sheet is applying it in the place where it is not supposed to be needed. We are of the opinion that if the fair cost of the material used and the labor required to properly paint a tin roof on the under side were added to the cost of the tin itself, thus insuring a thicker coat of that material, a better roof would be produced

thau by using an ordinary grade of plate and painting it. This brief expression of our own views in the matter will be sufficient to introduce the subject to our readers, and we hope it will call out a practical discussion from those who have experience upon which to base their opinions. Painting tin roofs on the under side is a line of work which many tinners would be glad to be rid of, and if paint has no advantage they will be glad to be convinced of the fact, and not only convinced of it, but have the fact presented in such a manner as to enable them to base their action upon it in dealing with their customers.

An argument of the iron roofing men, when they have come in competition with tin at different times, has been that the tin roof is no better than iron, from the fact that the paint employed is the sole protection of the metal against oxidation; that the only advantage of the tin coat is to facilitate soldering, and, therefore, that the heavier plate, thoroughly soaked in paint and laid in such a manner as to avoid the necessity of soldering the seams, forms the best roof of the two. The question, then, would seem to turn upon the real necessity of paint for protecting the body of the plates employed in laying the roof. This brings us back to the original question of the quality of tin plate, and we venture the opinion, subject to the criticisms of our readers, that with a satisfactory quality of tin plate—for example, such as one of our subscribers mentioned some time since by the term of "the tin p'ate of our daddies"—no paint on the under side is required. For that matter, paint on the upper side might also be omitted. It is a fact, not disputed, that some old tin roofs are in existence having no paint whatever that have been in use for more years than the age of the average tinners now engaged in laying roofs, and these roofs are at present perfect, and bid fair to continue satisfactory for use for many years to come. It is needless to say that the average plates which have been used for roofing purposes in the last 10 years in this country have not achieved such a record as the above. We believe it has been the presence of poor plates which has brought upon the trade the necessity of resorting to paint on both upper and under side in order to insure durable roofs.

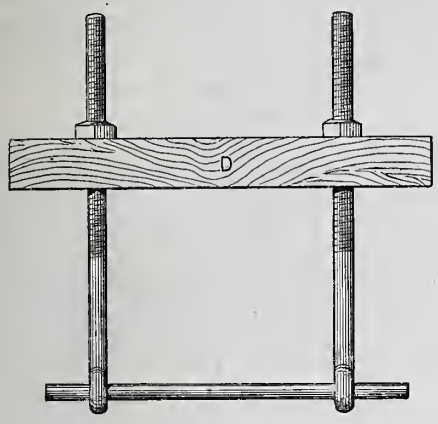
Frame Erector.

From DAVID M. WITMER, *Caledonia, Kent County, Mich.*—I desire to place before the readers of *Carpentry and Building* a machine that I have been using for some three years past, and which I find to be one of the best devices which has come to my notice for raising frames. It is known as King's patent frame erector. By the accompanying sketches I will endeavor to show how the erector is made and how it works. Fig. 1 represents the device in use. It is made of oak scantling 3 x 3 inches, and stands 10 feet high. The base is 7 feet long. The pieces marked G are 1½ x 2 inches, with a ½-inch rod on top of them for keeping them in place. H indicates rods, of which there are two, ⅝ inch in diameter, the use of which is to keep the upright in a vertical position and to counteract the strain from the parts that are being lifted. The erectors are used in pairs. They are set on the sills of the building, one at each end of the part that is to be raised. Pieces of scantling are placed under them, as indicated by I in the sketches. The erectors are fastened as shown at D. Fig. 3 is a detail of the fastening used at the end of the base of the erector just described. This anchor consists of a piece of scantling 3 x 3 inches and 2 feet 2 inches long. Holes are bored through it 16 inches apart. The irons that pass through these holes are provided with eyes on the lower end, through which a 1-inch iron rod is slipped under the sill. The upper ends of the irons are cut with long threads and are provided with nuts. By this construction the anchor is adapted to any sized sill. In the center of Fig. 1 and at the base of Fig. 2 is shown a jack with a windlass, by which the hoisting power is obtained. This is made 2½ feet high, of plank 1½ inches thick by 7 inches wide, for which hard maple is preferred. A board is bolted on each side, and a piece 3 x 3 is placed on each side at the bottom. The jack is fastened to the derrick in the manner detailed in Fig. 4. How these parts are placed can be seen from inspecting Figs. 1 and 2. The wheel on the windlass is notched and has a dog, so that the bent can be stopped with it at any point. Figs. 1 and 2 show the arrangement of the pulleys employed. The piece marked K in Fig. 2 is 3 inches thick, and is bolted in place to keep the two uprights of the erector together. E represents the pulley and F the chain used for fastening the pulley to the bent. The block L and staple M are put in place to afford convenient means for getting to the top of the erector in case it should be necessary to reach the pulleys for any purpose. In putting on the ropes the last one is put through a hole at the top of the derrick, marked N in Fig. 2, and is then brought down and tied to the sill as shown by D. The ropes used are ¾ inch thick. The windlass, being loose, can be fastened on the foundations anywhere with a scantling and chain. Fig. 5 shows the



Frame Erector.—Figs. 1 and 2.—Side and End Views of Derrick, the Former Showing a Post in Process of Raising.

plate attachment, which is fastened at the top of the main posts. It consists of a grip made of a piece of timber 3 x 8 inches, 2½ feet long, marked P in the drawing. The T-piece is made of 2 x 4 inch stuff, 6 feet high, the cross-piece being of 3 x 3, 2½ feet long. There is a mortise in each end of the latter, in which are placed pulleys. The T has a slot in the bottom of it, which sets on an iron pin 1 inch thick that is fastened in the grip block, as shown in Fig. 5. An iron



Frame Erector.—Fig. 3.—Detail of Fastening Shown at D in Fig. 1.

staple, marked Q in the drawing, is placed at the top of the grip for holding the T in place. A key is used instead of this staple to hold the T in place until the plate is up. The hooks marked R hold the grip in its place. These are so constructed as to fit any size post. The iron staple and the grip strips marked S in Fig. 7 are made of 1¼ x ¼ inch material, and are provided with several holes, so as to fit any size post. The bolt that passes through the end of them is 14 inches long and ⅝ inch thick. One of these grips is used at each end of the plate. Fig. 6 shows the side view of the plate attachment, as shown in Fig. 5, but with the plate hoisted in position, the wedge removed and things in position to lower the plate to its place. Fig. 7 is another view of the same parts, but turned in the opposite direction, and still further illustrating the construction. For convenient moving of heavy timbers, spools are used. These are rollers 20 inches long, fastened to a plank 2 x 12 inches and 24 inches long, with blocks bolted on each end which have holes bored in them, in which the rollers turn. The rollers are made 4 inches in diameter. I have now described all there is about this device, naming the several parts, except the ropes for

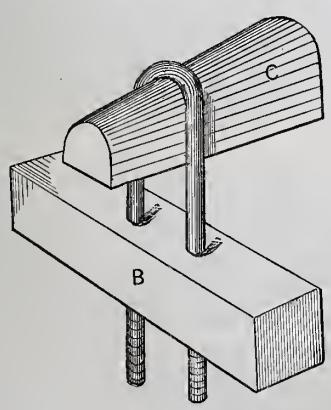


Fig. 4.—Detail of Fastening Connecting Windlass with the Derrick.

raising the girts and pulling the bents together after they are up. I will try to point out some advantages resulting from the use of this machine. It will at once be noticed that the workmen do not run risks from getting under anything. The construction is such that the foot of the post, being raised, is firmly held in place, as shown in Fig. 1. If the ropes are liable to break, they will break before the bent starts, from the fact that the heaviest strain comes on the ropes in starting. I am safe in asserting that four to six men with this device can put together and raise a good-sized barn in a single day. The parts of which this erector is composed are such that one man can load and unload them from a wagon, and they are only a light load for a single horse. I have with this device raised barns with posts 22 feet high, 10 x 10 size, the beam 18 feet from the foot of the post and 11 x 14 inches in size, 40 feet long, with post and girts all of oak. I have raised plates 10 x 10 inches, 34 feet long, and others 8 x 10 inches, 54 feet long, both being of rock elm.

Hopper Bevels.

The communication from "H. I.," of Sharon, Mass., on the subject of hopper bevels, published in our issue for March, in which allusion was made to articles by our correspondent, "H. McG.," has produced a characteristic response from that individual. Like some former efforts of his, it is a trifle rough in some of its expressions—that is, the writer has been in so much haste to get his ideas in shape, and so much in earnest in discussing a subject on which he has profound convictions, that manifestly he has not taken the time to sandpaper and varnish his work. Some of the peculiarities of expression and diction found below seem to be

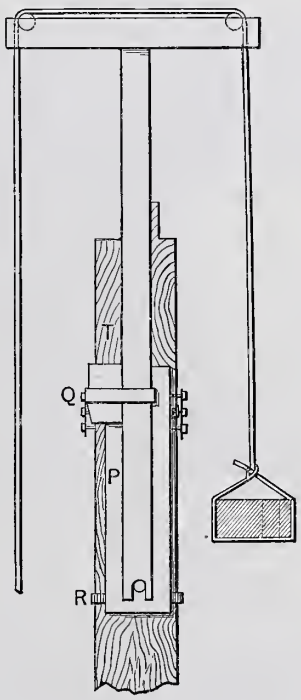


Fig. 5.—The Plate Attachment, in Process of Raising the Plate.

so much a part of "H. McG.'s" personality that we have made no effort to touch up the work ourselves. The communication, we think, will be found readable, even though some of the phrases are more vigorous than elegant. However, "H. McG." has not asked us to make apologies for him, but rather to introduce him to the reader, and allow him to to have his own say in his own way. So here he goes:

Hello! I'll be d——blessed, if here ain't one of the da——blessed "hopper bevel" chaps again, and with the old, old story. The way that "H. I." describes that "top bevel" will bring him "thar" every time, although he is a little obscure in spots. But he seems to forget that there are two old-fashioned ways of doing that same thing that never miss fire; one is to set up the side of the "hopper" at the proper angle, and scribe the end up to it; the other is to stand off and guess at the "top bevel," and fit the same up with a long fore-plane. These two ways are as sure as death, providing that the "chip" that attempts to make the joint can make a decent joint anywhere. Both have the advantage of being just as workmanlike, geometrical and as scientific as his way, and then you don't have to bevel, level and square a "waste piece of stuff" to do it with, either. When I suggested that, "if the top is level, a straight 45° miter cuts the joint, &c," I supposed I was addressing my remarks to mechanics who had brains enough to know that a principle that would miter an angle of 90° would miter an angle

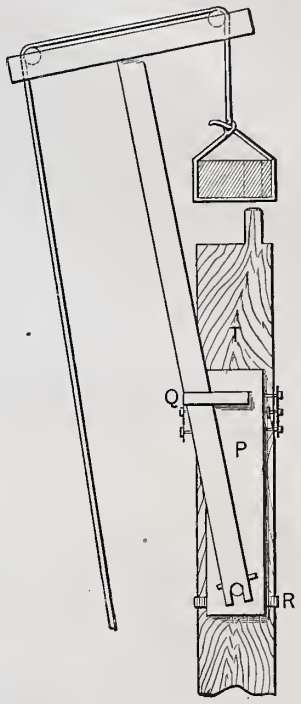


Fig. 6.—The Parts as Used when Lowering the Plate.

67° 59′ 22½″, or any other number of degrees, if the principle was worth a da——blessed cent, or, to be more explicit, a miter is the simple bisection of an angle, and the principle that will miter a square will miter any angle whatever, provided the principle is correct geometrically. This is all the science there is about "hopper bevels."

"H. I." says that the principle he uses most in down bevels is the one I suggested. Good! That's the one the old "chip" that made the first bread-tray, or splayed tool box, or "hopper" used, and he had a great head. Now, my dear "H. I.," when you understand that down bevel in all its beauty, all the geometrical power it possesses, you will never, never howl for "more stress" about that "top bevel;" you will discover that the side and down bevels are two independent arrangements, and that to get 'em both is

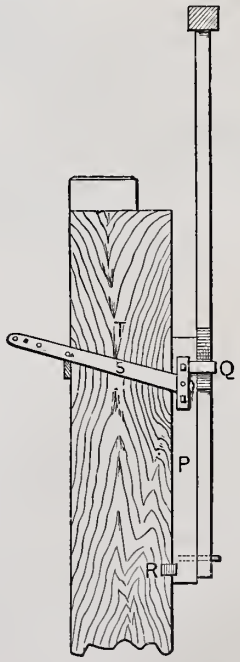


Fig. 7.—Side View of the Plate Attachment.

as easy as lying about laying 4000 or 5000 shingles in 8½ hours; that the one has no possible connection with the other, and that it won't make the slightest possible difference to you whether that "top bevel" is level, bevel or square; or if it is'nt 'ary of 'em, whether the thing pitches outside or inside, or if it pitches 19 ways. Tho same principle will bring the joint every time, even without that "waste piece of stuff." If you get the simple geometrical principle of that down bevel through your hair in good, clear shape, you needn't care a continental dam—blessed thing for all the "top" or side bevels than can be piled between Jersey and Jerusalem, and you won't want any "waste piece of stuff" or mathematical calculation (whatever that may mean) for it, either.

Pleaso hurry up that "simplest form of splayed box." I'm just dying to get that "box" wound around this Irish head of mine on the inside, so that the idea won't get away; and then I'll be damaged (that's tho word I disremembered all through) if I don't strike the boss "silly" with what I know, and the quantity of printed matter it requires to publish what I don't know about "hopper bevels." 'Till the "box" comes, A-jew.

Copper for Valleys.

From J. B. T., *Saxton, Pa.*—I desire to learn, through *Carpentry and Building* if sheet copper would be a serviceable valley for a house covered with tin The seams of the tin are continually breaking, causing leaks through the winter season particularly. Do you know of copper valleys in use?

Answer.—From the wording of our correspondent's inquiry we infer that he speaks of a gutter rather than of that part of a roof usually called a valley. Copper is very extensively used for gutters in some parts of the country, and we see no reason why, if properly laid, it should not give entire satisfaction. It is a metal, however, that by its nature should not be laid in the same manner as tin plate is ordinarily laid for the same purpose. If laid in that way it is likely to give poor satisfaction. The utility of using copper gutters in connection with a tin roof is one which our readers may discuss with advantage. We should expect a joint of ordinary construction between copper and tin to give trouble. Forms of construction, however, might be suggested in which all liability of trouble would be overcome. The question which our correspondent raises is one that may be profitably discussed by all tinsmiths. We hope to have correspondence on this subject.

Builders' Glossary.

From E. P. D., *Topeka, Kan.*—Something was said in *Carpentry and Building* some months ago about a "Builders' Glossary" as a regular feature of the paper. I desire to inquire if it has been abandoned or only temporarily suspended.

Answer.—We have not abandoned the idea, and, in fact, have done more toward carrying it out in the interval than the literal interpretation of our correspondent's letter would indicate that he credits us with. The space in *Carpentry and Building* is so limited, and the pressure on our columns from month to month so great, that we have been obliged to omit the Glossary as a special feature; but much of the information that our readers have asked for in the supposition that it would come in the Glossary, we have found it possible to give in other departments of the paper, and with economy of space. In some cases this has been done as parts of general articles, and in other instances in the Correspondence Department. In this matter, as in all others, we shall endeavor to keep pace with our correspondents' requests to the best of our ability.

Roof Framing.

From M. A. P., *Amesbury, Mass.*—I inclose a drawing of a roof of a house with an L, and would request some experienced reader of *Carpentry and Building* to explain, for my benefit, the method of getting the various cuts and doing all the framing of a roof of this kind, using a carpenter's square.

Note.—Tho questions raised by this correspondent have been so thoroughly discussed in back volumes of *Carpentry and Building* that we do not think it would be of interest to our readers to revive it at the present time. Tho sketch that he incloses presents nothing that is new, and every point that would come up in an exhaustive discussion of the question has been already considered. If this correspondent will take the back volumes of *Carpentry and Building*, and, by reference to the index, pick out those articles which relate to hip rafters, valley rafters, bevels, steel-square problems, &c., he will obtain all the information he requires. The new questions continually arising demand our attention rather than a repetition of what we have already treated somewhat exhaustively.

REFERRED TO OUR READERS.

Dock Construction.

From J. B., *Yorkville, N. Y.*—I am very much pleased with the bridge drawings and details presented in the February issue. If convenient, I should be very glad to see drawings of dock construction, including details. I think some letters on this subject would interest many of your readers.

Marble Stains.

From U. E., *Cambridge, Mass.*—I desire to learn, through *Carpentry and Building*, what will take strawberry and lemonade stains out of black marble. The stains at present show whitish. The difficulty occurs in a hall floor of white marble diamonds bordered with black marble in the same shape.

Mortar.

From A. T. G., *Washington, D. C.*—I desire to inquire why contractors and architects in this country stipulate that the mortar used by bricklayers shall be fresh. In England it is thought that the older the mortar is the better it is, and contractors there demand of the mason that the mortar shall have laid two years under water. It is obvious that both of these plans cannot be right. Houses recently built in this country are crumbling, while over there buildings have stood since Shakespeare's time. Our bricks are as good and are claimed to be better. I would like to see this question discussed by practical men.

A Desirable Sample-Room.

The C. J. L. Meyers' Sons Company, 26 Market street, Chicago, have recently arranged a sample-room of doors, door trimmings, inside finish. window frames and shutters, mantels and other parts of house construction and finish that possesses unique and useful features. The plan upon which they are displaying doors and door trimmings and finish in both soft and hard woods will especially commend itself to architects and builders. It is well known by the building fraternity at large that very few of those who invest their money in houses have either the knowledge or experience necessary to enable them to judge of the appearance of a piece of work from a mere technical description or by a representation of it drawn to scale. It is to meet the reasonable wants of people in this direction, as well as to display their various styles and patterns to the best advantage, that the new show-room has been arranged. It is intended to be a place to which architects and builders will bring their clients in order to enable the latter to indicate their preferences among the patterns displayed, or by comparisons to form an intelligent idea of what has been specially designed for use in the work contemplated. Two rows of frames extend down the center of the room, in which doors of various styles are hung, and the opposite sides of which are finished in different ways. Hardwoods, both domestic and imported, variously finished, are included in materials out of which the different forms of trimming are constructed. By this arrangement of samples a very large and complete assortment of patterns and styles of finish can be shown. We understand the plan contemplates also a display of different articles of appropriate hardware in place upon the doors. This arrangement of a sample-room, we believe, is entirely original, and if carried out as at present contemplated, with frequent and periodical changes of samples, will serve a very useful purpose. An adjoining room contains samples of mantels very tastefully arranged. Encaustic and other tile are also shown, and the entire display is one well worth visiting by any one contemplating building, whether an expert or not.

STRAY CHIPS.

Among the fine structures recently completed at Grand Rapids, Mich., is the new building of the Peninsular Club. The edifice occupies a plot of ground 66 x 99 feet in size on Fountain street. The building is of dark-red brick, with Ohio-stone trimmings, the wall up to the water-table being rock-faced. The roof is of slate. The general style of architecture is old English *renaissance*. Mr. B. L. Gilbert, of New York City, furnished the plans and supervised the erection. The brick, stone and wood work was done under contracts with Messrs. G. H. Davidson and F. C. Miller. The cost of the structure was about $22,000.

The proposed apartment hotel to be erected on Grand avenue, near Laclede, St. Louis, Mo., will be 654 feet in length, with a depth of 245 feet, seven stories in hight. The construction will be fireproof, and the elevated shafts will be fitted with automatic closing doors.

The flat mania has created a revolution in the furniture trade. In a model flat all the beds fold up, all the chairs are of the camp-stool variety, the dining table becomes a buffet, and everything collapses at a touch and changes into something else except the rent. Piano-makers say that they cannot sell anything but upright pianos in New York now, because no one has room in a flat for anything else.

If we may judge from present indications and the general feeling that prevails among carpenters and builders, there is likely to be considerable activity in the building trades in this vicinity during the summer months. At present blocks upon blocks of private dwellings, tenement houses and factories are going up in this city and its suburbs. The majority of the plans recently filed in the New York Bureau of Buildings were for tenement houses and flats, the number of plans for first-class private dwellings being less than at this season last year, while the number of factory buildings in course of construction or lately completed is somewhat greater than for several years past. The operations in Brooklyn are chiefly confined to medium-grade dwelling-houses of brick or brownstone, and from two to three stories in hight. While the number of plans for new buildings filed during the month of March largely exceeded those filed for the same period last year, the aggregate cost is much less.

The largest building for business purposes ever constructed in Staunton, Va., is now in progress of erection. It has a frontage of 77 feet, a depth of 95 feet, and is three stories in hight. Local pressed brick, with molded shapes for ornaments, will be used in its construction. The roof will be of IC charcoal tin, with iron paint. Mr. J. E. Tinsley is the architect and Messrs. Lushbaugh Bros. the contractors. The cost is estimated at $15 000.

Work on the new church in course of erection for the First Congregational Society of St. Louis, Rev. I. M. Post, D. D., pastor, is advancing as rapidly as the weather will allow. The building will be of stone, faced with broken ashlar limestone. The church is 104 feet front by 118 feet deep, and is expected to cost about $70,000. The plans were made by Hurd & Rice, of Boston, Mass.

The cities of Georgia seem to be in a very thriving condition. In Atlanta there are $2,000,000 worth of new buildings in the hands of contractors, besides the new Capitol; in Macon contracts for over $500,000 worth of new buildings have been closed out; Columbus also has had $200,000 worth of residences erected since last summer, and about $300,000 work of work engaged for the coming season; in Savannah $1,000,000 has been expended during the past year for improvements.

The Lackawanna County Court House, at Scranton, Pa., was formally opened on March 24 by President Judge Handley. Ground for the structure was broken on April 14, 1881, and the corner-stone was laid May 25, 1882. The building is a massive structure, designed by Mr. I. G. Perry, of Binghampton, N. Y. The cost was $205,824.50.

The directors of the Cordesman & Egan Company, of Cincinnati, manufacturers of wood-working machinery, have filed the petition in the Court of Common Pleas of Hamilton County, Ohio, for a change of corporate name. The proposed new name is the Egan Company.

The contract for completing the County Court House at Jacksonville, Fla., was recently awarded to Mr. Thomas W. Anderson, formerly of Boston. The building is 64 x 112 feet in dimensions and will be surmounted by a tower 115 feet in hight. The materials used will be brick with artificial stone trimmings, faced with Philadelphia pressed brick. The architects are Messrs. Ellis & McClure. Cost complete, about $50,000.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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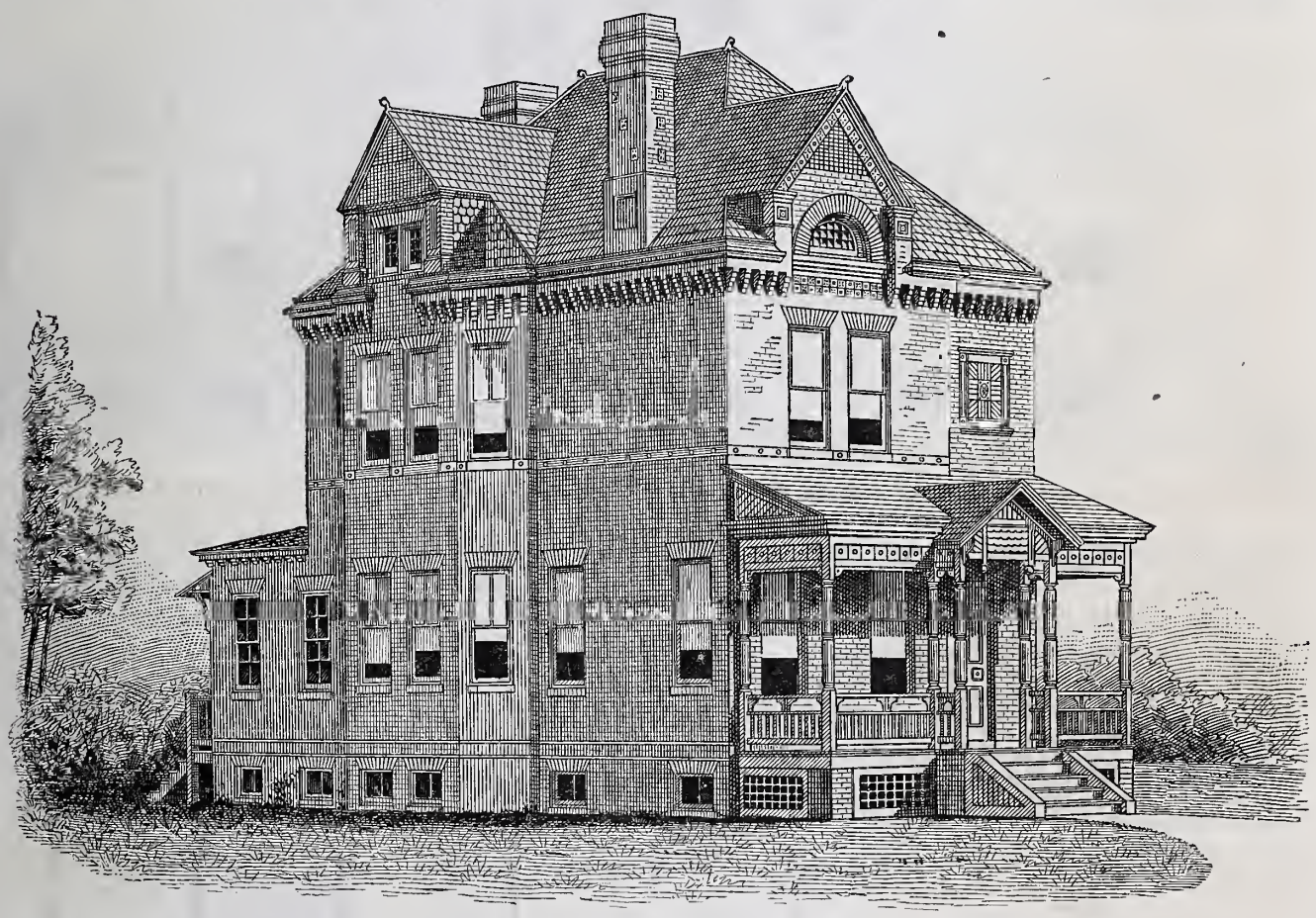
Seven-Room House in Brick.

We present this month a perspective view, with the elevations and details, of a seven-room house in brick, from our Twelfth Competition. The design shown received the first prize in that contest. The author is Mr. Alexander Millar, Washington, D. C. The following particulars with reference to this study are gleaned from the author's description, submitted with his drawings. The outside walls are intended to be faced with dark-red brick, selected as to quality and uniformity of color and laid in red mortar. The ornamentation is exclusively of brick in different shapes. No terra-cotta is employed. The bricks used for ornaments are so placed as to show to the best possible advantage. A string course extends partly around the house on a line even with the window sills of the second story. The space over the front door, which would otherwise present a bare appearance, is filled in with a panel consisting of large, square ornamental brick for the center, surrounded with square brick placed vertically, horizontally and diagonally. The border of this panel is of molded brick. Very little wood in this building is exposed to the weather. A galvanized-iron cornice might be substituted for the finish of the eaves at a very small cost above that of the wooden one shown in the details. The gables are constructed almost entirely of brick. The coping is wood, covered with tin. Square ornamental brick are introduced in the faces of the pilasters in the front gables, also in the chimney-stack. Square brick of different designs are used with good effect in the gables and also in the panel under the semi-circular window. A part of the south gable is intended to be filled in with red-slate work, as shown on the elevation. If slate should be used as a covering in place of shingles, the author prefers black slate for the purpose. The roofs of kitchen, porch and bay-window should be covered with tin. The cresting is intended to be made of galvanized iron. The molded and ornamental brick employed in this design are from patterns manufactured by the Peerless Brick Company, of Philadelphia, and the numbers shown in the details are from their catalogue.



PERSPECTIVE VIEW OF DESIGN AWARDED FIRST PRIZE IN TWELFTH COMPETITION.

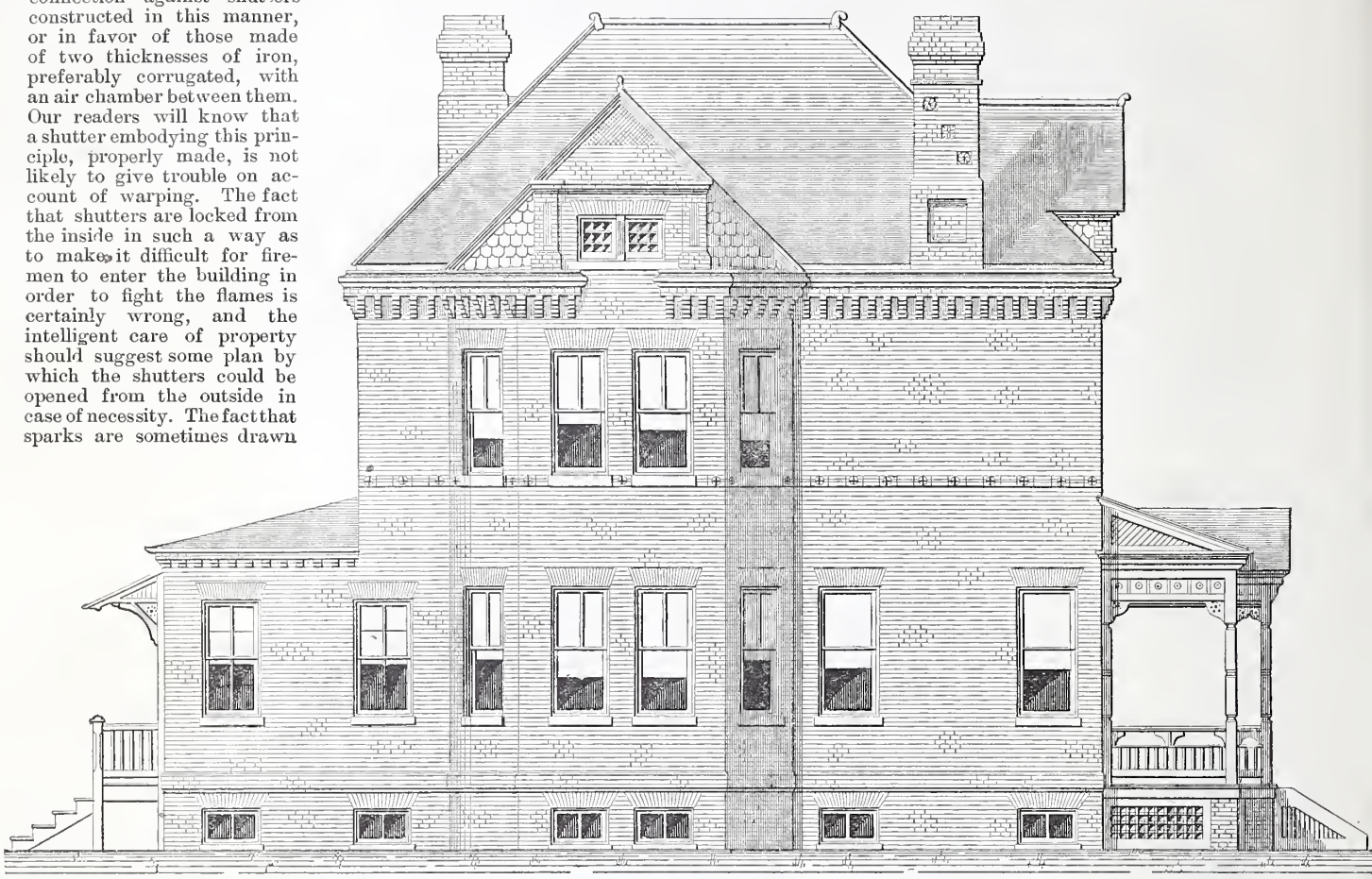
By Alex. Millar, Washington City, D. C.

Iron Shutters.

Cornice manufacturers and others are frequently called upon to build iron shutters, and almost every shop has its own peculiar patterns or its own method of construction applicable to articles of this kind. The use of iron shutters is very general, especially in large cities and upon manufacturing establishments. They are to a certain extent not only tolerated, but strongly recommended, by the insurance companies, and yet there are objections to them which are so weighty that a careful consideration of the subject would seem to warrant a substitution of some other material or the abolishment of shutters altogether. One of the daily papers, in discussing this question a short time since, asserted that experience has proven iron shutters to be among the worst obstacles that firemen have to contend with in striving to enter burning buildings. The time taken to batter them open is for the advantage of the flames, and when the firemen get enough of the shutters open to permit water to be thrown into the building, they find that a fire that was of little account when first discovered has acquired almost resistless energy. From this it argues that it is practically certain that a fire originating in a building whose windows are sealed with iron shutters will destroy the building. It asserts that the idea that iron shutters keep fire out is also a fallacy, and then proceeds to state that flames on the outside of a building will frequently heat iron shutters red-hot. It also asserts that shutters cannot be made so tight that small sparks may not pass them, and instances the fact that merchandise of the value of $2,000,000 was destroyed in Brooklyn some time since by a fire started by sparks from a fire-engine that was at work in front of the building, the sparks having passed through crevices at the hinges of the shutter.

While the naked statements presented by the journal above quoted are perhaps incontrovertible, it still remains that there is much in favor of the iron shutter, and

many reasons may be given for believing a building to be better protected with iron shutters than without any shutters at all. Some of the objections raised apply particularly to shutters made of a single thickness of iron, which are likely to warp whenever subjected to a considerable degree of heat. It is hardly necessary for us to argue in this connection against shutters constructed in this manner, or in favor of those made of two thicknesses of iron, preferably corrugated, with an air chamber between them. Our readers will know that a shutter embodying this principle, properly made, is not likely to give trouble on account of warping. The fact that shutters are locked from the inside in such a way as to make it difficult for firemen to enter the building in order to fight the flames is certainly wrong, and the intelligent care of property should suggest some plan by which the shutters could be opened from the outside in case of necessity. The fact that sparks are sometimes drawn



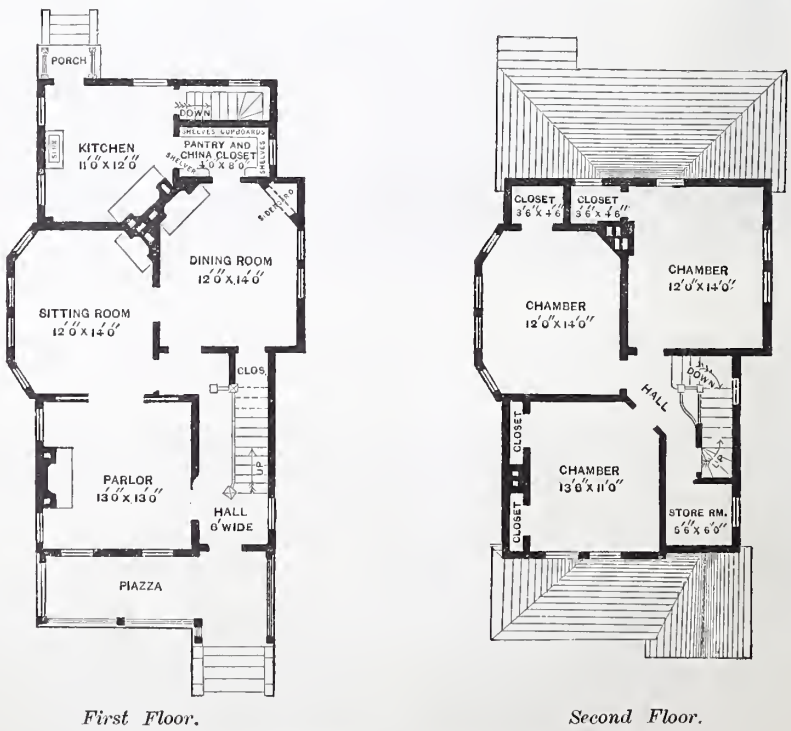
Twelfth Competition.—Side Elevation of Mr. Millar's Design.—Scale, ⅛ Inch to the Foot.

into buildings through crevices in the shutters, it seems to us, argues more than would at first be supposed. The true province of the shutters is to protect the building from fire, yet their presence induces carelessness upon the part of employees and others in caring for the building in other respects. Sparks would hardly be drawn through the crevices of iron shutters if the windows inside the shutters were properly closed. It would seem that if proper precautions were taken to keep windows shut, thus closing the building as carefully as though no shutters were in use, and relying upon the latter simply as a fire protection, it would overcome this class of objections to which the paper above mentioned alludes.

The Frieze and the Dado.

Of still more importance than the floor, says a writer in the *Independent*, is the decoration of the wall of our parlor. A few years ago it was genteel—yes, that is exactly the word—to have the parlor walls frescoed. Frescoing was dear in every sense. It was costly to the purse and dear to the heart of the purse-proud. And after the walls were frescoed they were generally rather uglier than when they were plain white. Sometimes the frescoing was intended to deceive the eye; then it was wicked as well as in bad taste. Cornices were painted with clever imitations of shadows on plaster, and people exclaimed, "How wonderful! One could hardly tell it." The good imitation of a bad and false molding was applauded. The thing was bad enough to demoralize a family. And then came a reign of tawdry and imitative and costly papers. All this has passed. We know better now. We are a people getting to despise imitations. We will be genuine, if we have bare and gray walls, or such paper only as our grocer wraps about our bundles. If there are frescoes, they are to be in simple flat-line decoration—geometrical figures, with no struggle to make them look like any other thing but simple paint.

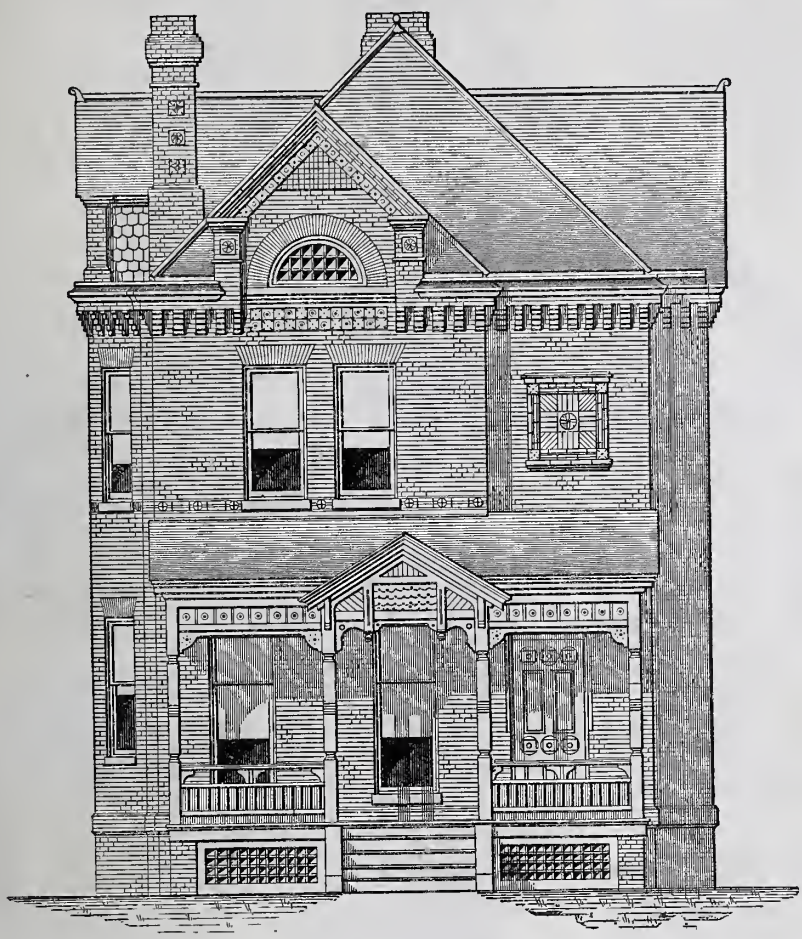
It is quite remarkable how quickly the supply for cheap and truly artistic papers has responded to the demand. The paper manufacturers have employed the best artists and have given prizes for good designs. They have taken hints from Morris and his followers in London, and Louis Tiffany and other decorative artists in this country. There was a time when, if one wanted a good paper for his wall, he must pay the enormous prices asked by William Morris & Co., of London. Now he can find quite as good designs as Morris ever made by looking over the stock of any first-class American manufacturer, and can buy the American papers at not more than one-third the price of the no better papers from England. The walls of our ideal parlor are covered from a frieze to the floor, or from a dado to the ceiling, with a paper of simple design—a design almost imperceptible across the room unless the light is strong, and intended rather to break up the plain large surface than to add any positive feature to the decoration. The figure is small, geometrical,



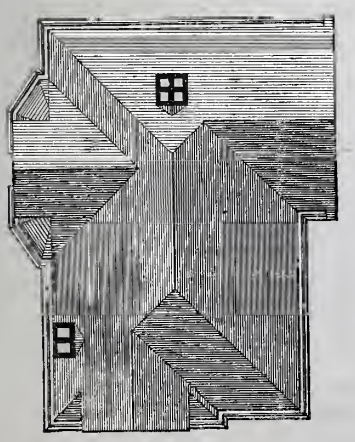
First Floor. *Second Floor.*

Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.

or purely conventionalized and flat, not "shaded" or "modeled." Better than a badly-figured paper is one upon which there is no figure at all. The plain papers are always effective, so long as they are not intended to imitate any material other than paper. The costly imitations of plain velvet or leather are as bad as a simple, soft parchment paper in some deep tone is admirable. It is surprising, indeed, how much may be made out of our plain wrapping papers. They are often of pretty shades of gray or bluish gray, and pictures always look well on them. A wall with a dado of matting in Pompeian red and a fold of gray parchment paper is very effective. There may be some designs in Pompeian red, or old china-blue with dull gilt, near the ceiling—



Twelfth Competition.—Front Elevation.—Scale, ⅛ Inch to the Foot.



Roof Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

such designs as can be applied with a Japanese stencil by any hand. It is astonishing what simple and inexpensive materials may be used to make effective walls. There is in Boston a room covered with loosely woven coffee bags, banded down with black strips of wood, and a wall of red showing through the meshes. The cost was but a few dollars in money and some patient labor, but the effect is admirable.

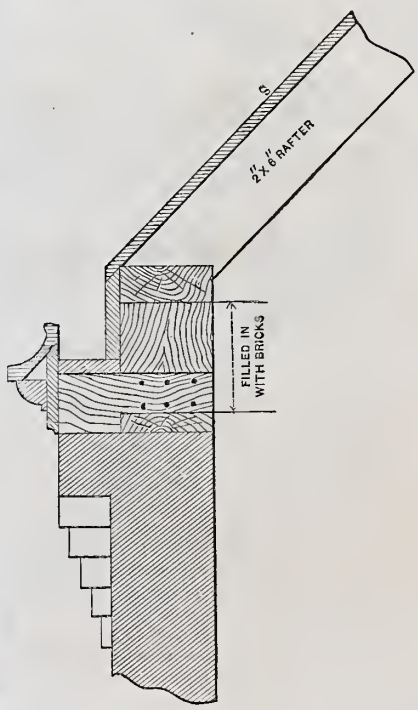
Of course, if the parlor is a grand apartment, a "society" room, it may have with propriety the very richest of decorations on its walls; but most parlors are rooms to be lived in, and most people who have parlors cannot afford paper at ten dollars a roll to be destroyed by children and badly-trained servants. The walls of the parlor are the place where must be hung family portraits, pictures of all kinds and such various *bric-a-brac* as is never gathered with an idea of any special scheme of decoration. This is a place where the choicest of the household treasures are to be displayed to the best advantage. The articles of art are rather miscellaneous than choice, and the prevailing thought must be to bring them as much into harmony as possible. A highly decorated wall in gilt and bright colors makes anything upon the wall look trivial and commonplace. It is not always easy to do without an elaborate pattern in the wall paper, because we are most of us creatures of education—or, rather, in this instance, of no education—in decorative art; but after once the struggle is made and prejudice overcome, the simple surface is preferred forever.

In regard to frieze and dado, the hight and size of the room must determine that; either makes a room seem lower, unless there be a most perfect gradation of color from the floor to the ceiling. In a room much used there is a place for a dado and chair rail on the score of utility. The dado and the frieze both help to break up large surfaces; the frieze furnishes a decoration where no decorative objects are likely to be placed. Borders at the top of the room indicate pleasantly the point where the wall leaves off and the ceiling decoration begins. There is a great danger, where borders are used, of making them too prominent in color. The tendency among manufacturers has been to make borders in what may properly be called "loud" designs and colors. The border should not be so prominent as to attract the eye the moment one enters the room, to the neglect of all other decoration. There may be a little gold in it, but it should be dead gold.

Let us sum up a few ideas as to the correct covering of walls for small parlors which are at once living rooms and company rooms. There should be color in low tones; and if figures on the wall decorations, they should be simple, conventional and flat. Plain papers are better than those with prominent designs and strong contrasts of color. A frieze puts agreeable decoration where no decorative objects are ordinarily put, and helps to break up the monotonous surface of the wall.

Mosaics.

By the term mosaic is meant a sort of inlaid or tessellated work, in imitation of painting, formed by small pieces of marble, glass, enamel or precious stones, such as lapis-lazuli, malachite, &c., of varying shades and colors, inlaid and fixed on cement. The art of working in mosaic was probably known in very early times, and was extensively practiced in Greece and Rome at the time of the first emperors. Later on mosaics were widely used in the civilized parts of Europe for decorating the walls and vaults of churches, &c., and splendid relics of the mosaics executed in those times are still extant. There is no place in the world, however, where this art has been more cherished than at Venice. Here Byzantine and Greek artists revealed to the Venetians all its secrets, and here was founded the Venetian school of mosaicists, who for centuries have covered the Basilica of St. Mark with masterpieces of decoration, both within and without the building. But

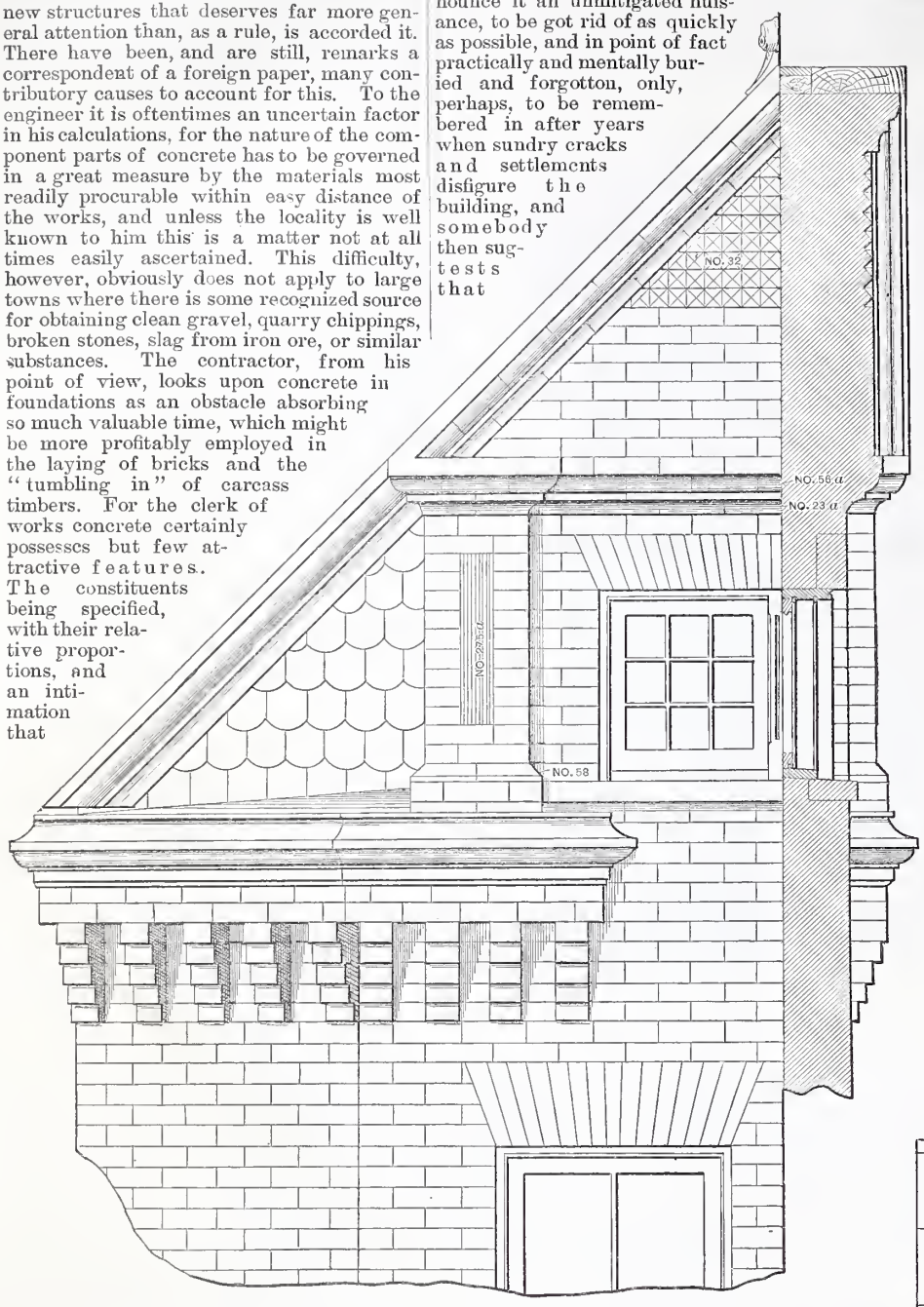


Section Through Gutter and Cornice.—Scale, ¾ Inch to the Foot.

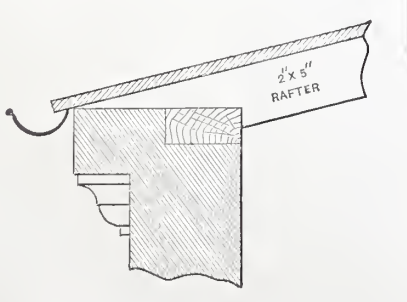
the glory of bringing the mosaic art to its hight is due to the Brothers Francesco and Valerio Zuccato, sons of Sebastiano Zuccato, master of Titian, who flourished in the fifteenth century. These artists executed their mosaics on cartoons drawn by themselves and by the most celebrated artists of the period. Among the numerous mosaics executed by them in the Basilica may be mentioned the "Visions of the Apocalypse," which have just undergone restoration. During the execution of the works in the cathedral the Doge offered a prize of 500 ducats for the best reproduction of a particular cartoon. The competitors were Francesco Zuccato, Bartolomeo Bozza and Dominico and Gian Antonio Bianchini. Titian, Tintoretto, Paolo Veronese and other painters were directed by the Republic to inspect the works and to pronounce their verdict. The prize was awarded to Francesco Zuccato, and his work was presented by the Doge to the Duke of Savoy. The mosaic executed by Bartolomeo Bozza is still preserved in the treasury of the Basilica.

Concrete in Foundations.

Concrete in foundations is one of those essential items connected with the erection of new structures that deserves far more general attention than, as a rule, is accorded it. There have been, and are still, remarks a correspondent of a foreign paper, many contributory causes to account for this. To the engineer it is oftentimes an uncertain factor in his calculations, for the nature of the component parts of concrete has to be governed in a great measure by the materials most readily procurable within easy distance of the works, and unless the locality is well known to him this is a matter not at all times easily ascertained. This difficulty, however, obviously does not apply to large towns where there is some recognized source for obtaining clean gravel, quarry chippings, broken stones, slag from iron ore, or similar substances. The contractor, from his point of view, looks upon concrete in foundations as an obstacle absorbing so much valuable time, which might be more profitably employed in the laying of bricks and the "tumbling in" of carcass timbers. For the clerk of works concrete certainly possesses but few attractive features. The constituents being specified, with their relative proportions, and an intimation that they are to be well mixed and thrown into the trenches from a hight of not less than, say, 6 feet, the *modus operandi* affords him but little diversity of occupation; it needs no working drawings or checking of dimensions, nor does it visibly grow into size or substantiality; it creates no opportunity for artistic treatment or constructive efforts; it leaves no visible evidence of careful forethought or unremitting care, and the clerk of works therefore mentally agrees with the architect, and for once tacitly is of the same opinion as the contractor, that it is a subject for which the usual half-dozen lines in the specification are as much as it deserves, and one and all pronounce it an unmitigated nuisance, to be got rid of as quickly as possible, and in point of fact practically and mentally buried and forgotton, only, perhaps, to be remembered in after years when sundry cracks and settlements disfigure the building, and somebody then suggests that "perhaps the concrete was no account." But within the last few years "concreto in foundations" has certainly received more attention, and it is partially recognized that the back that bears the burden should have its constitution inquired into more fully than has hitherto been the custom, and that the piling and planking always thought necessary when the foundations were at all of a suspicious character, might, in the majority of instances, be dispensed with in favor of concrete.

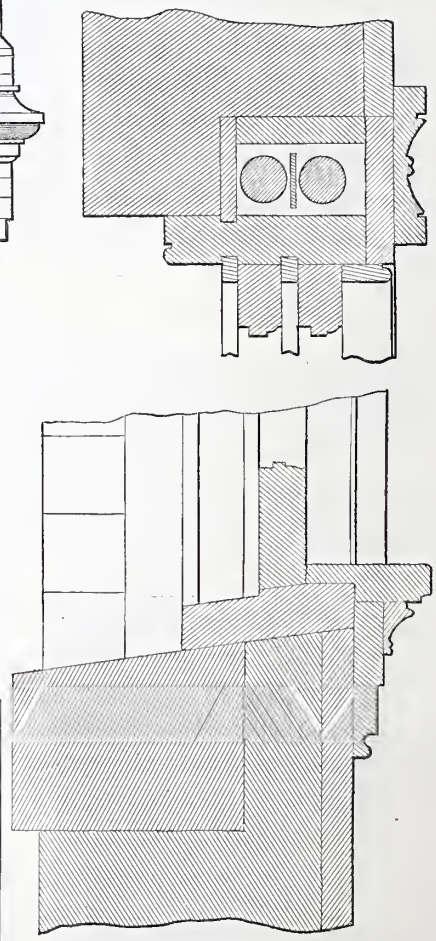


Twelfth Competition.—Half Elevation and Section of South Side Gable.—Scale, ½ Inch to the Foot.



Section Through Kitchen Gutter.

The causes that have led to this result are not difficult to discover. When concrete was used for one purpose only—viz., foundations—no practical means existed for testing whether the material selected fulfilled the desired object; the concrete was made, the trenches filled in and the walls commenced thereon with, in most cases, as little delay as possible, so that three sides of the foundations were incased by the natural ground and the fourth covered by the footings of the walls, practically hiding all defects and preventing any after-inspection as to the quality of the concrete. But concrete having become of late years a material extensively employed in engineering works, such as sea walls, dock walls and harbor works, and also in ordinary buildings for wall construction, has enabled very practical trials and careful observations to be made as to the respective qualities of the various materials employed in its composition, and of different modes of treatment in its adaptation. In dealing with concrete in foundations, it is not proposed to enter into any disquisition upon the nature of the ground upon which buildings have to be erected, but upon the concrete itself, which has to take the place of the excavated material from trenches and to carry the superstructure. The old system of piling and planking was costly and not always satisfactory, and there are very few instances now—except, of course, in swampy ground or on shifting sands—where concrete cannot be more economically and safely employed. As every one engaged in building knows, the object of concrete is to obtain an artificial foundation with a material that shall bear a large superincumbent weight, which shall be homogeneous in its character, so that no one part shall be able to sink or move away from the bulk, and of which the constituents to effect this object shall be uniform in character, possessing great cohesive properties, and resistance to crushing force, while also unaffected by aqueous surroundings. Unfortunately, it is too often considered that the natural soil will keep the foundations in place laterally. and that it is a waste of time and materials to spend much of either on work out of sight. But, in point of fact, the foundations of any building ought to be of that nature that it would be practicable to remove the whole of the ground on each side to within a few inches of the bottom without any fear of the concrete bulging; yet how many architects or clerks of works could safely say they would be willing to do this with the buildings they have superintended?

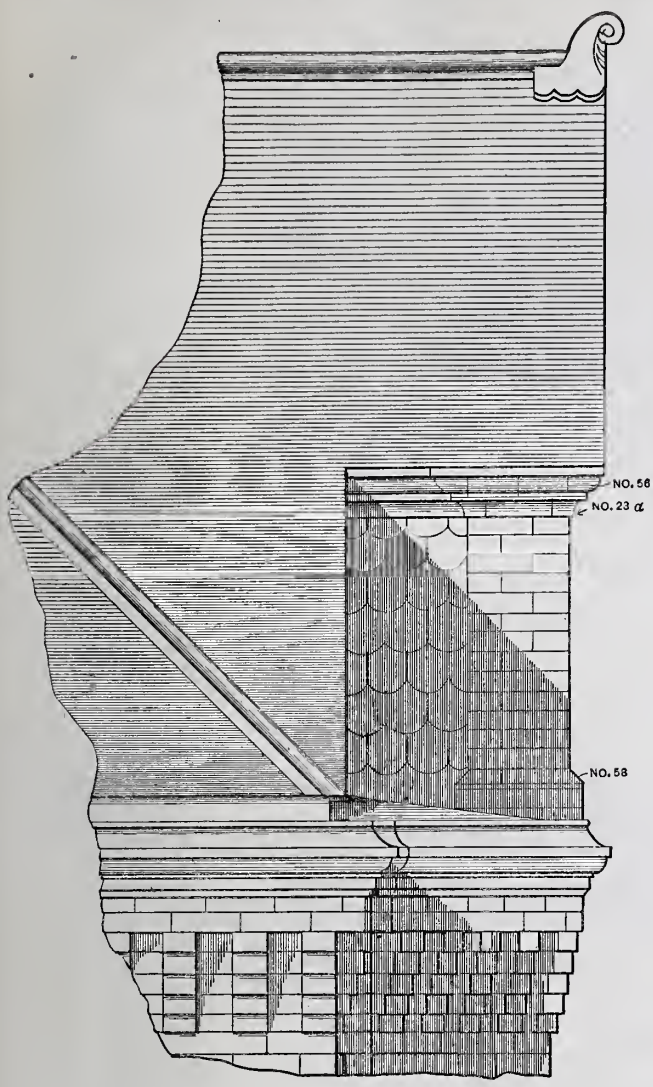


Horizontal and Vertical Sections Through Window Frame.—Scale, 2 Inches to Foot.

The materials, or bulk of them, employed in making concrete have, for want of a bet-

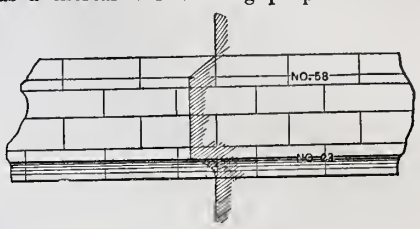
ter term, come to be recognized as the "aggregate," and the cementing medium, for like reasons, the "matrix." For the aggregate, where a choice exists, it should be a material free from anything of a clayey or dirty nature, and the finer or sandy portions of which are composed of the same materials as the bulk, and it is for this reason that hand-broken materials are unsuitable when compared with those broken by a machine crusher similar to Blake's. Another reason why machine-crushed materials are superior to hand-broken is that all sizes are thus obtained, ranging from irregular cubes of 3 inches square to coarse sand or grit, and this is of great importance, because it enables the interstices between the larger portions to be filled up by those next in size, and these latter interstices in turn by smaller still, till we get to the sandy grains, which unite with the matrix and make a strong liquid mortar, grouting the whole together and forming a solid "pudding-stone" unobtainable by any other system of manufacture. Now, concrete made with an aggregate almost uniform in size must have its interstices filled up only with the mortar grout formed by the matrix and the sandy grains, and therefore creating an irregular texture in the concrete itself, or, as is most likely the case, the insterstices are too large to be filled up in this way, and the aggregate is simply held together at its prominent angles, and is thus weak and unreliable, admitting water like a sieve, having but a limited power of cohesion, and if broken presenting a honeycombed appearance. It is attempted at times to avoid this condition of things by adding an excess of sand, the result being that the adhesive properties of the matrix are lessened in the same way that weak mortar would be produced.

In some articles that have been written on concrete we are told that the proper quantity of sand may be found by simply filling a water-tight measure with aggregate, then adding as much water as the measure will contain without running over, and that the amount of water by measure needed for this object will be exactly the correct amount of sand required for as much of the aggregate as the measure contains. Nothing could be more unsatisfactory in practice than this, especially if it happens that the aggregate is large and uniform in size. With most river and sea-beach gravels we usually find the distribution of sizes most essential for a good aggregate, but, as a rule, too much sand is employed; only so much should be left in the ballast as would insure making a good mortar with the lime employed as a matrix. Those proportions of the aggregate which are below a certain size—in point of fact, sand—combine with the lime to form the cementing medium which binds together the larger portions of the aggregate. This is a point which should not be lost sight of in concrete-making where lime is the matrix, viz., that without sand it will not make a mortar which will possess strong adhesive properties, and, on the other hand, when the aggregate contains more than a fixed proportion of sandy particles its strength is impoverished. This fixed proportion should be about twice the amount of lime intended to be used. River and sea-beach gravels have two disadvantages, in being generally of a pebbly shape, with their angles worn away by attrition, and also in being non-absorbent. No better materials for aggregates exist than hard brick-bats and the strongest of natural stones broken by a Blake's stone-crusher. Scarcely, if any, inferior is slag from iron ore. Those materials which, if of a hard nature, possess the strongest power of adhesion to mortar or cement, make the best aggregates. Experiments go to prove that the most absorbent materials do not always possess the greatest powers of adhesion, and that granite and rag-stone chippings, when obtainable, are pre-eminently fitted for aggregates. This knowledge has been taken advantage of in the manufacture of concrete pavings, for which purpose both these aggregates are extensively used.



Twelfth Competition.—Side Elevation of South Gable. Scale, ½ Inch to the Foot.

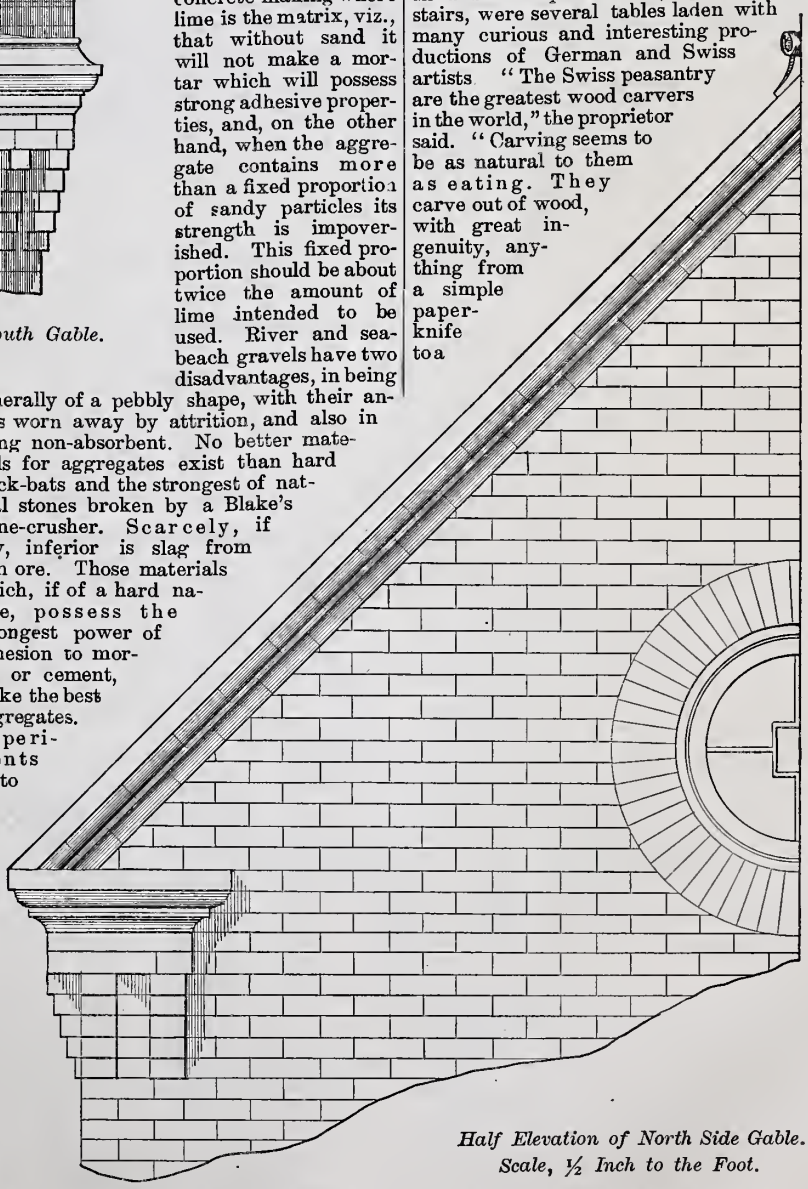
Coming to the cementing medium, the "matrix" or "matrice," we find that practically there are only two now in use—"lime" and "Portland cement." Roman cement enjoyed some popularity in its day as a matrix for concrete, in common with its other uses as a mortar for building purposes and a stucco for the external plastering of walls, but the introduction of "Portland" has driven "Roman" cement out of the market, and it seems likely that the latter will eventually become a curiosity. The quick-setting properties of Roman cement must have been a great drawback to its use in concrete foundations, although of great service where running water was prevalent and in tidal work.



Detail of Water Table.—Scale, ¾ Inch to the Foot.

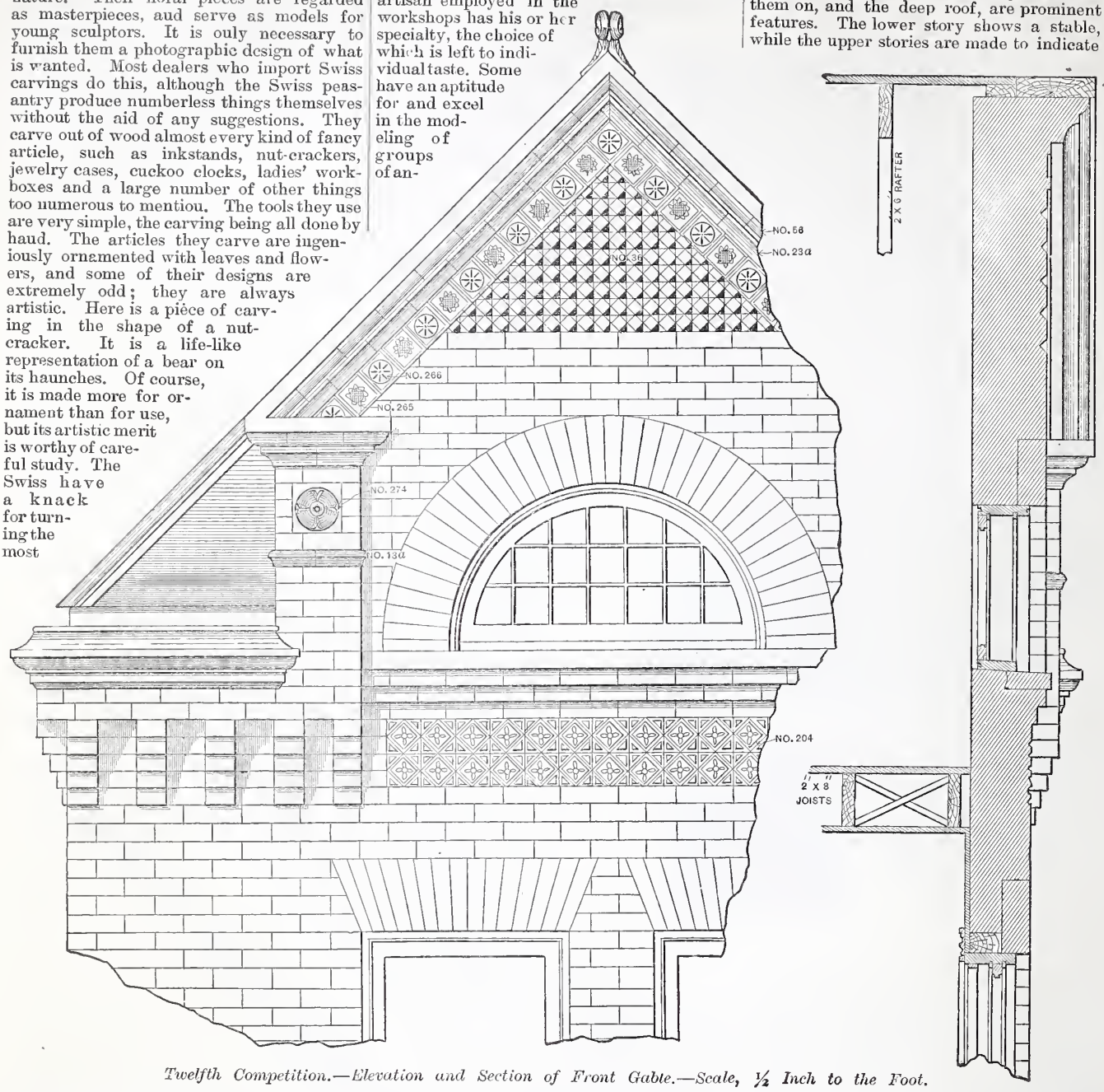
Ingenious Wood Carvers.

Over a West Side doorway in New York is the inviting sign, "Artistic Bric-à-brac." In a small square room, up one flight of stairs, were several tables laden with many curious and interesting productions of German and Swiss artists. "The Swiss peasantry are the greatest wood carvers in the world," the proprietor said. "Carving seems to be as natural to them as eating. They carve out of wood, with great ingenuity, anything from a simple paper-knife to a most elaborate piece of architecture in miniature. Aside from wood carving and some other mechanical occupations, they are not good for anything, being very simple, ignorant



Half Elevation of North Side Gable. Scale, ½ Inch to the Foot.

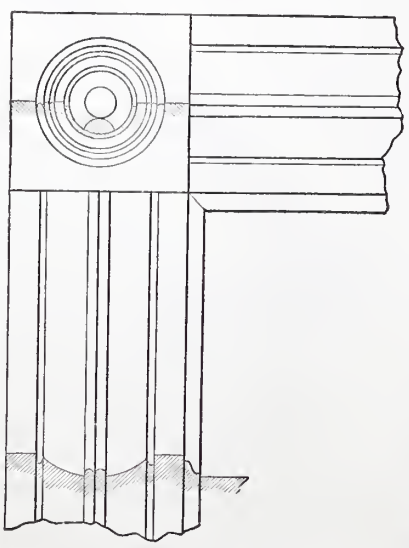
people. But they have a genius for carving, and have a natural skill for copying from nature. Their floral pieces are regarded as masterpieces, and serve as models for young sculptors. It is only necessary to furnish them a photographic design of what is wanted. Most dealers who import Swiss carvings do this, although the Swiss peasantry produce numberless things themselves without the aid of any suggestions. They carve out of wood almost every kind of fancy article, such as inkstands, nut-crackers, jewelry cases, cuckoo clocks, ladies' work-boxes and a large number of other things too numerous to mention. The tools they use are very simple, the carving being all done by hand. The articles they carve are ingeniously ornamented with leaves and flowers, and some of their designs are extremely odd; they are always artistic. Here is a piece of carving in the shape of a nut-cracker. It is a life-like representation of a bear on its haunches. Of course, it is made more for ornament than for use, but its artistic merit is worthy of careful study. The Swiss have a knack for turning the most delicacy of touch, and their work in certain branches is preferred to that of men. Each artisan employed in the workshops has his or her specialty, the choice of which is left to individual taste. Some have an aptitude for and excel in the modeling of groups of animals; others prefer to carve various fancy articles, with floral patterns, and some build miniature châlets. The latter is one of the most popular articles of Swiss handiwork. As usually made it is composed of different colored woods. The thatches, with the stones and ropes to hold them on, and the deep roof, are prominent features. The lower story shows a stable, while the upper stories are made to indicate the family dwelling. The surroundings, including the fence, courtyard, pump and spring, are also given. The roof is so constructed that it can be raised like a lid, and the part which represents the upper stories is lined with plush, and is intended as the receptacle for jewels. A movable partition divides this also from the first story, which contains a music-box, which is set going by lifting the top cover. The prices of these articles range from $10 to $35. Few dealers make a specialty of Swiss carvings, for the reason that the production is very limited, owing to inability to turn out the goods fast enough by hand. Besides, all the rare bits of carving are made by the peasants at their homes in the Alps, who work only during the winter season. In the summer they are occupied in tilling the soil and tending their herds of goats on the hillsides, a pursuit which they love so much that no amount of money could entice them from it."



Twelfth Competition.—Elevation and Section of Front Gable.—Scale, ½ Inch to the Foot.

simple article into a real work of art. Take this book rack, for instance." The dealer produced a very simple form of book-holder for the library table, having two slide pieces on a sliding base. "See how artistically the side pieces are carved, showing in bold relief a double rose surrounded with a mass of leaves and vines. One advantage the Swiss have is the wood which they use. This is remarkably fine and free from knots, and a tool cuts it as easily across as with the grain. The kind mostly used is known to the trade as peach-wood, which it closely resembles in every respect. Another kind of wood which is largely used is called satin-wood. This has a pure white color, and, like the other variety, is entirely free from knots, and peculiarly even in respect to hardness.

"The skill of the Swiss in carving wood first attracted notice about 50 years ago. It was not, however, until years afterward that it was turned to account in a commercial point of view, and even then the sales of Swiss carvings were restricted to tourists in the summer season, who made their purchases through the intermediary of hotel porters. Hence the trade was for a long time very small and unremunerative. But in the course of time local capitalists took the matter in hand, opened workshops, and began an export trade. The business of wood carving now finds employment for several hundred persons. In fact, in one establishment 300 persons of both sexes are regularly employed. The women have great



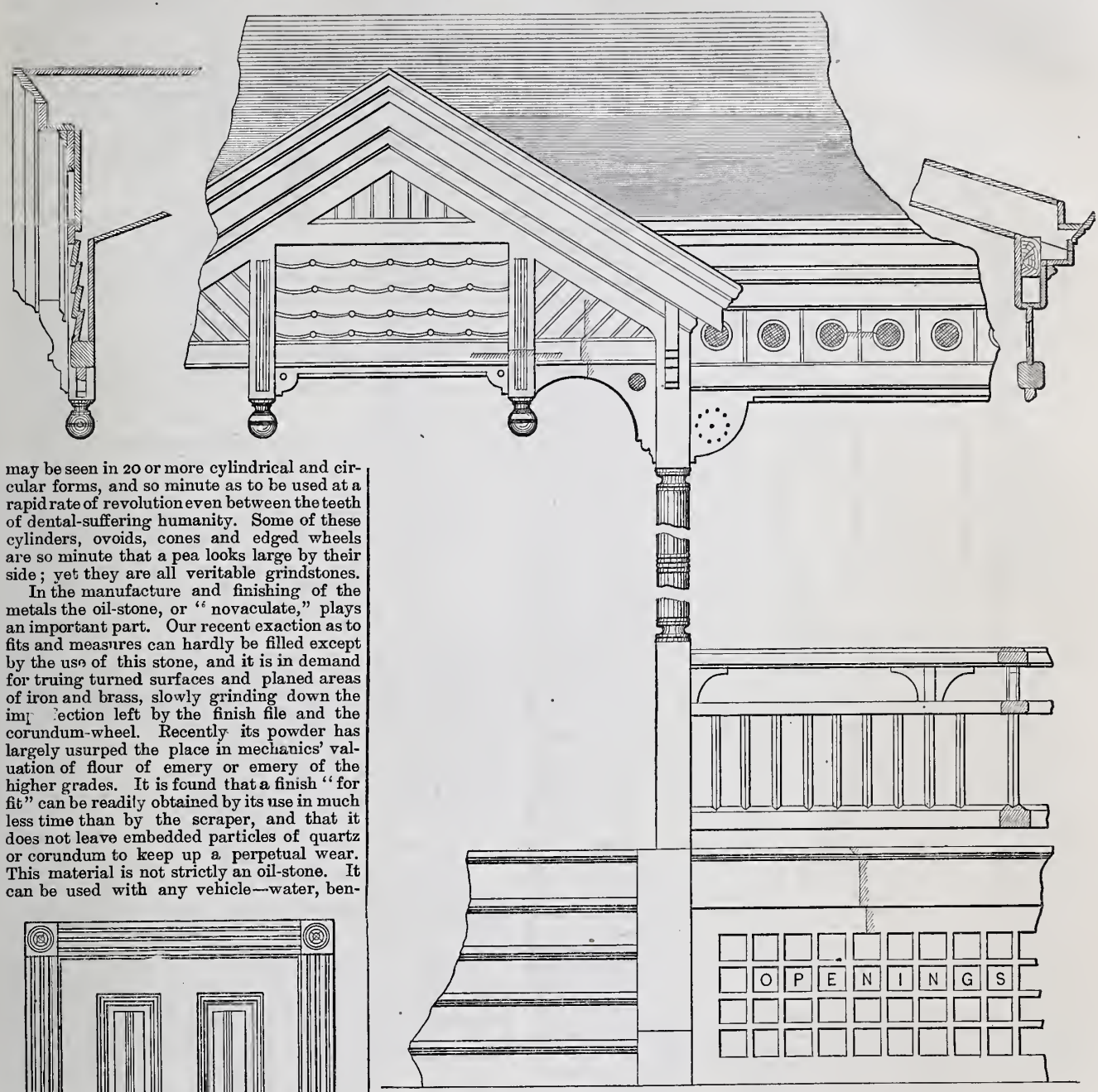
Detail of Door and Window Trimming.—Scale, 2 Inches to the Foot.

The Oil Stone.

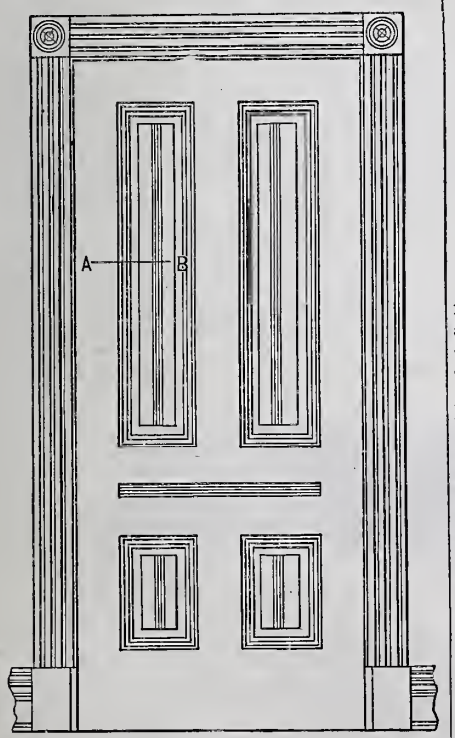
Twenty years ago the oil-stone was found only on the joiner's bench and possibly on that of the machinist, and its sole use was the sharpening of the edges of tools. To-day its use has extended beyond this province of edging tools to that of grinding, reducing, finishing—in fact, invading the limits of the grindstone, emery, rotten-stone, tripoli, and reaching almost to rouge. This stone, which is a slate known in science as *novaculite*—from

novacula, a razor—is cut and dressed in hundreds of varying forms for differing purposes. In any hardware or mechanic furnishing store it may be found in all manner of shapes under the name of "slips" adapted for sharpening tools of all forms. In dentists' supply stores it may be seen in 20 or more cylindrical and circular forms, and so minute as to be used at a rapid rate of revolution even between the teeth of dental-suffering humanity. Some of these cylinders, ovoids, cones and edged wheels are so minute that a pea looks large by their side; yet they are all veritable grindstones.

In the manufacture and finishing of the metals the oil-stone, or "novaculate," plays an important part. Our recent exaction as to fits and measures can hardly be filled except by the use of this stone, and it is in demand for truing turned surfaces and planed areas of iron and brass, slowly grinding down the imperfection left by the finish file and the corundum-wheel. Recently its powder has largely usurped the place in mechanics' valuation of flour of emery or emery of the higher grades. It is found that a finish "for fit" can be readily obtained by its use in much less time than by the scraper, and that it does not leave embedded particles of quartz or corundum to keep up a perpetual wear. This material is not strictly an oil-stone. It can be used with any vehicle—water, benzine, or kerosene oil; it is amenable to all of these. Perhaps its best use is with water, especially when the stone is of the harder sorts, as the Ouachita.



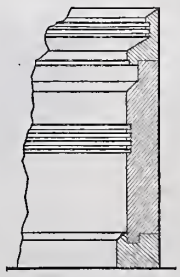
Twelfth Competition.—Details of Piazza.—Scale, ½ Inch to the Foot.



Principal Doors of First Story.—Scale, ½ Inch to the Foot.

The Creosoting of Timber.

As is well known, the preservative properties of creosote are owing to its preventing the absorption of the atmosphere in any form or under any change of temperature. It is noxious to animal or vegetable life, and it arrests all fermentation of the sap, which is one of the primary causes of dry-rot and other species of decay in timber. The action of creosote—says Mr. Bale, in his work on "Saw Mills, their Arrangement and Management"—may be thus described: When injected into a piece of wood, the creosote will coagulate the albumen, thus preventing any putrefactive decomposition, and the bituminous oils enter the whole of the capillary tubes, incasing the woody fiber as with a shield, and closing up the whole of the pores, so as to entirely exclude both moisture (water) and air. By using creosote, inferior porous timber and that cut at the wrong season, and therefore sappy, may be rendered durable. The Bethell system of creosoting is as follows: The timber is first thoroughly seasoned and cut to the required dimensions. It is then placed in a wrought-iron cylinder, fitted with doors that can be hermetically closed by means of wrought-iron clamps. The air and moisture contained in the wood are then exhausted from it, and from the cylinder, by means of a powerful air pump. The pores of the wood being now empty, the preservative material (creosote oil) is admitted into the tank. When the wood has received all that it will after this manner, more oil is forced into it by means of hydrostatic pumps, exerting a pressure of 120 pounds to 200 pounds per square inch. This pressure is maintained until it appears that the proper quantity of creosote oil has been absorbed by the wood, which is determined by a gauge. Timber intended for railway sleepers, bridges, &c., should absorb 7 pounds of oil per cubic foot, and timber required to be protected against marine insects, &c., requires at least 10 pounds of oil per cubic foot. The cost varies from 8 to 10 cents per cubic foot, according to the quantity of oil required.



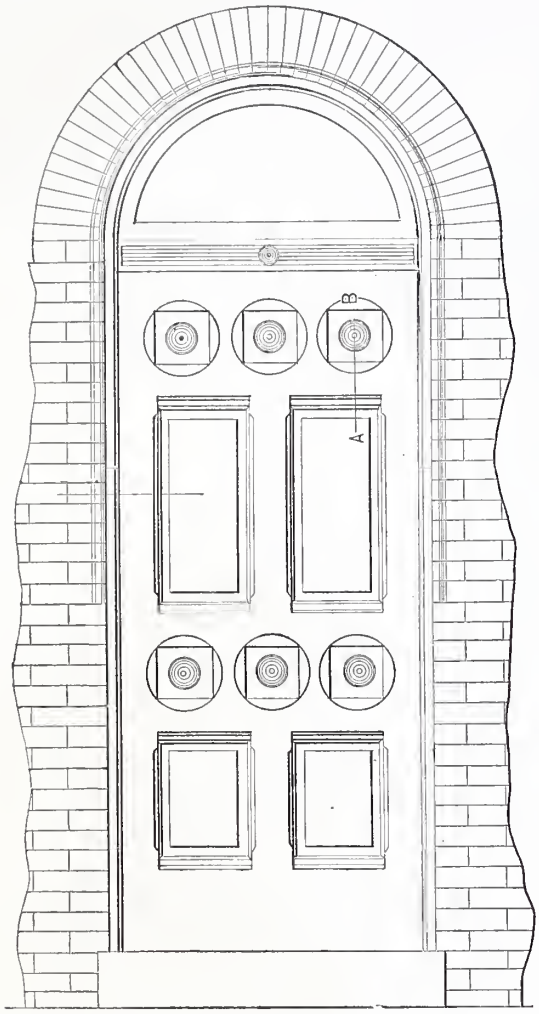
Base Board.—Scale, 2 Inches to the Foot.

Section on Line A B, in Front Door.—Scale, 2 Inches to the Foot.

TRADE PUBLICATIONS.

Portable Cabinets.

Mr. Q. S. Backus, of Winchendon, Mass., and New York office at No. 101 Chambers street, whose portable cabinets we illustrated and described a short time since, has issued a a very handsome catalogue of these specialties. The book is oblong, opening from the ends, and the illustrations are lithotypes, done by the Lithotype Printing Company, of Gardner, Mass. The lithotype process is well suited for the purpose of representing cabinet work, and all goods of a similar character. The printed illustrations very closely resemble photographs, the process being, in fact, a photo-print process, resulting in more accurate representations of the goods than are possible except by processes founded upon the same general principles. This catalogue has some 16 large plates of the character just described, with descriptive letter-press both above and below the illustrations. In addition to prices, which are given in connection with each style, a price list of parts is presented, thus making the catalogue very complete for use by all who have occasion to buy or estimate upon work of this character. This catalogue is one of the handsomest and best adapted to the purpose that it has been our fortune to inspect recently. We understand that Mr. Backus is distributing them to all applicants in the trade, and we suggest to our readers who are at all interested in novelties in plumbing that it will be to their advantage to obtain a copy.



Twelfth Competition.—Elevation of Front Door.—Scale, ½ Inch to the Foot.

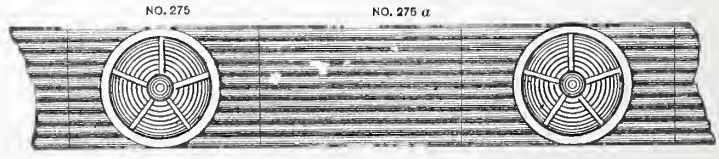
Sash, Doors, Blinds, &c.

We have received from William Willer, manufacturer of sash, doors, blinds, moldings, &c., corner Fourth and Cedar streets, Milwaukee, Wis., his illustrated catalogue and prices current, bearing date April 1. This book in its arrangement differs materially from the stock or universal catalogues which are very commonly employed by establishments in this line of trade. Evidently the engravings and the arrangement of price lists throughout are original and have been calculated and prepared with direct reference to the needs of an intelligent constituency. The first line of goods described is sash, and instead of allowing the term "8-light windows" or "12-light windows," as the case may be, to designate the goods referred to in the price lists, a carefully prepared engraving showing the arrangement of the lights in forming the sash is given in each case. In the accompanying price lists in the first column the size of glass is given, in the second the thickness of the sash, following which is the price per window without glass and price per window glazed. The last column gives the dimensions of the windows, thus affording the builder the information that he needs in managing work of this kind in a very satisfactory shape. The assortment of sash described is unusually large and covers almost everything that comes up in the ordinary range of work. Following this are price lists of doors similarly arranged. Door and window frames for wood and brick buildings are also presented, with horizontal sections, showing the design and arrangement of parts. Blinds are given, also being illustrated. The next division of the book is that of moldings, the designs presented being those of leading styles. The remark is made in the preface that any style of molding shown in the old "Universal," "New Universal," or "Standard Molding" book will be furnished on demand. Stair rails, newels, balusters, stair brackets and balcony balusters are given. A number of designs for counters, also for pews, office rail, and gates and fences, are contained. Screens for doors and windows are presented in the same thorough manner as characterizes the other departments which we have described in detail. Designs for modern inside finish is a conspicuous feature toward the close of the book, and also designs for ornamental glass for vestibule doors, transoms, skylights, &c. This establishment makes a specialty of the universal self-fitting window screen, which is adjustable, so as to be adapted to windows of different sizes. This article is carefully illustrated, with full particulars for orders.

Wood-Working Machinery.

Goodell & Waters, of Philadelphia, Pa., have just issued their illustrated catalogue of wood-working machinery for 1884. The catalogue contains over 100 pages, nearly every page of which is illustrated with one or more cuts representing the different wood-working machines built by this firm. Goodell & Waters classify the machines which they make under four heads, as follows: Planers, car, sash and door, and general machinery, these divisions including shafting and all necessary appliances for the transmission of power. They wish to call particular attention to the long list of planers which they turn out, the list being subdivided into pony planers, roll-feed lowering bed, the Woodworth and the endless-bed planing machines. Besides the machinery included in the above classifications, Goodell & Waters, having the facilities for manufacturing, are prepared to furnish any special tools or a complete plant; also having recently, after much experimenting, succeeded in perfecting a system of gauges and templates, they can furnish at short notice duplicate parts of machines which will fit accurately. Among a number of improvements recently introduced by this firm is their endless bed double-surfacer, which has been altered and improved, and is now known as the "Philadelphia." Another machine brought before the public last year is the "Keystone" floorer, and which is claimed to be the fastest-feeding machine built. The catalogue, which is excellently gotten up both as regards general arrangement and detail, contains descriptions of many other machines and appliances of improved pattern which will repay careful attention from all users of this class of machinery.

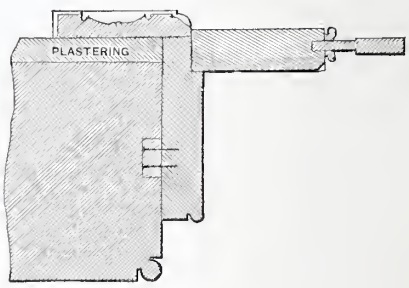
Sec. A B, in Front Door —Scale, 2 in. to Foot.



String Course Between Stories.—Scale, 1½ Inches to the Foot.

Sunlit Rooms.

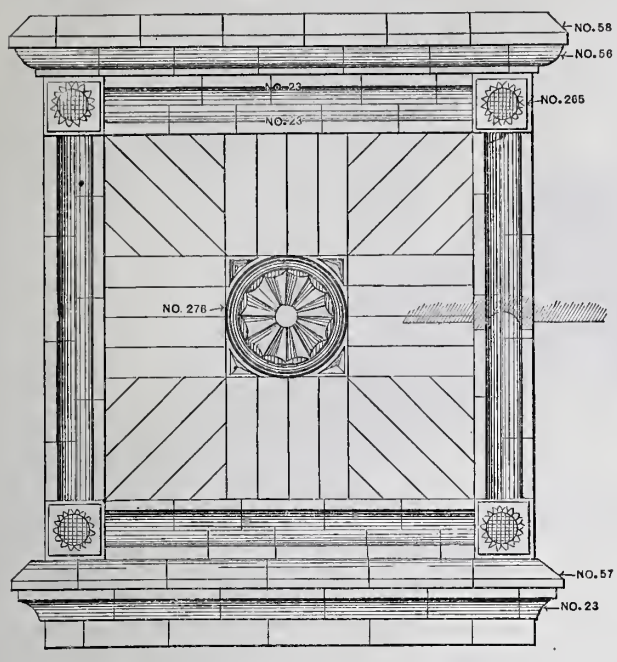
No articles of furniture should be put in a room that will not stand sunlight, for every room in a dwelling should have the windows so arranged that some time during the day a flood of sunlight will force itself into the apartment. The importance of admitting the light of the sun freely to all parts of our dwellings cannot be too highly estimated. Indeed, perfect health is nearly as much dependent on pure sunlight as it is on pure air. Sunlight should never be excluded except when so bright as to be uncomfortable to the eyes. And daily walks should be taken in bright sunshine. A sun-bath is of more importance in preserving a healthful condition of the body than is generally understood. A sun-bath costs nothing, and that is a misfortune, for people are deluded with the idea that those things only can be good or useful which cost money. But remember that pure water, fresh air and sunlit homes kept free from dampness will secure you from many heavy bills of doctors, and give you health and vigor which no money can procure. It is a well-established fact that the people who live much in the sun are usually stronger and more healthy than those whose occupations deprive them of sunlight. And certainly there is nothing strange in the result, since the same law applies with equal force to nearly every animate thing in nature. It is quite easy to arrange an isolated dwelling so that every room may be filled with sunlight some time in the day, and it is possible that many town houses could be so built as to admit more light than they now receive.



Section Through Wall and Front Door.—Scale, 2 Inches to the Foot.

NOTES AND COMMENTS.

One of the most complete buildings in its appointments is that recently erected by the Mutual Life Insurance Company, in this city,

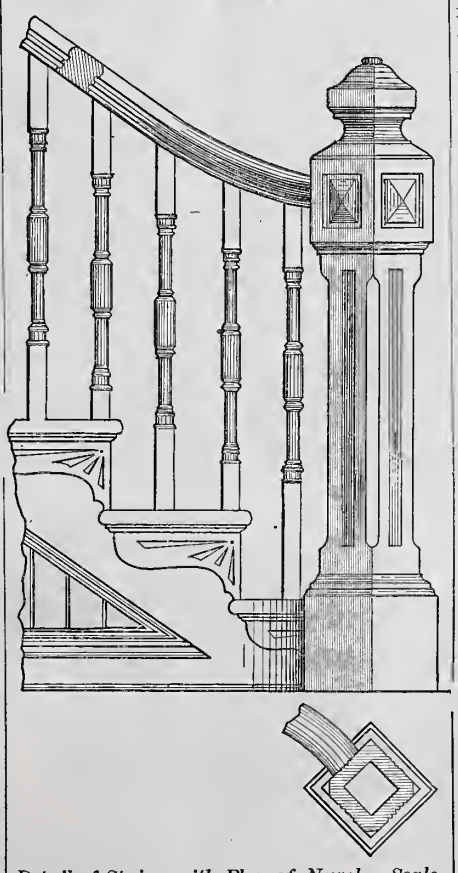


Twelfth Competition.—Panel in Front.—Scale, ¾ Inch to the Foot.

on Nassau street, between Liberty and Cedar streets. The building is eight stories in hight, and, standing as it does on rising ground, it becomes the most noticeable of all the great buildings in the down-town section of the metropolis that have been recently erected. The basements of the first story are wholly of granite. The material of the upper stories is a rich Indiana limestone. The design of the facade strictly follows the Italian Renaissance, and is at once simple and ornamental. The portico at the main entrance is in keeping with the great size of the building. The interior construction has been made to correspond with the character and requirements of business, subordinating ornamentation everywhere to practical utility. The result is the brightest, best-ventilated and best-lighted office building in the city. The greatest care has been taken to render the building fire-proof, and the most improved elevators and best systems of electric lighting and bells have been introduced. The water supply is from an artesian well on the premises.

An important meeting of the lumber manufacturers of the Northwest was held at Minneapolis a few weeks since. The object of the meeting was to consider the state of the trade and to devise means the adoption of which should insure a better profit in the business. A local paper, in commenting upon the meeting, says that men without experience and without adequate capital, and manufacturers lacking both education and means to indulge in expansion, commenced some time since to rush on the market more lumber than it was possible to find a ready and profitable sale for. To remedy this state of affairs it seems that the Northwestern lumbermen, who do not approve of rushing into the market more lumber than can be sold at profitable prices, are confronted with the necessity of forming a corporation which shall remove from the market the stocks offered by manufacturers who are forced to realize, and to restore by concerted action of this kind the confidence which has been destroyed. A movement of this kind would undoubtedly be welcomed by those manufacturers who are forced to realize, since it promises them a profitable market; but, on the other hand, it would seem that this scheme sacrifices the consumers' interests, which are always dependent upon competition. The combination looks like a pool to take up all surplus lumber offered in order to maintain prices, and if the scheme should be carried out it might possibly tend to diminish the amount of building that would otherwise be undertaken. The general lumber market would be stiffened and rates might reach a point which would deter many from investing who otherwise would put up buildings.

The utility of slow-burning construction is fast becoming appreciated by architects and builders. It is very generally recognized at the present time that it is practically impossible to make a building absolutely fire-proof. The best, it would seem, that can be done in ordinary circumstances, is to so construct it as to make swift destruction by fire impossible, thus affording every opportunity for fighting the flames when a fire occurs. Ex-Chief Damrell, of Boston, in a recent interview expressed himself as follows: "Buildings cannot be made absolutely fire-proof, but they can be made in such a manner that their swift destruction by fire is impossible, and so that a fire will not extend beyond the room in which it may originate. Iron, brick and stone as you know, are not in themselves proof against fire. Brick is the best; but even that soon succumbs to intense heat. The materials used in building must be fire-proofed by the application of such fire-proof materials as asbestos, magnesocalcite, terra-cotta, &c., and the air between floors, as far as possible, excluded to prevent draft. There should be a belt or 'fire stop' on the wall or walls of each story, consisting of a coat or coats



Detail of Stairs, with Plan of Newel.—Scale, ¾ Inch to the Foot.

of hair, mortar, concrete or plaster-of-paris, at least 6 inches in width, spread upon the wall between the furrings, and of a full thickness of the same. It should extend up 2 inches higher than lower line of the plastering. Also, every floor should have a coat of plaster-of-paris, mortar, concrete or other non-combustible material, at least ⅞ inch thick. An experience of 30 years enables me, I think, to fairly judge of the dangers incident to fire and panic, and I fully believe that the general adoption of the precautionary measures I have suggested would be the means of saving an immense amount of life and property."

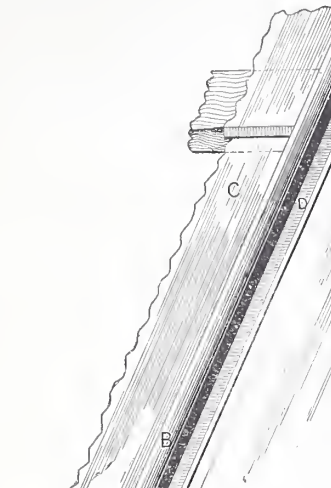
In this period of overproduction it is very gratifying to learn of any line of trade in which there seems to be an opening with a fair prospect of remunerative business. It would seem at first thought that so simple an article as building brick would afford the fewest opportunities, in the way of openings, of almost anything that might be mentioned. Our correspondent at St. Louis, however, has periodically called our attention, during some three years past, to the fact that building operations in that city are greatly embarrassed in progrses, as well as limited in amount, from the lack of supplies of this prime requisite. There is no lack of material, we are informed, or of locations favorable to the manufacture of brick, but the facilities in operation are altogether inadequate in comparison to the demand. We are informed that during the first ten days in April the two machine establishments operating in St. Louis sent out 390,000 brick daily, and that the hand yards delivered 400,000 brick daily, and yet the city demand could not be supplied. Several buildings waited for a supply of brick, the lack of which completely suspended operations upon them. The supply of clay at St. Louis is said to be so fine that there is a large demand for brick for shipping.

The danger of excessively high buildings in large cities has received considerable attention of late, and has received more or less discussion. Bills have been introduced in the legislatures of several of the States, looking to the regulation of the hight to which buildings may be carried. A few weeks since the New York Board of Aldermen limited the hight of dwelling-houses in streets and avenues 60 feet wide or less to not more than 60 feet, and in all streets and avenues exceeding 60 feet to not more than 70 feet. Measurements are to be made through the center of the facade from the sidewalk up, and are to include cornices, mansard stories and attics. A violation of the ordinance is made a misdemeanor, punishable by fine of $100 for each day the violation continues, or imprisonment. It is well known that many of the buildings erected in New York during the last few years greatly exceed these limitations, and the danger has been that the presence of a very large number of these structures would render the streets of the city dark, damp and unwholesome, while the lower stories of the buildings themselves would be likewise unfit for occupancy. New York has had one or two fires in structures that from their number of stories would entitle them to the name of high buildings, but it yet remains for a conflagration of any magnitude to break out in some of the great office buildings, whose upper stories are far beyond the reach of the streams which the fire department is prepared to throw. It is not beyond the region of probability, however, that some great disaster of this kind will occur sooner or later, and then the advisablity of limiting the hight of business edifices will be so clearly shown as to force some action in that direction, as well as in respect to dwellings.

Pine wood, on account of its cheapness and general employment, has never been very favorably regarded as an ornamental wood. Yellow pine, however, has recently obtained something of a reputation in this direction. This material, hard-finished in oil, in the opinion of many is the rival in beauty of any wood that grows, not excepting the costliest of the hard species. It is susceptible of receiving and retaining as high a degree of polish as any known wood, while impregnated with oil it is almost indestructible. In such a condition it is impervious to even hot grease and other substances that leave an ineffaceable stain upon white pine, maple and various other woods.

Glazing Without Putty.

The question of glazing without putty is attracting marked attention upon the part of English and Continental journals and architects. A number of very elaborate systems have been devised, and some attempts have been made to introduce some of them into the United States. The advertising columns of the foreign architectural and engineering journals show a number of such systems which are candidates for public favor. We show several of them in the accompanying illustrations, in which we think many of our readers will be interested. Fig. 1 is a general view of glass laid according to the "Pennycook" system, while Fig. 2 shows a full-sized section of sash-bar, and indicates the way in which joints, connections and fastenings are made. The bar of the size shown in Fig. 2 the manufacturers offer for use in connection with purlins up to 8 feet apart. The glass, it will be seen, is held in position by the lead flange turned down upon the top, and which clamps it against the upper edge of the bar. The lower edge of this lead clamp or cleat is



Glazing Without Putty.—Fig. 1.—General View of the "Pennycook" System.

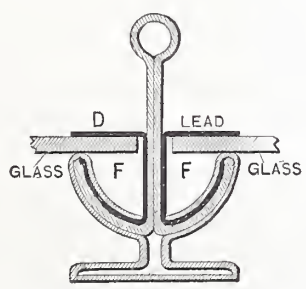


Fig. 2.—Enlarged Section Through the Pennycook Bar.

folded between the sections composing the bar. The method of fastening the bar in place is indicated in Fig. 1. On the upper purlin, E represents a clip fastened in place, and which engages with the base of the bar. The bottom end of the bar is held in place by a shoe which the manufacturers make either of wood or iron, according to circumstances. The advantages to which the manufacturers direct attention are the great light space obtained on account of the small size of the sash bars and the large space between the purlins. They also direct attention to the security from breakage of glass from expansion, contraction and vibration. No screws or other fastenings are necessary to be removed when replacing broken lights. We gain from the manufacturers' circular that no paint of any kind is considered necessary to make this form of glazing wind and water proof and durable. The name of the company handling this device is known as the Pennycook Patent Glazing and Engineering Company, Limited. Their principal offices are at No. 58 Renfield street, Glasgow, Scotland, with a branch at No. 57 Chancery Lane, W. C., London, England.

The next to which we shall direct attention is illustrated in Figs. 3 and 4 of the engravings, and is known as MacKenzie's patent. It is controlled by the British Patent Glazing Company, with offices at No. 24 Finsbury Circus, London, E. C. Fig. 3 shows the general appearance of a section of roof covered upon this system. The distance between purlins, it will be noticed, varies from 6 to 8 feet. The bars employed are of malleable iron incased with lead, as indicated in Fig. 4. The lead, which is represented by the black line encircling the bar, forms a soft cushion for the glass to rest upon, and also serves to make the work water-tight upon the upper side. The glass is made a little narrower than the space between the bars, so as to have clearance for expansion. D D in the engraving represent gutters for carrying off the moisture. By the peculiar construction employed in this form of glazing the gutter of malleable iron bar is completely lined by the lead. Another advantage, to which the company that control this system direct attention, is the fact that, the under surface of the bar being sheathed in lead, sulphurous fumes cannot act upon the iron. This makes the system desirable for use in railway stations. It will no doubt occur to some of our readers, with reference to this system and others, that the form of gutter for carrying off the moisture of condensation is such that the drip would be very likely in many cases to run down the outside of the bar, thus causing annoyance.

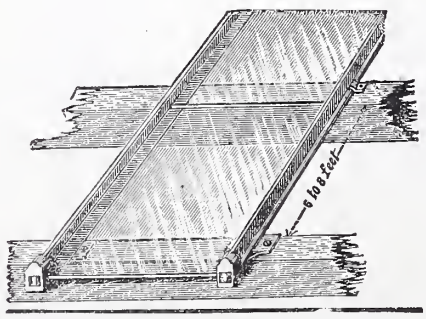


Fig. 3.—General View of the MacKenzie Plan.

In Fig. 5 we illustrate Shelley's "Standard" system of glazing, controlled by Messrs. Shelley & Co., No. 40 William Edward street, Birmingham, England. This system is said to be applicable to all kinds of structures, such as railway stations, picture galleries, markets, riding schools, arcades, conservatories, &c. Referring to the engraving, A represents the upper pane of glass and B the lower pane. C represents a middle channel arranged to convey condensed moisture from the top to the outside of the under pane. D D are channels to convey any water that may get into the work at the line of the rib. E E are hollow vulcanite tubes, or packing, that serve as a bed for the glass. F represents a movable stop that prevents the upper pane of glass from sliding down. G and G represent locking studs for securing the capping to the glass. A detail of one of these is given below the larger view. H represents a movable saddle secured to the bar to which the locking stud is fastened. The outer capping in this system is made of either zinc or copper. The fastening is very simple. The hole in the saddle for the stud to go through is an elongated slot. The stud is simply pushed through and then turned quarter round, like a button, and the locking is completed. The advantages to which the makers direct attention comprise, among others, the absence of bolts or nuts in securing the capping to the bars. Flanges may be placed across the bars without in the least injuring the zinc or copper or damaging the glazing. The glass is not held in position solely by the capping, and does not depend on such capping to prevent its being blown out by gales of wind. It is secured by the saddles, which, as we have already explained, are fastened to the bars after the glass is fixed in position. Among the important buildings upon which this system of glazing has been used may be mentioned the buildings belonging to the Prince of Wales on the Sandringham estate.

In Fig. 6 we show a section of what is called Rendle's "Invincible" glazing, and of which, it is said, over 7,000,000 square feet have been used in Great Britain. The largest single area over which this system has been employed is the new Citadel station, Carlisle, and which contains 350,000

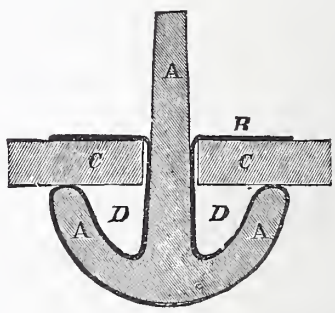
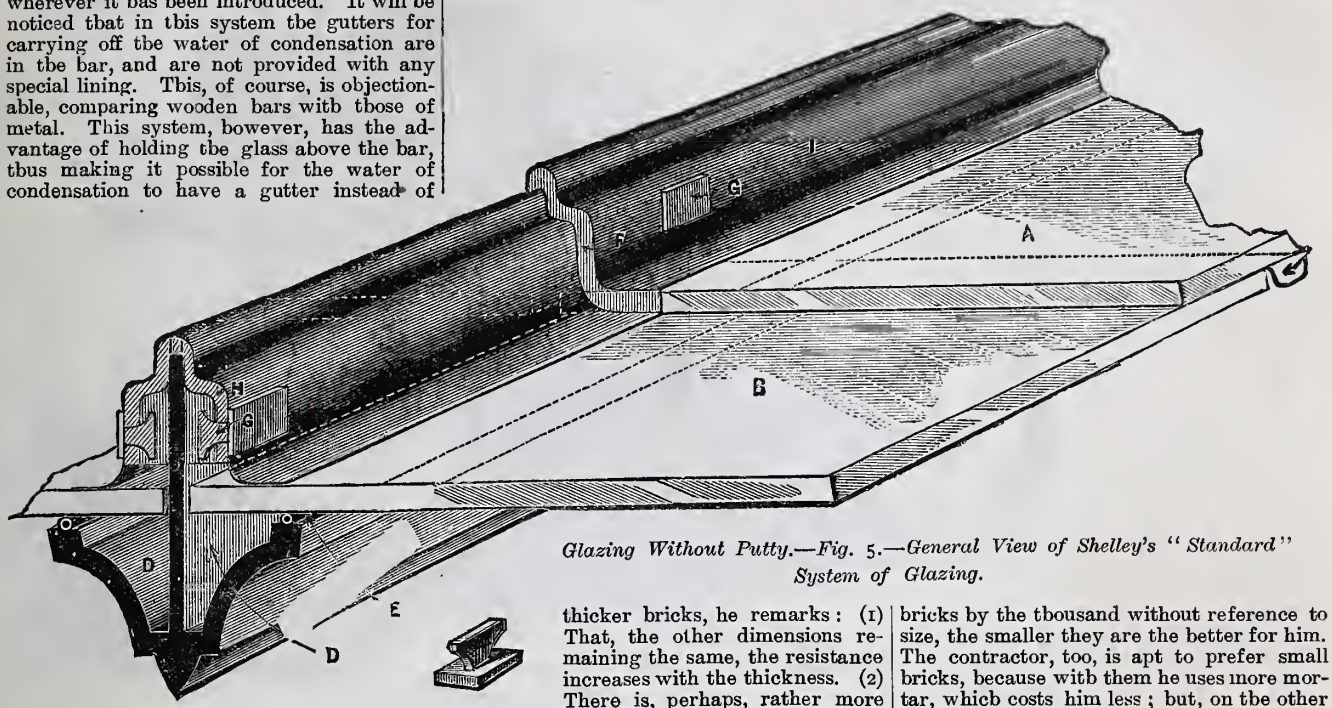


Fig. 4.—Section Through the MacKenzie Bar, Full Size.

feet superficial. The system is controlled by William Edgcomb Rendle & Co., No. 3 Westminster Chambers, Factory street, London, S. W. An attempt, we believe, was made some time since to introduce this system into this country, but with what success we are not at present informed. The system is specially designed for roofs where very long pieces of glass are to be employed. By referring to the engraving it will be seen that the glass is clamped in place against the top of the bar by a bolt and washer, the nut of which comes above the capping. The bar is hollow, forming a water channel for whatever water penetrates between the glass or through the capping. Condensation gutters are provided at the sides and at the bottom of the bar, thus rendering this form very desirable in this particular. The makers direct attention to great saving in repairs, strong and durable construction, and a minimum of labor in putting the glass in place.

In Figs. 7 and 8 there is shown what is called the "Simplex" system of glazing. Fig. 4 shows a section of the sash-bar before glazing, while Fig. 8 shows the same after the glass has been applied. The advantages to which the proprietors, Messrs. Grover & Co., of London, direct attention are the fact

that no iron, zinc or putty is used, and that by its features it is suitable for almost universal application. The lead strips are the special feature of this system, and have been patented. They require no skilled labor to put in place, and, accordingly, the system has come into quite general use wherever it has been introduced. It will be noticed that in this system the gutters for carrying off the water of condensation are in the bar, and are not provided with any special lining. This, of course, is objectionable, comparing wooden bars with those of metal. This system, however, has the advantage of holding the glass above the bar, thus making it possible for the water of condensation to have a gutter instead of



Glazing Without Putty.—Fig. 5.—General View of Shelley's "Standard" System of Glazing.

trickling down the outside of the bar. An advantage to which the makers direct special attention is that with this system all outside painting is dispensed with.

The Size of Bricks.

The best method of developing the art of building in brick has occupied the attention of architects and engineers in Switzerland for some years, and with this view it has been determined to attempt to fix a certain

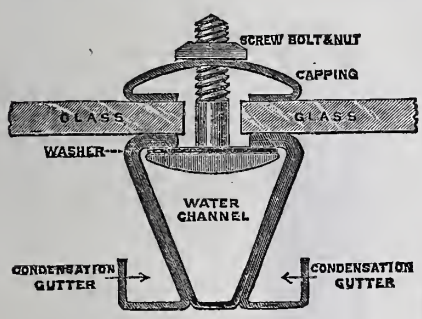


Fig. 6.—Rendle's "Invincible" Glazing.

standard size of brick, and a report was presented to the Swiss Society of Architects and Engineers, in which the dimensions recommended were 9.84 x 4.72 x 2.36 inches. As, however, these dimensions were not agreed to by all sections of the society, a special federal commission was appointed in December, 1882, to inquire into the subject. A report was presented to the General Assembly of Cantonal Delegates at Berne by M. Favod. The author first of all gives a brief account of the bricks that were used by the Assyrians, Egyptians and other ancient peoples. He then gives tables of the dimensions of the bricks that were used from remote periods up to the seventeenth century, and of those in use at the present day in Italy, France, England, Belgium, Austria, Germany and Switzerland. From these tables he shows that the standard size should be between the limits 4.45 inches long, 4.33 inches broad and 1.97 or 2.56 or 2.76 inches thick, and 11.63 inches long, 5.12 inches wide, and 1.97 or 2.56 or 2.76 inches thick; or, taking a mean, the size should be 9.84 x 4.72 x 2.36 inches. This size is made at the present time, as is also that of 9.84 x 4.72 x 2.76 inches.

The author is greatly in favor of the thicker brick, and a great deal of the paper is taken up with a discussion of the possibility of properly burning it, many of the Swiss brickmakers having stated that they cannot burn bricks having a greater thickness than 2.36 inches. In reference to the thicker bricks, he remarks: (1) That, the other dimensions remaining the same, the resistance increases with the thickness. (2) There is, perhaps, rather more difficulty in drying a thick brick, but care in mixing the beds of clay, the addition of sand, gradual drying, &c., will readily get over it. (3) In burning, the bricks must be carefully placed in the kilns, as the gas will follow the shortest route to the outlet. The bricks must be arranged so as to oppose obstacles to its escape in this direction, while facilitating its passage by the longer route. The bricks, after being dried in the sheds, should be further dried by hot air from the kilns before being burnt. All apertures by which the air could pass into the kilns must be carefully closed, and the cooling of the bricks must be gradual. (4) When color is of importance attention must be paid to the fuel. Coals of inferior quality frequently contain extraneous matter which is deleterious to good color, and also to the weathering qualities of the bricks, and is sometimes the cause of efflorescence. (5) With the same materials there will be a better output of first-class bricks with a 2.76 inches than a 2.36 inches thickness, because vitrifaction does not begin so soon. Of course, the best quality cannot be obtained from clays which are very chalky, earthy or sandy, but with careful manipulation very fair bricks may be made from very moderately good earth.

The author conducted some experiments at the Horn brickfields of M. Bourry, where the bricks are made by machinery and burnt in Hoffman kilns. These experiments were performed with eight varieties of earth—three blue, three yellow, one sandy and one earthy. Bricks were made from each variety separately, and also from mixtures of different kinds. Their dimensions were 9.45 inches by 4.53 inches by 2.76 inches. They were dried under different conditions, according to their kind, and burnt carefully in kilns with other bricks. The result was that each different clay and each mixture produced bricks of different colors, but all well-burnt and sound. With regard to the question of price, of course, if the manufacturer sells his bricks by the thousand without reference to size, the smaller they are the better for him. The contractor, too, is apt to prefer small bricks, because with them he uses more mortar, which costs him less; but, on the other hand, he requires more bricks per cubic yard (the number of bricks of different sizes in a cube meter of work are given), and there is more labor in setting them, so that what he gains in one way he loses in another.

In regard to the quantity of mortar, Dr. Boehme's experiments at Berlin in 1875 proved that no more mortar than was actually necessary to keep the course horizontal and effect the cohesion of the bricks (for which purpose joints of .4 inch thick are ample) should be used, as, whether the mortar becomes more or less hard than the bricks, the result is in either case to reduce the strength of the work. Experiments made with blocks of 20 sound bricks, one set of blocks cemented with various kinds of mortar and cement (the joints .4 inch thick), another set consisting of bricks laid dry, and surrounded with cement simply to keep them together, gave as mean resistances to compression: For the first set, 1618 pounds per square inch to cause splitting, 1934 pounds for the destruction of the bricks; and for the second set, 2202 pounds per square inch to cause splitting, and 2291 pounds per square inch for destruction, showing that the dry bricks gave a mean resistance of one-third more than those set with mortar before splitting, and one-fifth more before destruction. The author, therefore, concludes that to secure the greatest strength thick bricks with a minimum of mortar should be used. The author suggests that the price of bricks per thousand should vary according to the number required per cubic meter of work, so that the manufacturer may be paid according to the size of the bricks. Finally, he recommends that the standard brick should have the dimensions 9.84 inches by 4.72 inches by 2.36 inches.

Fig. 7.—Section Through Bar of "Simplex-Laid" Glazing Before the Glass is Applied.

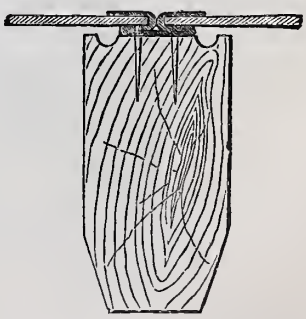
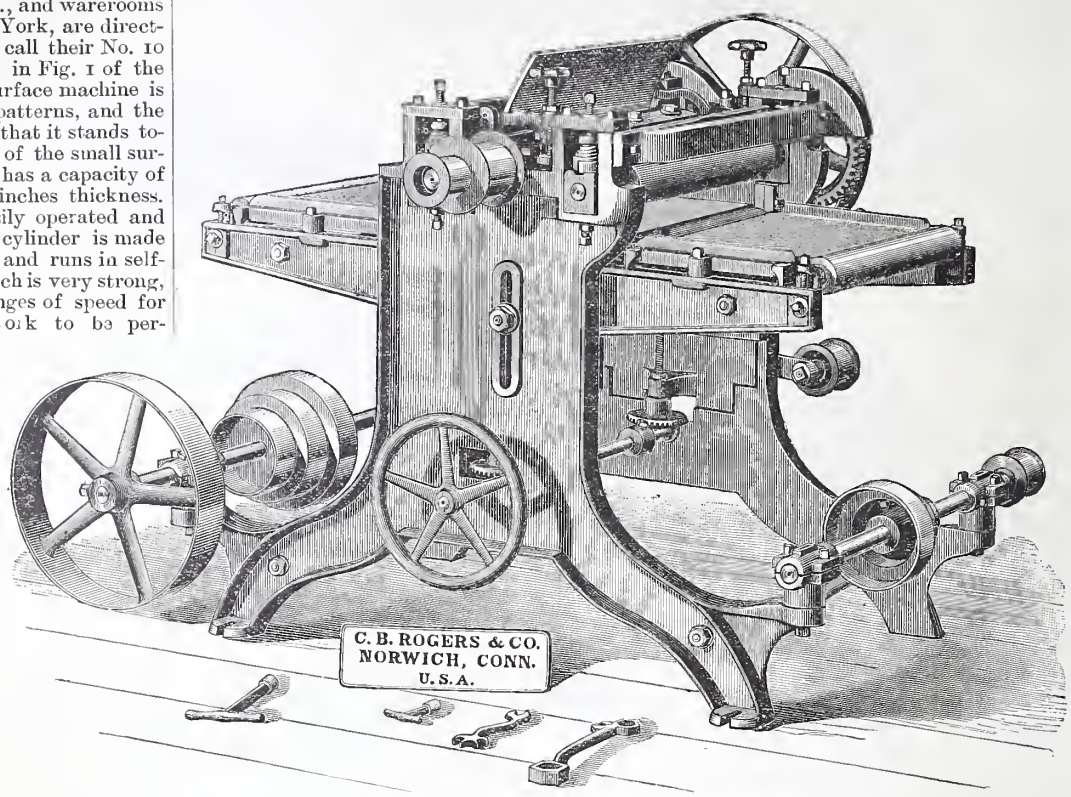


Fig. 8.—Section Through the Same Bar, Showing the Glass in Position.

NOVELTIES

New Single-Surfacing Machine.

Messrs. C. B. Rogers & Co., whose manufactory is at Norwich, Conn., and warerooms at 109 Liberty street, New York, are directing attention to what they call their No. 10 Planer, which is illustrated in Fig. 1 of the engravings. This single-surface machine is made from entirely new patterns, and the manufacturers claim for it that it stands today at the head of the list of the small surfacers in the market. It has a capacity of 20 inches in width and 6 inches thickness. It is quickly adjusted, easily operated and does excellent work. The cylinder is made from a solid steel forging and runs in self-oiling boxes. The feed, which is very strong, is supplied with three changes of speed for the various classes of work to be performed. The necessary changes are quickly accomplished by simply shifting the belt on the cone pulleys attached to the feed counters on the machine. The manufacturers call attention to the advantages of quick and easy change of feed on machines of this class in every shop where both hard and soft wood are used, and where the quality of work done is required to be of a high degree of excellence. The cylinder and feed-roll boxes are made fast to the machine, and by means of a hand-wheel at the side of the bed are raised and lowered for different thicknesses of stock. This arrangement gives solid foundations for the working parts of the machine. Two horse-power is required to drive this planer. The weight of the machine is 1300 pounds.



Novelties.—Fig. 1.—New Single-Surfacer, Built by C. B. Rogers & Co., Norwich, Conn.

Stearns' Anti-Friction Door-Hanger.

Messrs. E. C. Stearns & Co., of Syracuse, N. Y., are introducing a new door-hanger, which is represented in Fig. 2 of the engravings. It is called Stearns' anti-friction door-hanger. It combines some of the more valuable features of the Warner hanger, made by the same firm, and with which our readers are already well acquainted, with the Hatfield principle of running the axle-pin in a slot. In the construction of this hanger the makers state that they have adhered to the same principles that have made the Warner hanger so popular—namely, no flanged wheels to wear and mount the track, but, instead, a friction roller, which makes it impossible for the wheels to get off the track. The doors are raised or lowered, as may be required, by an adjusting screw, as shown in the cut. The axle-pin is made of steel, and it runs in a chill-hardened slot. The makers do not expect that this hanger will entirely supersede the Warner hanger, although the principles involved in its construction are old and well-tried. The former has made too many friends to be dethroned by any rival, however meritorious. They do expect, however, that the hanger here presented will increase their business in these specialties, and that it will fill a peculiar class of wants to which it is particularly adapted. It is offered on its merits to all who desire an anti-friction hanger with no flanged wheels.

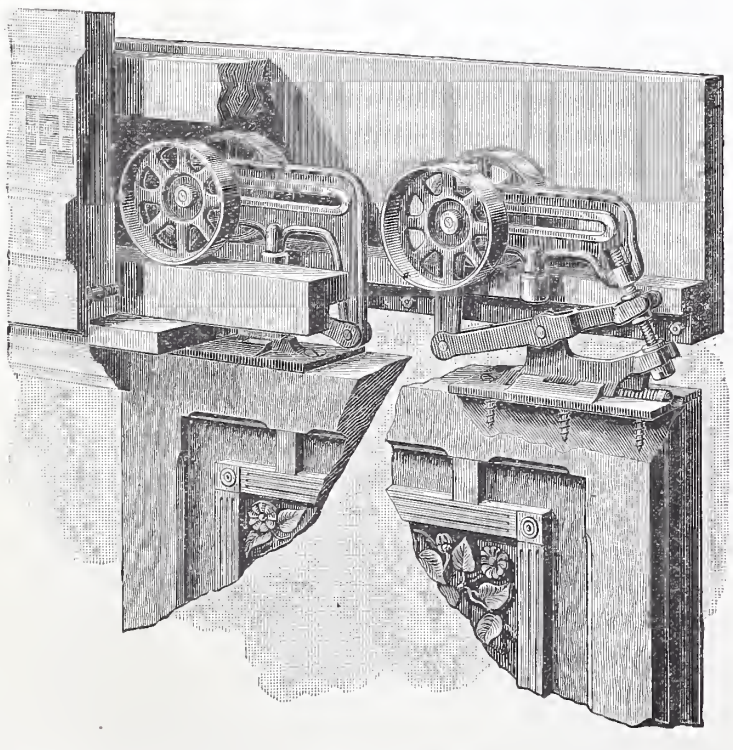


Fig. 2.—New Anti-Friction Door-Hanger, Manufactured by E. C. Stearns, Syracuse, N. Y.

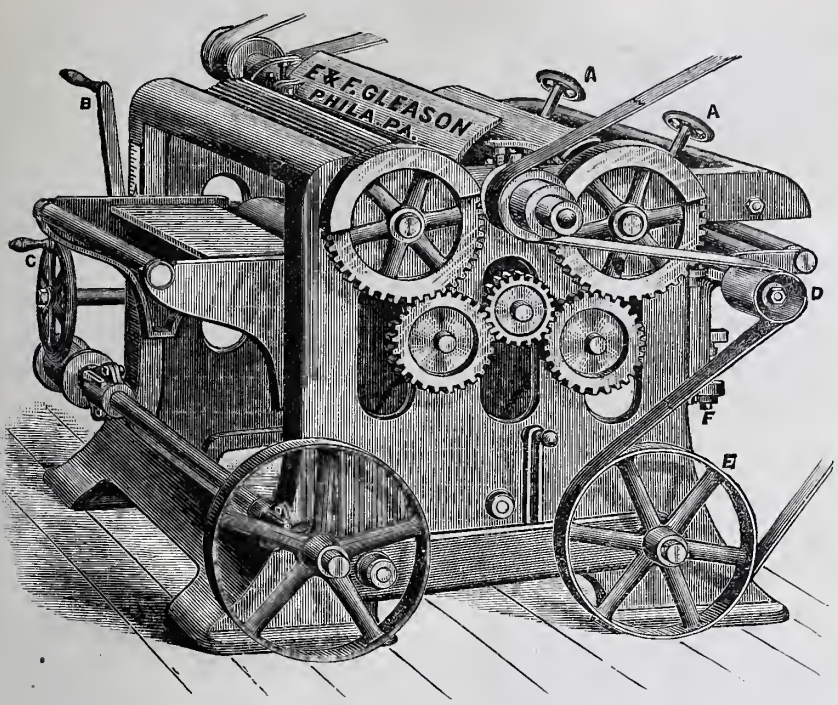
Compressed Lead Sash Weights.

J. N. Raymond, of 55 and 57 West Lake street, Chicago, is offering the trade a very desirable article in the way of compressed sash weights. The feature which distinguishes these weights from others of the same general class consists in the manner in which the fastenings are applied, rendering them much more convenient for use than other similar articles. In Fig. 3 the general appearance of two round weights connected together is presented, while in Fig. 4 a longitudinal section through one of the weights is shown, indicating the manner in which the fastenings are applied. Each weight is centered, making it hang perfectly true and plumb, thus obviating all friction and noise. The fastenings are of wrought iron, and the method of con-

Fig. 3.—Compressed Lead Sash Weights.

Fig. 4.—Section Through Lead Sash Weight.

struction is covered by a patent which has been recently granted. The linked weights are very convenient for placing in and removing from pockets with small openings. Various sizes and shapes are made, thus adapting them for use in almost every conceivable position. The advantages of compressed lead sash weights are very generally recognized.



Novelties.—Fig. 5.—Double Roller Surfacer, Manufactured by E. & F. Gleason, Philadelphia, Pa.

They are about double the weight of iron for the same size, or, in other words, only one-half the space required for iron weights is sufficient where lead weights are used. Mr. Raymond invites the trade at large to send for a circular which he has prepared, which contains a table of weights.

The Reno Hand-Screw.

The Reno Bench Vise Company, Detroit, Mich., are the manufacturers of the Reno hand-screw, represented in Fig. 6. As indicated in the cut, this hand-screw with wooden jaws is operated by iron screws working in metal bearings, the screw ends being squared in the wooden handles to prevent turning. It is evident that such a contrivance has its advantages, and among these the manufacturers claim the following: That less material is required for the same strength, making the tool lighter and more convenient

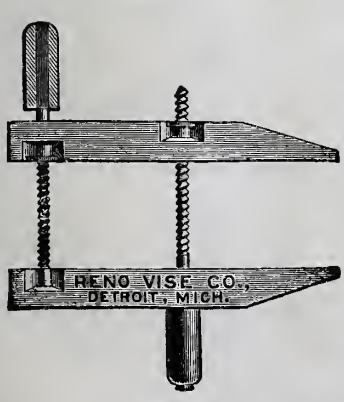


Fig. 6.—The Reno Hand-Screw.

to use; that there is no swelling of the screw in damp weather, and no stripping of thread when glue dries on the screw; that, should a jaw become broken by severe usage the metal parts can be transferred to a new jaw, whereas with the old style the tool is useless; that much greater pressure can be obtained with less power than with the old style, and that these screws will outwear the old style three to one, and can be handled with much less labor.

Double Roller Surfacer.

Fig. 5 represents Gleason's improved double-surfacer, manufactured by E. & F. Gleason, northwest corner of American street and Susquehanna avenue, Philadelphia. It is styled a roller planer from the fact of its feeding the lumber to the cylinder or cutter-head by means of rollers. It differs from the chain or revolving bed in having a fixed or stationary bed. For the class of work it is designed to do, namely, planing thin and short lumber, it is preferable to the revolving-bed planer. While all double-surface planers of the roller class have the same general features, the manufacturers claim for this machine that it possesses several new and important improvements. Among these they mention that both top and bottom heads are driven by belts requiring but one counter-shaft and but two driving-pulleys on the counter. This results in a saving of belts, pulleys and power. The bottom head has all the advantages of the top head in adjustment or in the setting of the knives on the head. The bottom head can also be run to do the same work as an ordinary single surfacer. It will bring the lumber to any desired thickness, and as its relationship to the other parts of the machine is in many respects similar to that of the top head, it does not require the same amount of fine adjusting necessary with the old style of surfacing machines. The bottom head is attached to the standards of the bed and is raised and lowered with it. To insure smooth work it is necessary, of course, to hold the head firmly. This is accomplished by means of a long wedged-shaped jib which is fitted between the guide of the bed and frame. This can be forced up to any degree of tightness required. The bed has a vertical adjustment of 6 inches by means of a turned scroll and cut worm-wheel, and will stand in any position without clamping or fastening in any way. The bed also has an independent adjustment on each side to keep it parallel with the top head. The feed-rolls are driven by a very simple but powerful train of gearing, all four rolls being connected. The operator has full control of the feed and adjustment of the bed, as both under wheel C (see Fig. 5) and lever B are on the same side of the machine and within the immediate reach of his left hand. All the parts requiring oiling are of easy access, and those that require much attention are so arranged as to be oiled while in motion. That size of the machine admitting lumber 24 inches wide occupies a floor space of about 4 feet square. Different sizes of the machine are constructed which double-surface lumber from ⅛ inch in thickness up to 6 inches.

Reed's Patent Noiseless Door-Hanger.

Figs. 7 and 8 represent Reed's patent noiseless door-hanger, made by the Reed Manufacturing Company, Canajoharie, N. Y. Fig. 4 shows it mounted on a steel track, and Fig. 5 indicates the principle used in the construction of the wheel, to which they direct special attention. For the hanger as a whole the manufacturers specify these points of merit, which will enable our readers to understand the manner of its construction: 1. Its simplicity and durability, as the arms are made of steel, with a flange turned up on each side to stiffen them. 2. That they can be used equally well on wood or steel tracks, as well as on many iron tracks made by other manufacturers. 3. That the steel arm gives a finer finish and a lighter article than any cast or even wrought iron one can. 4. That the door cannot be thrown off the track, on account of the manner in which this hanger is constructed. 5. That the track is adjustable to fit doors of different thicknesses, by means of several small holes in the brackets, the rail being fastened to these brackets with bolts. 6. That the hangers, brackets and tracks are made entirely of steel, thus securing great strength. But another special feature

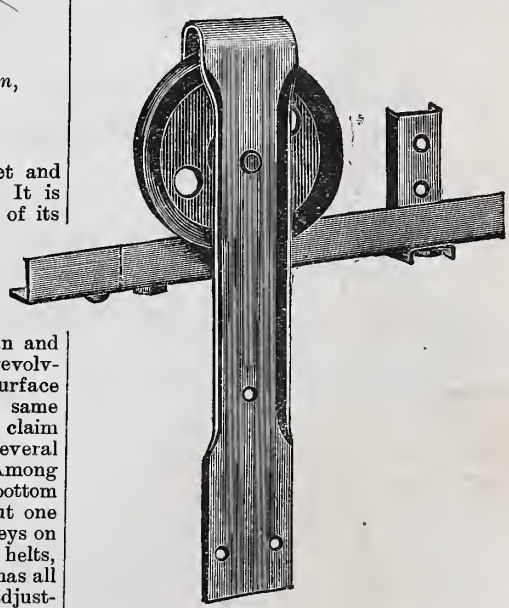


Fig. 7.—Reed's Door-Hanger.

of this door-hanger is in the method that is adopted to secure lubrication of the wheel. Fig. 8 shows the wheel as it is made with wooden bushing, the wood having been thoroughly boiled in tallow, thus affording sufficient lubrication. The wheel so constructed revolves on a hollow tube, turned smooth in a lathe, and held firm by the rivet passing

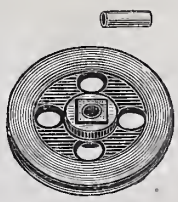
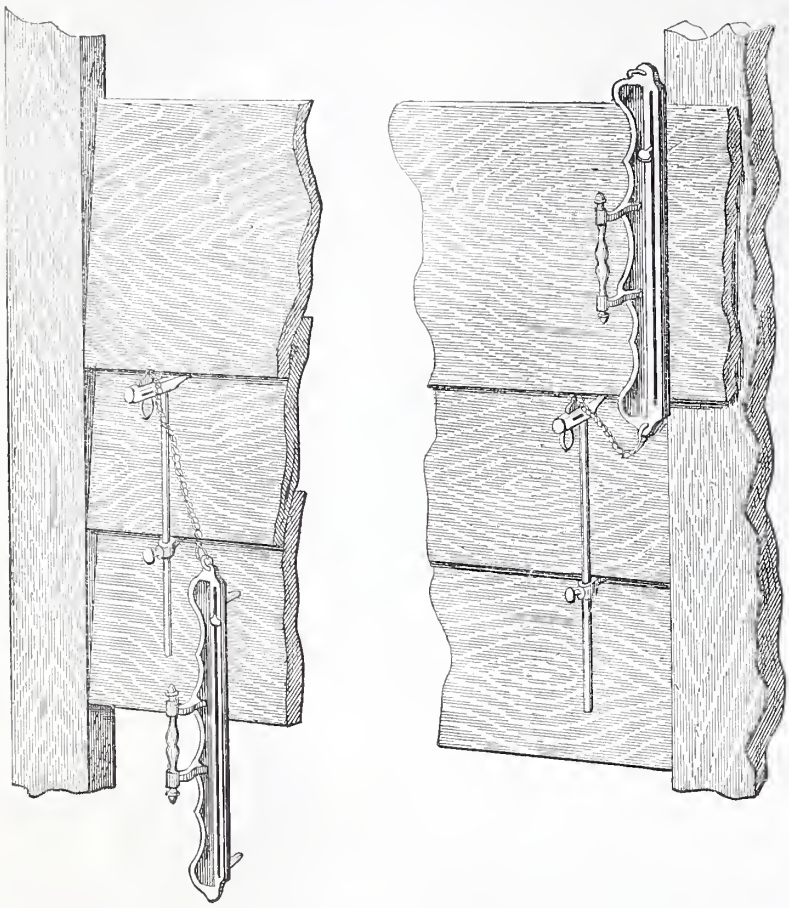


Fig. 8.—Hanger Wheel and Pin.

through it. As a result of this arrangement the manufacturers describe the hanger as running with exceptional ease, and without the rattle and noise of competing goods.

Combination Clapboard Tool.

Fig. 9, 10 and 11 of our engravings show a combination clapboard tool manufactured by Basset & Washburn, Plainville, Conn. The tool consists essentially of two pieces, one of which is very clearly shown in Fig. 11, and is designated as an adjustable gauge; the other, which is shown in one of its uses in Fig. 10, is called the marking gauge. It is provided with a small spirit level at the center, which adapts it for leveling, as from a window stool to the corner board and in other places. The marking gauges are also used as supports for the clapboards in nailing, and when used in this way assume the position shown in Fig. 9. As many of these are employed as may be necessary to support the board from end to end, or according to the number of workmen that may be engaged upon a given portion of the work. For convenience the marking gauges are attached to the adjustable gauges used at the ends of the clapboards, thus affording them a ready support and keeping them close at hand whenever required. In Fig. 9 the one at the left is shown hanging down, while the one at the right is in position showing how it would be used in marking the cut on the end of the next board to be nailed. A lengthy description of the manner of using this tool is hardly necessary, since our practical readers will readily perceive from the engravings the use of the different parts. The manufacturers claim that by the use of this tool more and better work can be done in the same time than with the ordinary appliances. This tool takes the place of chalk-line, dividers, set nails, strike, try-square, pencil or knife, level and block plane. The adjustable gauges are graduated by eighths up to 8 inches, so they can be set for any number of inches to the weather desired. The marking gauges contain a hardened steel knife, and are attached to the adjustable gauges by a chain in such a manner as to be readily separated whenever required for leveling. This tool can be used by men working in sets, or with it one man can work alone advantageously upon any part of the building. A set consists of 8 pieces—that is, 2 marking gauges and 6 adjustable gauges. They are all made of malleable iron, nicely japanned and the gauge parts nickel-plated. The manufacturers direct attention to the fact that by using the level on the marking gauge the carpenter is enabled to commence to clapboard on any part of the building. The adjustable gauge is also adapted for spacing, and is shown doing this work in Fig. 11. It has the advantage of not gaining as dividers do in spacing long distances. This tool, which has recently been patented, has already been partially introduced to the building trade, and has achieved a very desirable reputation.



Novelties.—Fig. 9.—Combination Clapboard Tool, Manufactured by Basset & Washburn, Plainville, Conn.

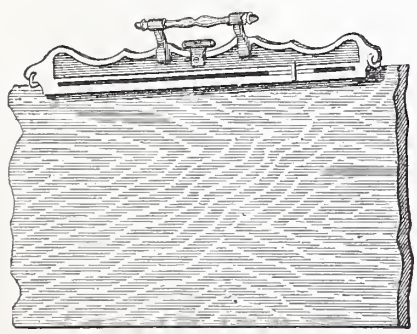


Fig. 10.—The Marking Gauge Used in Leveling.

New Spiral Screw-Driver.

The Decatur Coffin Company, of Decatur, Ill., are introducing a new spiral screw-driver, the general appearance of which, with the bit withdrawn, is shown in Fig. 12 of the engravings. The rotary motion of this tool is obtained by two spiral grooves cut on the inside of the brass cylinder which forms the shank. A sleeve with corresponding spiral projections fits loosely upon the upper end of the bit and inside of the cylinder. On the lower edge of the sleeve notches are cut, into which fits a pin that extends through the bit near the upper end. Whenever pressure is applied to the bit this pin engages in the notches in the sleeve, so that forcing the bit to the handle causes the bit to be rotated. Accordingly, by placing the end of the bit in the head of a screw and pushing the screw-driver against it the screw will be driven home. The manufacturers claim for this device simplicity of parts and thoroughness of construction. By providing the spiral groove in the shank of the tool the bit is left of full size, and therefore must be stronger than those of equal diameter which are cut away in order to obtain a construction which will impart a rotary motion under pressure. The sample which we have received, with the bit withdrawn, as shown in the engraving, is a little over 12 inches in length. When the bit is extended to its utmost capacity, it measures a trifle over 19 inches.

Fig. 12.—New Spiral Screw-Driver, Manufactured by the Decatur Coffin Co., Decatur, Ill.

Solid Universal Wood-Worker.

For several years past Messrs. Bentel, Margedant & Co., of Hamilton, Ohio, have been building different styles of universal wood-workers adapted to various lines of work. From time to time changes in the patterns and the designs have been made, rendering them still more desirable for the special purposes intended. In Figs. 13 and 14 we show a front and rear view of what they term their Solid Universal Wood-Worker, which has been recently improved by the addition of the vertical side-head, shown in Fig. 13, but more clearly indicated

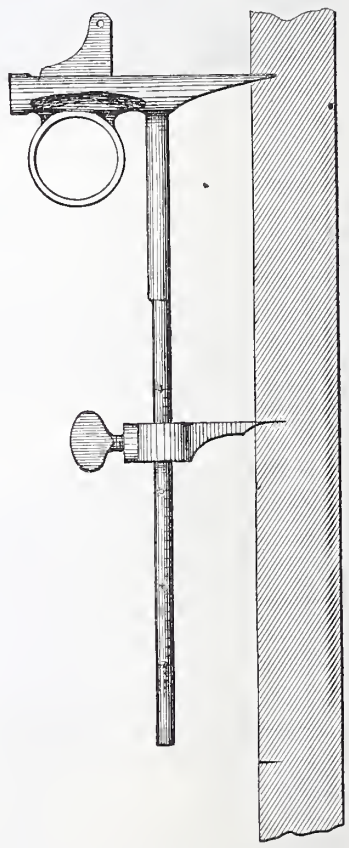
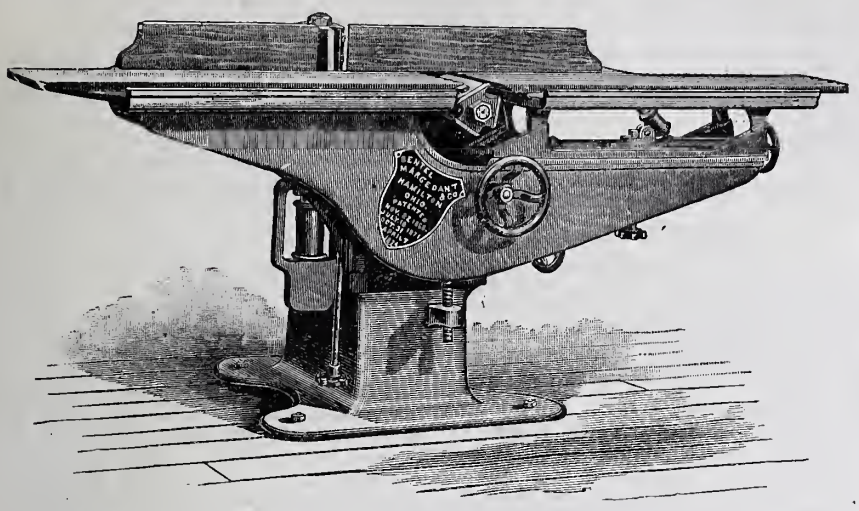


Fig. 11.—The Adjustable Gauge Used for Spacing, in Place of Dividers.

in Fig. 14, and other minor features. As will be seen by the engraving, the frame of this machine is a square column with a broad base, which is convenient for setting up. The leveling of the machine is not dependent upon several feet of an unsteady floor, but is at once accomplished by properly placing the foot of the rigid and self-supporting base in place. The upper frame, which carries the tops, is raised and lowered on a planed way on the front of the column by means of a screw, bevel gears and the hand-wheel shown. The front top is raised and lowered by means of the hand-wheel shown at the end in Fig. 13. The back top has no vertical motion independent of the upper frame or saddle. Both tops are adjustable horizontally, and can be moved back from the head for the purpose of inserting low boards, panel irons, &c. A third top, back of the two front tops, when set level with them, forms a very large surface useful for gaining or sawing large work. The fence is ingeniously arranged to be set at an angle for beveling, and is easily moved in or out to suit the work. The adjustable vertical side-head incorporated in this machine is a very useful arrangement for squaring up material, since with it two sides can be planed square and out of wind at one and the same time, thus saving one operation. In addition to this, the side-head can be used for thicknessing by fastening an adjustable guide to the front tops and running the material between it and the head. The side head can also be used for shaping. With the fence off, a very large table is presented upon which the material may be placed, the same as on a shaper, and for many kinds of work the upright spindle will do as well as any single shaper. The side housing is arranged to drop below the level of the tops when a clear top is wanted for sawing or gaining, &c. This machine the manufacturers warrant to be thoroughly made in all its parts, and to give satisfaction wherever used in accordance with their circular of directions.



Novelties.—Fig. 13.—Front View of the Solid Universal Wood-Worker, Built by Bentel, Margedant & Co., Hamilton, Ohio.

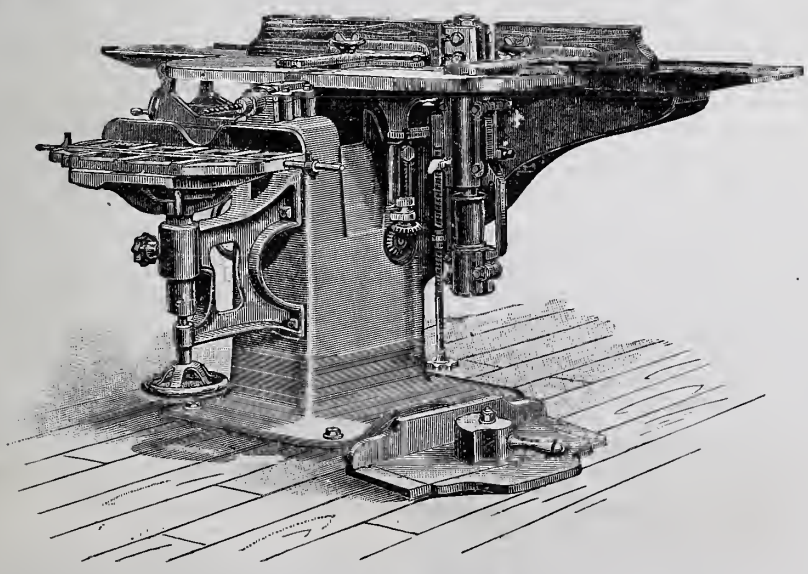


Fig. 14.—Rear View of the Solid Universal Wood-Worker.

Allen's Floor Clamp.

In Fig. 15 we illustrate F. E. Allen's patent floor clamp, manufactured by Witherby, Rugg & Richardson, 26 Salisbury street, Worcester, Mass. The engraving represents the clamp in use, placed on the floor timber, with the floor boards in front of it, and with the dogs on opposite sides, driven into the timber for the purpose of holding the frame stationary. By raising the lever the bar A is drawn back, engaging with the teeth of the rack B. By pressing the lever down the rack B is forced out against the floor boards into proper position. The pawl at the end of the frame engages in the teeth of the rack B, holding it in position while the lever is being raised. The rack B is furnished with a slot running lengthwise with a headed screw running into the bar A, so arranged as to prevent the latter from raising too great a distance from the former, and preventing the bar A from going either side of the rack B. In order to remove the clamp, it is necessary to raise the lever; then by pressing down the pawl is loosened so that it can be raised; then by throwing the lever back, the pressure is removed from the edge of the floor board. The dogs which hold the clamp in position may be loosened by the claw of a hammer. The clamp may be moved from one part of the floor to another, although a better plan would be to use a pair of clamps, keeping one at each end of the floor while it is being laid.

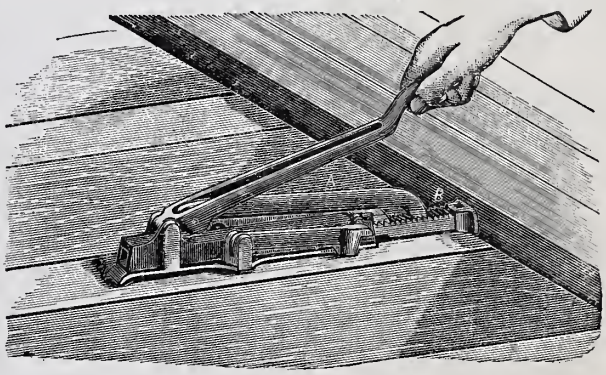


Fig. 15.—Allen's Floor Clamp.

Japanese Houses.

The Japanese houses, says the *Builder*, are generally one-storied, but roomy, and of exceedingly neat appearance inside and outside. They much resemble Swiss chalets, with the roof protruding over a basement veranda from 6 to 8 feet wide. The wooden framework of the main walls is filled with bamboo lath covered with clay, and heavy rafters are put on it for the roof, to give the whole structure the necessary stability. No permanent partitions are found in the interior, and light wooden panels moving in grooves or porcelain casters divide the different compartments. They can be removed and transposed at will to form new partitions. Transparent paper serves for the window panes, and the same material, made of the bark of the mulberry tree and painted over in colors with elaborate patterns, is used for curtains, portieres and many other items of ornaments.

The floors are covered with mats made of rushes, which all over Japan have the same dimensions—6 feet long, 3 feet wide and 2 inches thick. The size of these mats, or "kins," as they are called, regulates all the measurements of a house, and, if a Japanese wants to have one built, he only states to the architect the number of kins it has to contain. These mats are always kept scrupulously clean, and never allowed to be trodden upon by the sandals of the natives or the boots of foreigners, but only with stockings or bare feet. Chairs, tables and bedsteads being almost unknown, the Japanese sit and sleep on this matting, and, except some ornamental cabinets and screens, hardly any other furniture encumbers the room. The reception and business apartments open toward the street, and the back of the house contains the living and sleeping rooms, as well as the kitchen, which are all more or less open to the view of the passers by. All the household utensils are made of lacquered *papier maché* or bronze, in curious shapes, elaborately ornamented, and with a view to stow them away after use in the smallest possible space, economy of space being a cardinal virtue in the construction and management of Japanese houses. In winter the rooms are warmed by coal pans—a very insufficient method in a climate like that of Japan, but counteracted by the number of quilted gowns both sexes wear one over the other in cold weather.

To Render India-Ink Waterproof.—As the ink is prepared with a certain proportion of gelatine, the addition of a little bichromate of potassa, followed by exposure to sunlight, has been recommended for rendering the ink so insoluble in water that it will not run or spread when water colors are used for shading the sides of the lines.

CORRESPONDENCE.

Estimating by the Square.

From C. L. G., *Burlington, Wis.*—Referring to the inquiries published in recent numbers of the paper on the subject of estimating by the square, I inclose some analyses of cost which may be of interest to the readers to examine. The first is an analysis of cost of four squares outside walls. For convenience I take a space 20 x 20 feet as a basis, resulting in 400 square feet, or four squares. The studding employed is 2 x 4 inch, sized on one side and one edge. The studding is placed 16 inches from centers and covered with dressed and matched fencing. Building paper is next laid on, and then first or second clear siding is used. Plates are included in the cost and are put on double thickness.

Analysis of Outside Walls.

19 pieces, 2 x 4 inch, 20 feet long = 247 feet, at $14.50 per M.	$3.58
466 feet dressed and matched fencing, at $17.50	8.16
475 feet siding, at $21	9.97
11 pounds nails	.40
30 " paper, at 2½ cents per pound	.75
Framing and putting in place 247 feet of scantling, at $8 per M	1.98
Laying 4 squares of flooring, at 50 cents per square	2.00
Laying 4 squares of siding, at $1.12½ per square	4 50
Laying 4 squares, at 12½ cents per square	.50
Total	$31.84

Dividing this sum by 4 gives the price of a single square, $7.96.

The analysis of cost of four squares of roofing, the rafters being 2 x 4 inch scantling, set 2 feet between centers, covered with dressed and matched fencing, and the best quality of cedar shingles, laid 4½ inches to the weather, is as follows:

Analysis of Roof Work.

12 scantlings, 2 x 4, 20 feet long = 156 feet, at $14.50 per M.	$2.26
466 feet matched fencing, at $17.50 per M.	8.16
3½ M shingles, at $2.75 per M.	9.17
14 pounds 3d. nails	.63
10 " 8d. and 10d. nails	30
Framing and putting in place 156 feet 2 x 4 scantling, at $8 per M.	1.25
4 squares of roof hoarding, at 50 cents per square	2.00
4 squares of shingling, at $1.25 per square	5.00
Staging	.63
Total	$29.40

This sum, in turn, divided by 4 gives as the cost of a single square $7.35.

The following is an analysis of cost of four squares of flooring, laid on joists 2 x 8 inches, the flooring being selected from No. 1 fencing, and the joists being placed 16 inches between centers. Allowance is made for doubling where necessary.

Analysis of Flooring.

17 joists, 2 x 8 inches, 20 feet long = 459 feet, at $14.50 per M.	$6.65
466 feet of flooring, at $17.50 per M.	8.15
15 " 1 x 2 inch bridging, at 2 cents	.30
10 pounds of 8d. common nails	.30
3 " spikes	.08
Laying 4 squares of flooring, at 50 cents per square	2.00
Framing 459 feet of joists, at $5 per square.	2.30
Bridging	.50
Total	$20.28

Dividing this amount by 4, as in the previous cases, gives $5.07 as the cost of one square of flooring. It may be remarked in this connection that these figures are based upon present prices in Milwaukee.

The following is an analysis of the cost of an inside door, 2 feet 8 inches by 6 feet 10 inches, 1⅜ inches thick, cased and finished complete except the one item of painting:

Analysis of Cost of Door.

Frame, 2 set casings and stops	$2.00
18 feet of molding, 2½ inches	.28
1 threshold, hardwood	.15
1 first quality door, size as given above	1.95
3½-inch morticed lock, bronze face, bolts and striking plate	.63
Porcelain knobs, plated roses and escutcheons	.40
1 pair of 3½-inch japan butts and screws	.25
Setting frame	.25
Casing up, 2 sides	.40
Putting down threshold	.15
Molding, 1 side	.20
Fitting, hanging and trimming door	.75
Total	$7.42

The following is an analysis of cost of a 4-light window, with sash 14 x 30 inches, 1⅜ inches thick, check-rail, the window set, cased and finished complete:

Analysis of Cost of Window.

Window frame prepared for weights	$2.15
Sash glazed	2.10
20 feet 2½-inch molding	.30
25 " inside case and window sill	.75
28 pounds of sash weights	.56
Sash cord	.18
Grounds for plastering and putting on	.30
Setting frame	.25
Casing up	.55
Fitting sash	.15
Nails	.10
Sash lock	.25
Putting on sash lock	.10
Total	$7.64

Technical Terms.

From F. N. T., *Philadelphia.*—I should like very much if *Carpentry and Building* would give the pronunciation and meaning of all the unusual words and technical terms that it has occasion to use. This might be done by means of foot notes at the bottom of the page on which the article occurs, or else at the end of the article. For example, on page 238 of last volume, in the middle column and in the thirteenth line from the bottom, the word "scarcements" is used. I would like very much to know how the word is pronounced, and what its meaning is, and why it is employed in preference to some more common word?

Answer.—To carry out our correspondent's suggestions, we very much fear, would be to produce an appearance of pages in *Carpentry and Building* that would be offensive to some of our readers, if not ridiculous in the extreme. The fact that dictionaries are comparatively cheap and easily obtained, coupled also with the consideration that no two readers would require the same list of terms defined, would seem to render such a plan as our correspondent suggests entirely needless. The word "scarcement" to which the above particularly refers is pronounced exactly as it is spelled, with the accent on the first syllable. Its meaning, as given by Webster, is "a set back," or "rebate." It is also used in the sense of a footing. The article in which this term occurs, our correspondent will notice if he refers to the commencement of it, is reprinted from one of the English technical journals, and was a paper read before one of the engineering societies of Great Britain. While in our own articles we aim for the most part to avoid technicalities, it must be evident to every one that in presenting a paper of this kind it would be impossible to make changes in the terms by which the author expressed himself simply to save some of our readers the necessity of occasional reference to their dictionaries.

A Criticism on Riddell's System of Hand-Railing.

From J. D., *London, England.*—I have been working to Mr. Riddell's system of stair-building and hand-railing for the past seven years, and I find it the best of its kind I have seen. In his various works everything is very fully explained and turns out correct; still there are some cases where his principles will not work, especially if the man constructing the railing does not also control the stairwork. I have frequently noticed where Riddell's system fails in platform, quarter-circle and winding-stair rails. For instance, in platform stairs the center joint of the rail will not be correct if it is square to the falling line of the outside while it is nearly plumb to the inside. This will be noticed especially if the cylinder is small, the rail wide and the rise greater across the cylinder. On the other hand, if the cylinder is too large the pitch of the stairs continued throws the rail too high at the cross tangent. To get over these difficulties, and to make a first-class job in a scientific manner, the mechanic requires three bevels for each joint, which puts Riddell's system out of question. His joints are made square to the face and tangents. There has been a work published here by Mr. Perry which is said to get over these difficulties, but I have not yet examined it. Mr. Crocker's system is similar. The latter recently spoke of Mr. Perry's system in one of the trade journals published here. My impression with reference to Mr. Crocker's system is that it is applicable in every situation of stairs, as, for instance, in stone stairs, where the mason does not always place the risers according to specifications. It is in just such cases as this that difficulty would arise in employing the Riddell system.

Driving Cut Nails.

From H. S., *Waverly, Pa.*—I am a carpenter by trade, and find considerable difficulty in driving cut nails, owing to the square face on the point. A pointed nail will drive much easier and nearer where it is wanted; besides, it does not tear the wood as much. The square face carries more or less wood with it, making it turn to one side or the other, and, accordingly, is quite uncertain as to the direction. On very fine work I have sometimes taken a flat file, and, by twirling the nail with the end resting on the bearing, have filed the corners so as to leave only about one-half of the former surface. I aim to file it at an angle of about 45°. Such treatment of a nail makes a vast difference in the result. A far better job can be accomplished, to say nothing of the pleasure of doing the work. This leads me to raise the question, Could not *Carpentry and Building* say something to nail-makers to induce them to put a point on their nails? What would be greatly appreciated by carpenters generally would be something similar to the point on wire nails, or perhaps not quite so sharp; nor is it necessary that it should come to a full point. My remarks, of course, apply particularly to finishing nails; but points would be of great benefit if put on ordinary nails. It would enable them to be stuck to their places much more easily than at present.

Definitions of Terms.

From T., *Albany.*—I desire to have explained the meaning of the term "pargeting."

Answer.—The term pargeting is derived from a Latin term signifying wall. Since its use has commenced in the English language it has had various meanings, different from that of the present time. One of the obsolete meanings of this word is in the sense of gypsum or plaster stone. Pargeting has also been used to indicate a paint sometimes used for the face. As defined by Gwilt, pargeting means the plaster used for lining chimney flues or for covering the walls and ceilings of rooms. Parget as a verb means to plaster, as, for example, "to parget the walls." A pargeter is a plasterer. Pargeting as defined by Webster is a kind of decorative plaster-work in raised ornamental figures, formerly used for the internal and external decoration of houses. The term pargeting as commonly employed in the trades at the present time means the lining of chimney flues with a coat of mortar, the mortar employed for the purpose being that with which the chimney is built.

Chip Nailing.

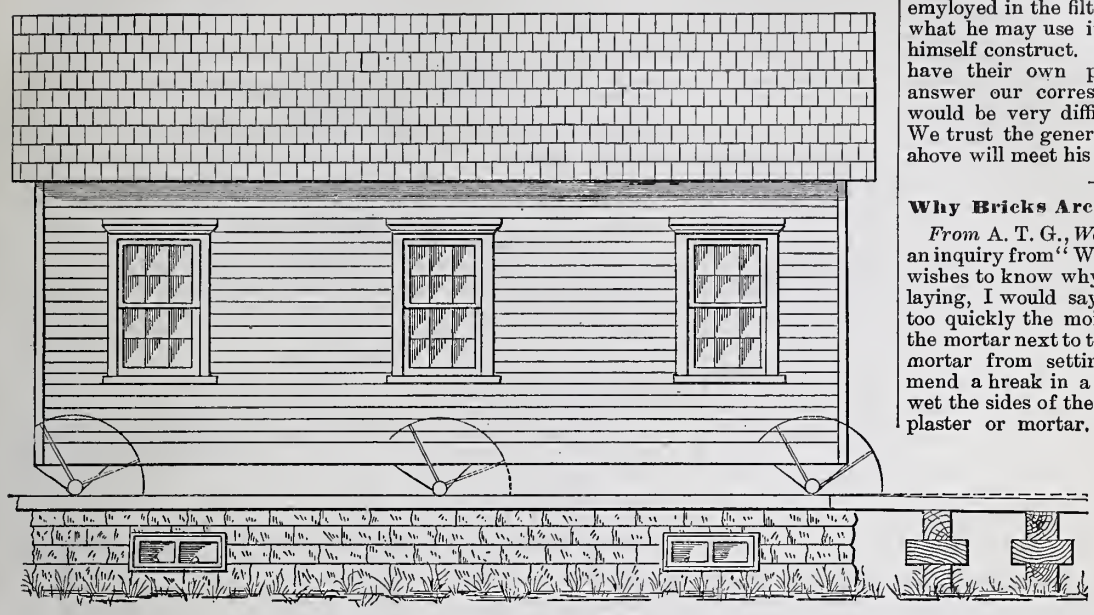
From D. M. G., *Dalton, Ohio.*—In response to an inquiry in *Carpentry and Building* from a correspondent at Milan, Ohio, I would say that various tools may be used for chip nailing, or sliver nailing, as he calls it. I find no tool, however, so well adapted to the work as a thin gouge, about ⅜ inch size. After the chip is raised and the nail is set below the surface of the chip, fill the set of the chip with well-prepared glue; then press the chip to its place with the thumb. Next, take a small block, say 2 x 2 inches and ½ inch thick, and rub down upon the chip until the block sets directly over it. Let it remain in that position until the parts have become thoroughly dry, and then the block may be knocked loose. The work may be finished by smoothing off. If any one has a better method than this, I shall be glad to learn of it through the paper.

Alton Lime.

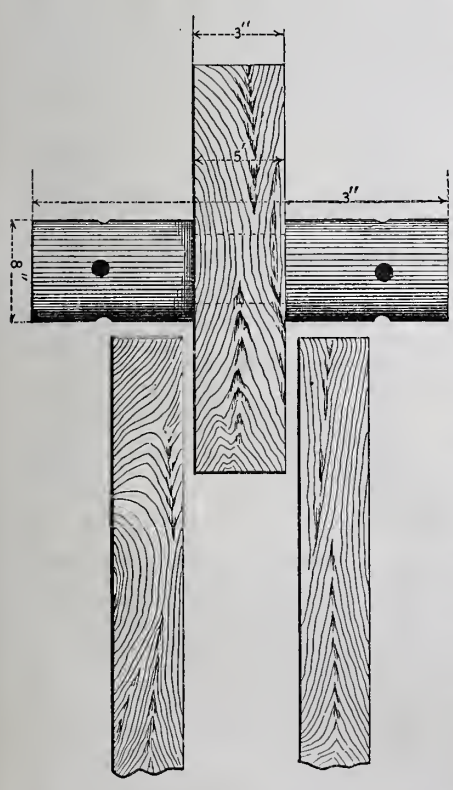
From I. F., *Stanton, Ill.*—I think a few practical hints on the use of limes and cements would be valuable in *Carpentry and Building*. My experience with Alton lime in this country is that it must be put in tight barrels for a few months before it is slacked. If used when fresh out of the kiln it is nearly worthless, as it is too fiery.

Moving Buildings.

From J. F. W., *Danville, Pa.*—Some months since a corresponpent asked for information about moving buildings, and as no one else has undertaken to give him the information desired, I will describe the common method in use. I inclose a sketch showing the rollers, track and other parts; also a building in process of removal. The building, in the first place, is to be carefully raised from the foundation with jack-screws or by other means, until a hight sufficient to insert the timbers under the sills, also the rollers and track, has been reached. The track, as it leads away from the foundation, should be well blocked up, and may be a little descending in order to facilitate the moving of the building, and yet it should not be so steep so as to cause it to move faster than necessary. All the timbers used about the track should he very strong, in order to insure against breaking. A large building should have three rollers on each side, and also three under the middle. With smaller buildings four rollers—one at each corner—are sufficient. The force required to move the building may be estimated at two men at each roller employed. I think the sketches I inclose, in connection with this brief description, will afford all the information that the correspondent desired.



Moving Buildings.—Method Described by J. F. W.



Top View of Roller and Track.

Filter.

From G. A. H., *Boltonville, Wis.*—Will you please inform me, through *Carpentry and Building*, the materials used in filters for purifying water?

Answer.—This question as presented is a difficult one to answer satisfactorily. Various materials are used for the purpose, depending very much upon circumstances and the supply that may be at hand. A very satisfactory filtering material, especially for use in connection with cisterns, consists of ordinary building brick. The brick are laid in cement, and the water, being pumped on one side of them, percolates through to the other side, and is delivered pure for domestic purposes. A hed of charcoal and sand is also very frequently employed, hut filters of this kind soon get foul and do not give satisfactory results. A cheap filter may be made as follows: Take a common flower-pot as large as possihle, plug the hole with a piece of sponge, and then put in a layer of powdered charcoal about an inch thick, then another of silver sand, and follow by a layer of small stones and gravel about 2 inches thick. A filter of this kind will give satisfactory results when first used, but after considerable water has passed through it, particularly if it he of a character to leave behind it offensive matter, it needs to he renewed. One of the hooks treating upon this suhject says that a filter may he made hy placing in a tank of impure water a vessel so arranged that a sponge which it contains shall lap over its edge and dip into the water of the tank. The sponge gradually sucks up and purifies the water, and allows it to drip into the smaller vessel or reservoir, from which it may he drawn off by a tuhe. By placing a few pieces of charcoal in the bottom of the reservoir, filtration of a very perfect kind is effected. A method of making a filter, which, if properly carried out, would probahly give excellent results, consists in pulverizing animal charcoal until reduced to an impalpahle powder. This is mixed with Norway tar and a compound of other comhustihle substances. The comhined materials are then properly amalgamated with liquid pitch, and the whole kneaded up into a homogeneous plastic mass, which admits of heing molded into slabs or blocks of any required dimensions or shape. These hlocks having heen allowed to dry and harden, are subsequently carbonized by being suhjected to a process of incineration hy heat. In this manner all the combustible ingredients are burned out, leaving nothing behind but the animal charcoal in the form of a hlock of charcoal permeated throughout by innumerable pores. We are in douht from our correspondent's question whether he desires to know what materials are commonly emyloyed in the filters sold in the trade, or what he may use in such filters as he may himself construct. Most filter manufacturers have their own peculiar recipes, and to answer our correspondent in this respect would be very difficult, if not impossihle. We trust the general information conveyed ahove will meet his requirements.

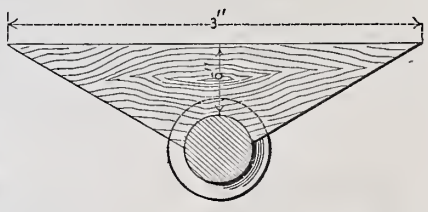
Why Bricks Are Wet Before Laying.

From A. T. G., *Washington.*—In answer to an inquiry from "W. G. M," of Missouri, who wishes to know why hricks are wet before laying, I would say that dry bricks ahsorb too quickly the moisture of that portion of the mortar next to them, thus preventing the mortar from setting. Those who wish to mend a hreak in a plaster wall should first wet the sides of the hole, and then put in the plaster or mortar. Under these circumstances it is likely to adhere. If this precaution is not taken, when the plaster drys that portion lying next to the old mortar will he found soft, and the patch or plug will soon drop out. The same principle may he illustrated as follows: Suppose it is desired to mend a broken plaster cast. By first wetting the cast the fresh plaster will adhere; otherwise the old part quickly ahsorhs the moisture from the new, and the chemical process of setting is hroken up. The hulk of the new work will hear, but that resting directly against the old will he found soft, and will not adhere. Bricks that are simply dipped or well sprinkled are wet enough. If allowed to lie in water they are liahle to slip while being laid.

Repoussé Tools.

From C. E. E., *Urbana, Ohio.*—Will you please inform me where I can buy tools for doing *repoussé* work in person?

Answer.—The tools used for *repoussé* work vary from a tenpenny nail and a common hammer to very elahorate sets with different forms of figures and shapes of points. Our impression is that the general hardware stores, particularly in towns where attention is given to art matters, are carrying these tools in stock. We know this to he the case in some places. A considerable demand for them is experienced hy wholesale dealers in the large cities. If our correspondent desires to send to this city for the tools he can obtain them from Messrs. Devoe & Co., William street, or of Montgomery & Co., Fulton street, helow Nassau. Both of these firms, if we mistake not, have issued pamphlets giving instructions in the work and describing the tools required.



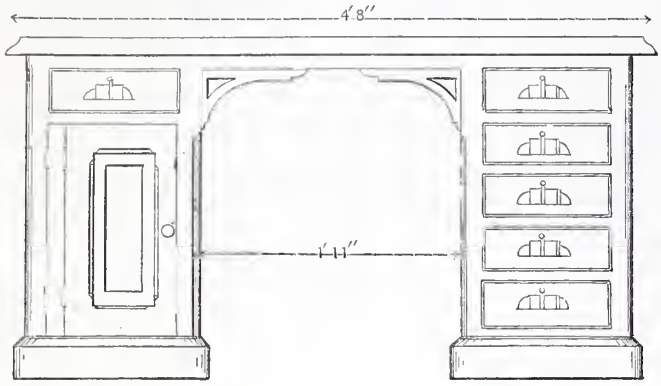
End View of Roller.

Tar for Shingles.

From J. A., *Nantucket, Mass.*—There was published some time since a communication from me on the subject of tar on shingles, in connection with which the Editor suggested a desire for further information. I would say that the tar which was used was common tar, and not coal tar. The tar was applied hot with a hrush. The shingles in question were pine and thoroughly seasoned. The decay referred to was on the exposed part of the shingles.

Desks.

From P.—Inclosed I hand you elevations, sections and details of a cabinet desk in one piece, in which readers of *Carpentry and Building* may be interested. I have endeavored to make the drawing so complete as to explain itself. The top should be covered with the best blue cloth. The cost of a desk of this kind in walnut, oil finish, according to bids recently received, is about

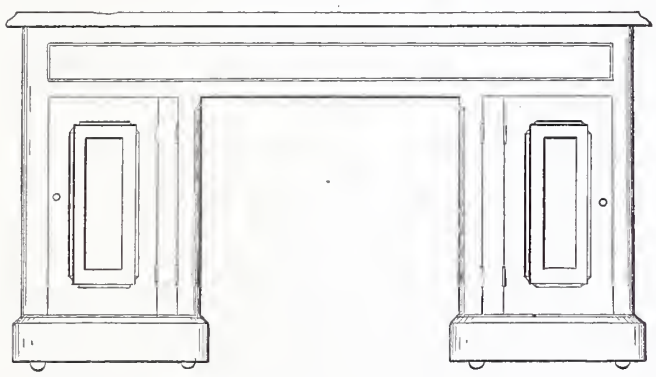


Desks.—Front Elevation of Desk Submitted by P.—Scale, ¾ Inch to the Foot.

$55. The bids ranged from the figure named to $78. The design is one which a carpenter or cabinet maker could readily build for his own use, and it would be serviceable in either library or office

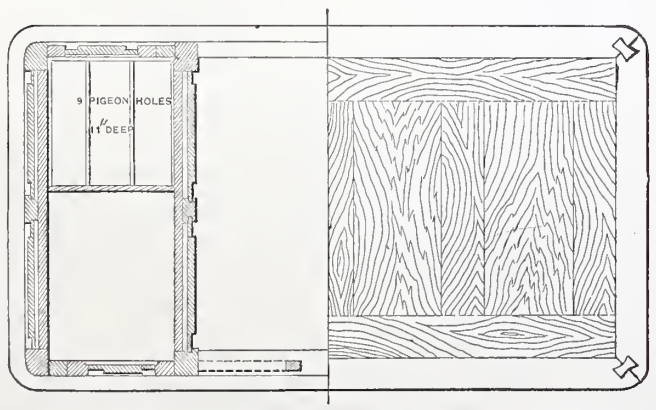
Setting Fence Posts.

From A. D. R., *Silver City, New Mex.*—Thinking it will be useful to some readers of *Carpentry and Building* (whose columns, by



Rear Elevation.—Scale, ¾ Inch to the Foot.

the way, are always consulted in our shop), I send you a method of setting fence posts in rock where blasting is necessary. Instead of removing rock, I drill two holes at right angles to my fence 6 or 8 inches apart, and place in the holes a piece of ¾ round iron 12 or 14 inches long, and lead the iron securely in place. I bend the ends of the pieces together at the top, so as to brace my fencing.



Top View and Horizontal Section, Showing Construction.

I then bore holes in the end of my post and drive it down on to the irons with a sledge. By this means the post is securely set. I calculate the lengths so as to leave the bottom of the post a few inches above the ground, thus keeping it free from rotting off, especially in alkaline districts. I use cedar posts from 6 to 8 inches in diameter. In drilling rock or very hard ground the irons can be pointed and driven with a sledge in a way to save labor, as compared with the expense of digging holes.

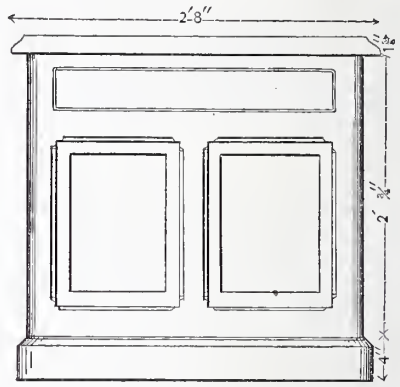
Iron Roofing vs. Tin Roofing.

From J. W. V., *Williamsport, Pa.*—I desire an opinion with regard to iron roofing as compared with tin roofing in point of durability; also the relative advantages of these two materials as a protection against fire. There is a great difference of opinion among roofers in this section of the country as to which is the best of the two for all kinds of roofs. I would like to have the opinion of the readers of *Carpentry and Building* who have had experience and have noted the lasting qualities of this kind of roofing, as well as the opinion of the Editor on the same question. I am a tinner and have done considerable roofing, but as yet have not given much attention to iron roofs. I would like to know how the iron roofing as manufactured at present will compare with tin for roofing purposes.

Answer.—Manufacturers of iron roofing have no hesitation in claiming for their product durability equal to, if not greater than, that of tin, for roofing purposes. They base their claims upon carefully-selected stock of a heavier gauge than is used in the case of tin plates, thorough painting, less seams, and a construction that makes the workmanship more satisfactory for the purposo than is very commonly encountered with tin roofs. During the time that tin plates have been under a ban, from the fact that poor quality of iron and insufficient coating have been the rule, there has been but little question that a good iron roof of any of the leading kinds now sold in the market was equal in quality, if not superior, to the tin roofs laid of the average quality of plates. With all respect for iron roofs, however, we are not prepared to admit that an iron roof as commonly laid is superior to a roof laid of the best "MF" tin or of other first-class plates. While the iron roofs have some advantages on their side with reference to gauge of plates and a smaller number of seams, it does not follow by any means that these difficulties cannot be overcome. We believe by the employment of good tin it is possible to make roofs which, on account of the coating, are likely to endure much longer than iron could be expected to last. The opportunity of the iron-roofing men occurred when poor tin plates began to be used for roofing purposes. Iron roofs have been generally introduced, and it is evident, from their extensive employment and the general satisfaction that follows their use, that they have come to stay, and taking into account the comparatively small labor required to lay them, the convenience with which the material is shipped from a central factory where much of the labor is done by special machinery, and the advantage in price, which is on the side of iron, it is evident that iron roofs fill a well-defined want in the building community. Tinners might as well recognize, once for all, the fact that iron roofing is to be a direct competitor with tin. It would seem to be to the interest of tinners generally, therefore, to be prepared to lay either iron or tin roofs, according to the demand of the customers they serve. We second our correspondent's suggestion with reference to records of actual experience from those in the trade who have handled both kinds of roofs, and shall be pleased to publish such letters as may be forwarded to us upon this subject. It is only by records of experience and careful comparisons that it is possible to ascertain which is the best of the competing materials for the purpose named.

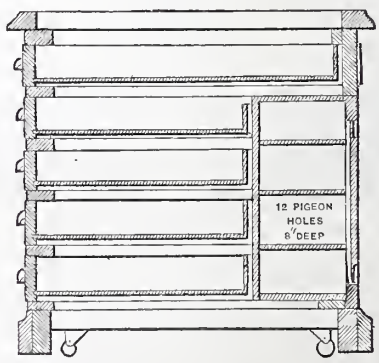
Practical Painting.

From E. F. C., *St. Paul, Minn.*—I will endeavor to answer a question asked in a recent issue by "S. W. F.," of Webster, Mass. The



End View.—Scale, ¾ Inch to the Foot.

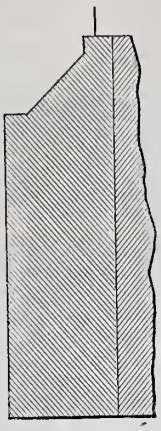
first coat for outside work should be mixed so as to cover and fill the pores of the wood. It should not be too heavy, for in that case it is apt to peel. This difficulty, however, will be considered further on. The first coat should be allowed to stand three or four weeks, so as to become perfectly hard. Then all the nail holes should be puttied. The second coat should be of medium weight, and should be rubbed well. I am in favor of



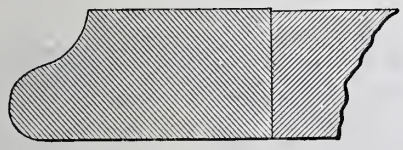
Cross-Section.—Scale, ¾ Inch to the Foot.

using a little drier in my first coat, and also some in my second, provided the weather is not too hot. The presence of the drier causes a good, hard surface with the first coat and helps bear out the second, and imparts a much better gloss; at the same time the paint wears better. The inside work I prime in the same general manner as suggested above, but use a little larger quantity of drier. This is necessary, for the reason that inside work does not dry as rapidly as outside work, and, accordingly, the surface is not as hard if driers are not used. For my second coat, if wanted to be flat work, I mix with turpentine well stirred. My experience has taught me to use 1 gallon of color to 1 gill of Damar varnish. This will not hurt the flatness of the color, but does prevent its becoming stained easily, and gives a surface that can be wiped off with a

damp cloth without leaving streaks. For an egg-shell gloss, one-half turpentine and one-half oil. For gloss work I use Damar varnish and a small quantity of oil to prevent it from setting too quickly, and also a little turpentine. With reference to the colors for inside work, the hall should be of such a color and tint as to be pleasant and inviting. I suggest either pea-green, very light, toned down with a little black—enough to kill the greenish cast — or of a warm steel-gray. The latter, I think, is very pretty. The panels might be painted a light steel-gray and the balance a lilac, taking care in the latter not to get the colors too loud. If corner blocks are used in the casings, they will look well painted a shade darker than the color used on the other work, and picked out with Indian red. Light lilac is used a great deal in this vicinity in parlors, but if a rich color is wanted take one coat of English rose lake,

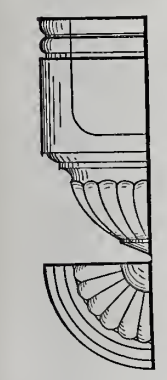


Desks.—Base, Half Size.



Section Through Top.

put on over two coats of dark pink, well sandpapered, and finished by a coat of light-colored varnish. The remarks made with reference to the parlor apply also to the sitting-room. For the dining-room I would suggest graining in oak. The kitchen should be painted a light or dark drab. This leads me to say that many think a kitchen should be painted very dark, so as not to show the dirt. On the contrary, I think if I was a neat, tidy housekeeper I would like my kitchen to look as homelike as the parlor, and in so doing the paint would necessarily be of a light color. A good housekeeper keeps her kitchen clean, with a shining stove to correspond, leaving no excuse for painting this room dark. When painted dark it looks like a prison cell and suggests that the occupant does not want her lack of duty to be seen. The most durable colors for outside work is a subject worthy of consideration. Yellow ocher is a good wearing color. Ocher with a little white lead is very satisfactory for priming, or the ocher clear may be used if the second coat is to be dark. Venetian red for roofs is a good, durable color. The colors should not be ground for outside work. If the grit should be taken out, the durability of the paint will be destroyed. On the other hand, they should be ground for inside work. A durable green can be made with yellow ocher, Prussian blue and a little lampblack—not enough of the latter to start the color. I add the black simply to set the blue, for without it the color is apt to fade. Prussian blue and ultramarine blue used alone will fade, but these two blues mixed together in equal parts will not fade. With reference to the question why paints peel off, I suggest that the difficulty is attributable to the manner in which the first coat is laid. If in laying the paint it is made as thin as it can be, and is allowed to fill the pores of the wood, a hard surface will be probable. Oil enough should be used simply to bind it firmly to the wood. The fault of many painters is that of making the first coat too thick. They have an idea that thick paint will make a solid job; but this is not so. Where thick paint is used there is not oil enough to bind the color to the wood. In other words, the oil leaves the color and penetrates the wood, leaving a thick mass of paint with very little oil in it. This, I think, satisfactorily accounts for paint peeling under many circumstances.



Drawer Pull.

Drawer Fronts.

An important question for the painter to consider is that of harmonizing colors. The surroundings should be considered. If plenty of shade trees or lawn is around the house, I should suggest a light olive, with trimmings two shades darker of the same color. The dark should be obtained by using blue, and a little of the latter used with the light color is always desirable. If there is any picking to do, do it with Indian red or dark English vermilion. This treatment looks well for farm-houses, and the color effect is one that harmonizes with the foliage at different seasons of the year. It looks warm in the winter, as well as attractive in the summer. What looks worse than a large white house, encircled by a white robe, in the winter time? A white house, under such circumstances, to me always looks cold. As one looks across the Western prairies, where so many of the wealthy farmers of the country reside, his eye fails to catch the houses that are painted white, while those that are painted warmer colors are noticed instantly. This is especially true in winter time. In the summer a white house might, by contrast, catch the eye first. A stone color, warmed a trifle with green—not enough of the latter being used, however, to kill the color, but just enough to make it visible—is also desirable for use.

The Remarkable Number .142857.

From Jno. C. Rankin, *Mount Vernon, N. Y.*—I have read with interest a number of articles relating to the figure 9, and to which the title of "a remarkable number" has been given. I have been ciphering in this direction, with results which may interest some of your readers. I found, first, that "the number" was the (repeating) decimal of the fraction $\frac{1}{7}$. I next multiplied "the number" by the remaining digits 8 and 9, and found that each product was composed of the same figures, save one, and that that one appeared on the addition of the first and last figures of the respective products. I then multiplied it by several multiples of 7, finding all 9's except the first and last figures of the products, and these added gave the missing 9, and I entered all in my note-book for future study. I was prompted to make another venture, resulting in some most astonishing discoveries regarding the wonderful number, which will be readily understood by the aid of the diagrams herewith and some brief explanations.

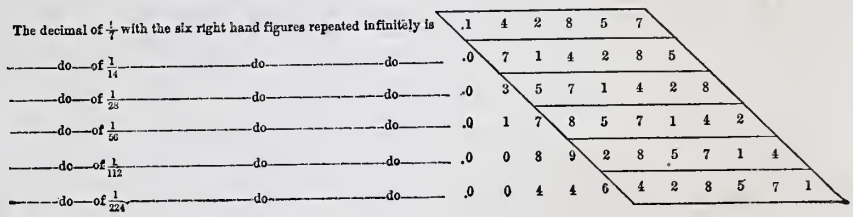


Fig. 1.

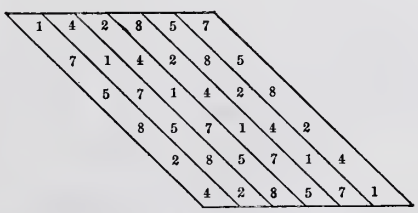


Fig. 2.

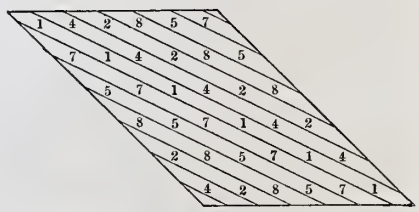


Fig. 3.

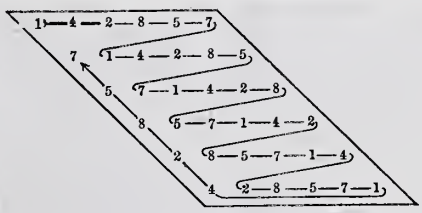


Fig. 4.

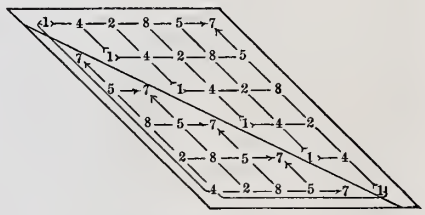


Fig. 5.

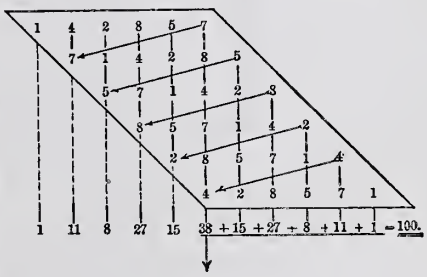


Fig. 6.

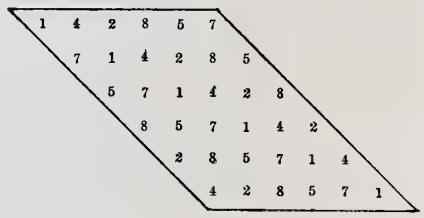


Fig. 7.

A Remarkable Number.—Diagrams Accompanying Letter from John C. Rankin.

Fig. 1, with its accompanying remarks, will illustrate my basis of operation and tell its own story. (The figures and their arrangement are the same in all the diagrams.) Each column in Fig. 2 contains the "remarkable number," found by beginning with the 1's and reading upward. Each column of Fig. 3 is composed of repetitions of the different figures composing the number. Commencing at the upper left-hand corner of Fig. 4, and following the serpentine trail, we find the number repeated six times. Beginning at the figure 1 in Fig. 5, and following the courses of the arrows, we find the mysterious number in many convolutions. Fig. 6 shows that the amounts of the vertical columns on either side of the central one correspond, and that the sum of either of

said amounts, increased by that of the central one, is *one hundred*. Also, that the right-hand figure of each horizontal line is the left-hand figure of the line next below, No 3, 6 or 9 appears in the number, but arranged in this order, $\frac{1}{2}\ \frac{8}{7}$ 4 5, we find, on reading as 18, 45 and 27, *seven* multiples of those digits, &c. I leave to abler and more "leisurely brains" to find and publish more of its wonders, and especially to tell us "the reason why."

TRADE NOTES.

The Dudley Shutter and Burglar Alarm Company, whose goods we illustrated and described some months since, announce the removal of their office from the Bible Building to 105 and 106 Temple Court, New York. Several improvements have been made in these goods. The lock has been so altered as to make it burglar proof. The company are at present manufacturing their own goods instead of contracting for their supplies, which insures a better quality of work in all respects.

We have received from the Egan Company, successors to the Cordesman & Egan Company, Cincinnati, a photograph of their works during the time of the flood last spring. The stage of water, February 14, was 71 feet and ¾ inch. The depth of water in the street in front of the establishment was 13 feet. These figures indicate a hight several feet in excess of that attained by the flood of the previous year. The photograph conveys an impression of the waste of water in Cincinnati at the time named as nothing else could do. Bad as things look in the picture, the company had the shops cleaned up within a week after the water had subsided so as to be in running order again.

Beautiful yards and well-kept gardens, whether devoted to flowers or to vegetables for supplying the family table, are the most appropriate accessories to tasteful houses. How to manage work of this kind, and how to select suitable seeds and plants, are very clearly set forth in the various publications issued by James Vick, Rochester, N. Y. "Vick's Floral Guide" and "Vick's Illustrated Monthly Magazine," copies of which are at hand, are especially helpful in this direction.

The Eureka stained glass, which is offered by C. L. Seib, No. 853 Broadway, may be more accurately described as a cheap substitute for stained glass that any one may apply to a common window or door light. Mr. Seib is the successor in business to F. M. Johnson & Co.

A very attractive poster in colors, measuring some 24 x 30 inches, having metal edges and being arranged for hanging, recently came to hand. The legend across the top, which is in old-style letters done in black and red upon a ground of gold, appeared at first to read the "Billy Taylor Co.," and pleasant memories of that sprightly opera were at once revived. Architectural and decorative features gracing the body of the poster, however, did not seem to accord with this view of the case. We also noticed the word "paint," and while we have always supposed the charity scholars that appeared so bright and fresh upon the stage were more or less painted, we hardly thought the fact would be so prominently advertised. So we returned to the first lines again, and read it, "Billings, Taylor & Co., colormakers, varnish-makers, superfine coach and car colors, paints of every description, pure prepared house paints a specialty, &c." This is an incorporated company, with offices at both Cleveland, Ohio, and New York City. The poster is unusually bright, and the colors in which it is done have been very carefully managed.

The Builders' and Manufacturers' Mutual Benefit Association of America announce the removal of their offices from 194 Broadway to 239 Broadway. Some changes in the plan of the association have also been recently adopted. For ages under 50 the rate of assessment for death losses is less than heretofore, while from ages from 50 to 60 it is more, although the same in proportion to increased benefit.

N. & G. Taylor Co., Philadelphia, Pa., are doing the architects and builders of the country a great service in affording them an opportunity of obtaining good quality of tin plates for roofing purposes. Architects are at present realizing the importance of using first-class materials on first-class buildings, and are alive to the fact that first-class tin plates can be had if they are properly specified and the work intelligently inspected during the erection of a building. As our readers generally know, during the past 10 years the quality of roofing plates has been getting gradually poorer and poorer, and many old brands that at one time could be relied upon have caused frequent complaints on account of the inferior coating and poor quality of iron that has characterized them of late. There are some notable exceptions to this general rule, but it is difficult for any but experts to pick out such goods save by the guidance of reputable importing houses. In order to meet a demand for plates of excellent quality N. & G. Taylor Co. brought out, some time since, what they have named "Taylor's Genuine Old Style," a plate which is described as being redipped or double-coated. Inasmuch as this plate is fully warranted by the house which sells it, builders can depend upon its quality. The registered trade-mark for this article is a target and arrow, which consumers will find on every box. The company guarantee every sheet of this material to be of the best charcoaled bloom iron, covered with all the metal it will hold.

NEW PUBLICATIONS.

The Air We Breathe, and Ventilation. By Henry A. Mott, Jr. 82 pages, 5½ x 7 inches, illustrated, bound in cloth. Published by John Wiley & Sons. Price, $1.

This little volume, which forms No. 2 of what has been called the Mott series, is likely to prove of value to the community at large, since it treats in a practical manner such subjects as are indicated by its title. The first division of the book—"The Air We Breathe"—is a careful inquiry into the constitution of the air, with numerous illustrations, taken from the records of research by prominent scientific men in different parts of the world. The impurities found in the air are clearly pointed out and their nature discussed. It forms a very appropriate preface to what will be considered by the reader the more practical and important part of the work—namely, "Ventilation." In his consideration of this subject, the author has restricted himself to comparatively narrow limits. He has described in detail several so-called systems of ventilation that are in more or less general use, both in buildings and in railway cars, and also several different forms of apparatus that are of use in promoting artificial currents of air, either for supplying a building with fresh air or for exhausting impure air. While the usefulness of these special systems is emphasized, the author does not fail to point out the correct principles upon which ventilation must always be based, and this makes the work of more value than it would appear from a casual inspection of the engravings with which it is illustrated. Several plates relative to the ventilation of theaters and schoolhouses show in a very satisfactory manner the application of the principles described in special buildings. The book closes with a description and illustrations of several different forms of ventilators, which are calculated to facilitate ventilation in buildings.

The hight to which some of the new edifices in Chicago are being carried may be gained by the following, from the *Times* of that city: "The 'sky-parlor' of a hotel will be pretty low down compared with many offices in the star-gazing structures with which Chicago is certain soon to be dotted. Two nine-story and basement buildings are already completed, three others are almost ready for tenants, and permits have been issued for the erection of nearly a dozen more office buildings ranging in hight from 8 to 12 stories. An ordinance is talked of to prevent this bold evasion of the heavens, as the tops of such buildings cannot be reached in case of fire."

STRAY CHIPS.

Mr. James Murphy was the architect of the large business block just completed at San Antonio, Tex. The structure is 80 x 135 feet in plan, three stories and basement in hight. It is built of St. Louis red-pressed brick, trimmed with white terra-cotta. It has a frontage on three of the principal streets, and is an ornament to the city. The cost was about $60,000

"The Haeenlen Building," on Liberty street, Philadelphia, has recently been completed. The structure has a frontage of 52 feet, a depth of 120 feet and is six stories in hight. The entire front is constructed of brick, with brown-stone trimmings, relieved with ornamental brick and terra-cotta moldings. Mr. P. A. Welsh furnished the plans.

Work is in progress on the new building of the Mercantile Exchange, at the corner of Hudson and Harrison streets, in this city. The building will occupy an area of 93 x 100 feet, and will be constructed of brick and stone. It will be fitted up with elevators and all the modern conveniences. The plans contemplate its completion by the 1st of May, 1885. The cost of the building and land is placed at about $330,000.

A public school building, 118 x 93 feet in plan, is nearly completed at Tucson, Arizona Ter. The structure is of brick, with cement trimmings, and has at in roof. There are six class-rooms, 30 x 32 feet in size; two recitation-rooms, 20 x 30 feet, and an exhibition hall, 88 feet 6 inches by 51 feet. Mr. A. P. Pettit furnished the plans. The estimated cost is placed at $46,000.

A business block, 120 x 200 feet in plan, is being erected for Messrs. L. Zekendorf & Co., at Tucson, Arizona Ter. The front is of wood and glass, and the sides of adobe. The plans were furnished by Mr. A. W. Pattianna, of Oakland, Cal. The builders are Messrs. Prince Bros., of Tucson. The cost will be about $20,000.

The management of the Atchison, Topeka and Santa Fé Railroad have decided to rebuild in a different style of architecture the "Montezuma," the famous Las Vegas (N. M.) Hot Springs hotel, which was burned in January last. The material used will be red and white granite, which is very abundant at the Springs. The building will be fireproof throughout and thoroughly complete in all its appointments. Accommodations for 300 guests will be provided.

Mr. H. H. Richardson is the architect of the new court house about to be erected on Grant street and Fifth avenue, Pittsburgh, Pa.

A high-school building, 156 x 128 feet in plan, has recently been completed at St. Paul, Minn. The structure is two stories and attic in hight, with walls of red brick and cut-stone trimmings. A tower, with spire, rises 140 feet from the street grade. The most careful attention has been given to the matter of sewerage and ventilation, and all the school rooms are lighted in the most approved manner. The building is heated by steam, both direct and indirect radiation, cold air being introduced and passed over heated coils in the basement, and carried by flues to the several rooms. Alongside of each warm-air flue there is a ventilating flue of sufficient capacity to take the foul air out of each room as fast as its place is supplied with fresh air. Mr. G. P. Randall, of Chicago, furnished the plans, and Mr. D. W. Millard, of St. Paul, was the supervising architect. The cost of the structure was about $90,000.

Mr. S. H. Elliott, of New Castle, Ind., is the architect for a $5000 dwelling for Dr. W. A. Boors, a $2500 house for Mr. Frank Needham, and a $4000 dwelling for Mr. Frank Milliken, that are in course of construction in that place.

A brownstone church building—157 x 105 feet in plan—is in course of erection at Holyoke, Mass., that is estimated to cost about $50,000. Mr. H. F. Kilburn, of New York, is the architect, and Mr. P. B. Johnson, of Holyoke, the contractor.

The New York Cotton Exchange is putting up a new structure on the site bounded by William and Beaver streets and Hanover Square. The building has a frontage of 116 feet on William street, 87 feet on Beaver street, 89 feet on Hanover Square, and will be seven stories in hight. The basement is constructed of oolitic limestone, from Kentucky, while the upper part of the building will be of cream-colored brick, with terra-cotta ornamentation. The architect is Mr. George B. Post. The cost of building and site is estimated at about $1,000,000.

It is reported that the building outlook in Carthage, N. Y., is better than for several years past. A block of two stores and opera house, three stories in hight, is under construction for Mr. F. L. Bones, to cost $12,000, also a Gothic cottage to cost $2000. Mr. A. W. Patterson furnished the plans for these improvements. Several other buildings are under way.

A new court house, 107 x 116 feet in size, two stories and basement in hight, is in progress of erection at Santa Rosa, Cal. The building is constructed of brick, stone and iron, and is classic in design. In form it approaches the Greek Cross. The four projections of the building will each have a pediment surmounted by a figure of the Goddess of Justice. The dome will be topped with a figure of Minerva. The cost of the structure completed will be about $80,000. Messrs. Curtis & Bennett, of San Francisco, are the architects, and Messrs. Carle & Croly, of Sacramento, the contractors.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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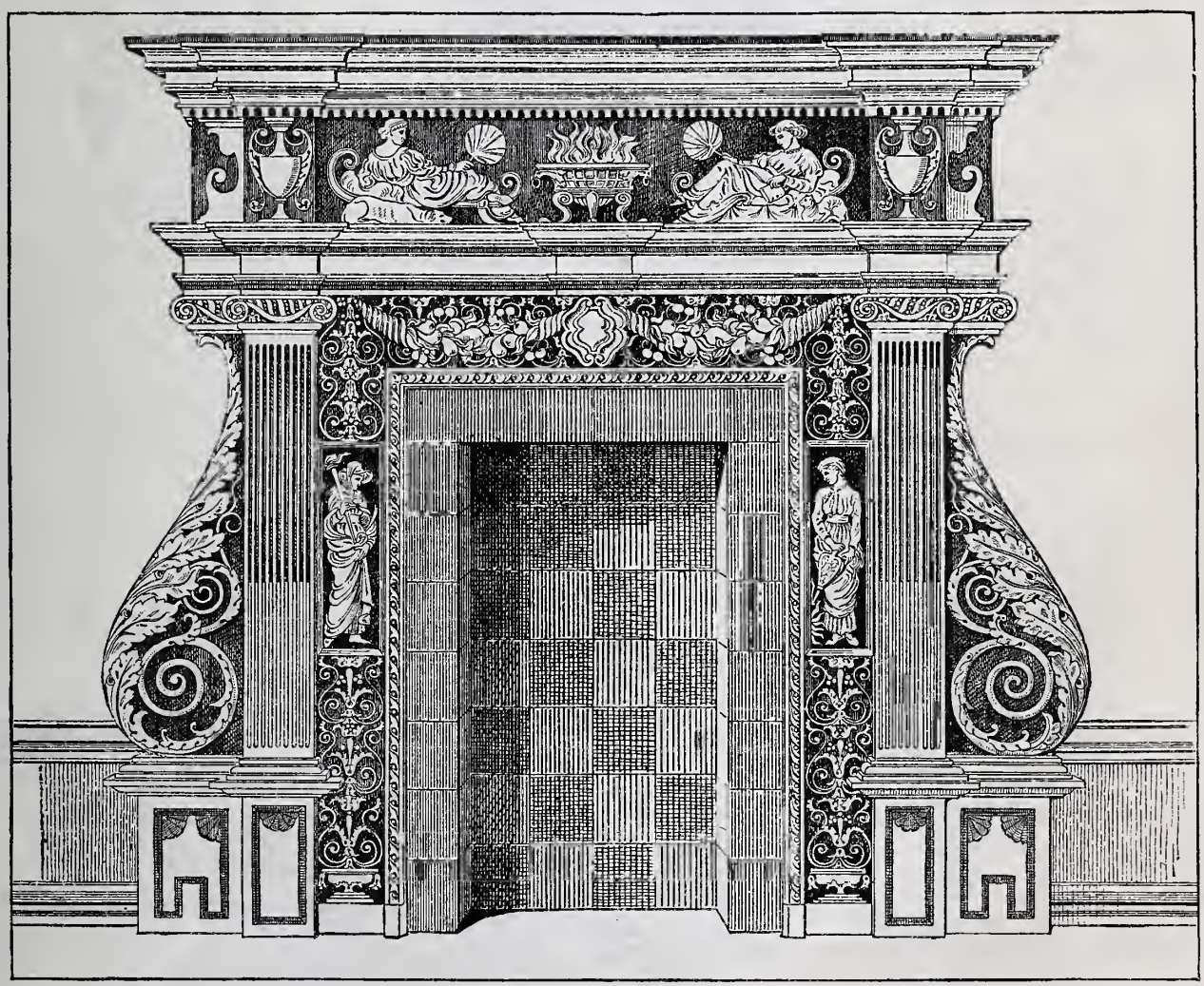
An English Fireplace.

It is sometimes advantageous to pause in the course of routine work, whatever may be the line of effort, and spend a short interval in studying results at the hands of others who are differently located, but who are working in the same general direction. Accordingly, we present this month a fireplace design which represents current English practice. We believe it will be of interest to our readers as pointing out the direction of taste in work of this kind by English artist and artisans. The design is by Mr. Walter Crane, and the work, which has been done at Cumberland Place, Regent's Park, London, was executed by a well-known contractor. The London *Building News*, to which we are indebted for the originals from which our engravings were made, presents the following description of the work and decorations of the room of which it forms a part:

The general tint of the coloring as a basis is ivory white, the grounds of the figure panels, the arabesques, the flutes of pilasters and base ornamentations being a subdued yellow of a golden tone. The tile lining of the fireplace and the bordering of the hearth are of the same color, which in a somewhat paler key is repeated in the stenciled patterns of the frieze of the room, and in the panels of the room doors, which are also of ivory white. The walls are tinted a flat pale gray-blue. The figure subjects in the mantelpiece are intended to be suggestive of domestic security and the repose of the hearth, as in the frieze with its two reclining dames with their fans or screens, and the cat and dog as time-honored warders of the fireside. Below are figures emblematic of the feeders and supporters of the fire, one maiden carrying the lighted torch and faggot of wood and the other applying the homely bellows. These figures are modeled in plaster, and their minute detail is carefully shown by the enlarged drawings which accompany the general elevation in our plate. The architectural details have the merit of novel proportion and treatment, peculiarly arranged, perhaps, but essentially the work of a decorative hand of no mean order, fresh in conception, at any rate, and certainly extremely interesting.



A FIREPLACE DESIGN BY WALTER CRANE.

(*For details see next page.*)

The lumbering industry of the South is at present in the ascendency, caused in part by the rapid destruction of the Northwestern forests and their inevitable early exhaustion. The general development of the South is also to be accredited for some part of the prosperity of this industry at the present time, for it has shown the resources of sections of that country which have been comparatively unknown heretofore. Throughout the Carolinas, Georgia, Florida, Albama and Mississippi vast forests of yellow pine, cypress, cedar and other useful timber stand ready for the woodman's ax, while the mountain regions of Tennessee, Kentucky, Virginia and West Virginia are covered by a magnificent growth of walnut, chestnut, oak, ash, hickory and poplar, worth untold amounts to the manufacturing industries of the country. A very large capital has been invested during the last few years in the developing of the Southern lumber and timber trade. Mills have been erected, railroads have been constructed and choppers have been set to work. It is a question of but a short time when these vast supplies of valuable materials will be placed in the various markets of the country. The resources of the South are practically inexhaustible, not only in lumber and agricultural products, but also in coal, iron and other minerals and metals. The time is not far distant when the South will

be better known on account of the development of her native resources than she has ever been known in the past on account of her cotton and other products.

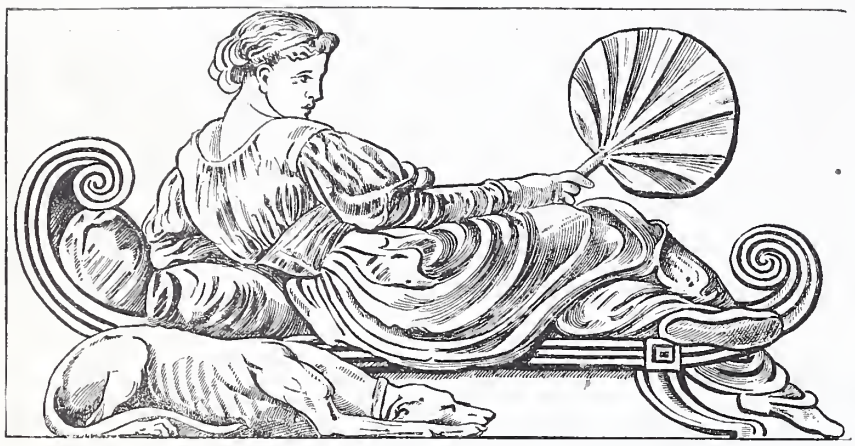
NOTES AND COMMENTS.

The manufacture of marbleized iron and slate mantels seems to be an industry that has greatly prospered in some of the Western cities. Cincinnati has long been engaged in it, and some of her firms have achieved a national reputation. Louisville, Ky., has more recently turned attention to it, and in her trade with the Southern States finds a market for a large quantity of goods of this kind. A new enterprise in this line exists at Cleveland and other towns. The art of finishing cast iron and slate to imitate the various stones and marbles of the world has been reduced to an exact science, and many of the goods produced are really handsome. Better judgment is displayed of late in the selection of patterns and designs than formerly, and therefore there is far less offense to refined and artistic tastes now than was the case some years since, which removes one of the reproaches under which the industry has labored. Changes, too, have been made in construction. What are known as combination mantels are now very common. In these the shelf is of slate, marbleized, while the other parts are of cast iron. Combinations are also made in the other way. With slate mantels, some of the more intricate ornamental parts, such as small molded brackets, which it would be difficult as well as expensive to cut out of solid slate, are made hollow, of cast-iron, and filled with a cement which hardens. These parts are securely fasted in position, and, after the whole has been finished, scarcely any one but an expert can tell which is iron and which is slate.

For slate mantels the stock is roughed out at the quarries, and then sent to the mantel manufactories for finish. Mantel stock is a staple line of trade, and into it is worked much material that would otherwise be waste. By working to approximate shape at the quarries the freight on what is necessarily lost and destroyed in reducing is saved, and the material is put in much better form for transportation than it would be in large blocks. If we are correctly informed, slate which has been exposed to the action of frost before being split is no longer fit for the manufacture of roofing slate. As every quarry has considerable material spoiled in this way every winter, and as slate which is for other reasons unfit to split into roofing slate is good for mantels, the supply of raw material is large, and therefore prices are kept below what they would otherwise be. In molding, cutting and polishing the pieces of slate which go to constitute a mantel some establishments employ more machinery than others. Some use scarcely any at all, while others have given very careful attention to labor-saving devices at every stage. The finish applied to iron and slate in mantel construction is substantially the same, and, as before indicated, so far as looks are concerned, comparatively few can distinguish between them.

Builders' cards and advertisements, like announcements in other branches of trade, must, of course, be in keeping with local conditions, and must meet the requirements of the community in which they are circulated. Some of those which reach us from remote districts sometimes have a freshness about them, with references to materials not in common use throughout the country at large, that makes them unusually interesting. An example in point is offered by a card issued by Charles P. Prather, Lake Valley, New Mexico, which has recently come to hand, Mr. Prather announces himself as carpenter, contractor and builder, and says he is ready to contract to build adobe and frame buildings from the foundation up, and to plaster, paint, ceil and paper the same, as may be required. He is also ready to lay rock foundations. He states, further, that he has an adobe yard from which he can supply adobes to any one wishing them. In view of the peculiar character of the buildings in New Mexico, and the materials which enter into their construction, it would seem that Mr. Prather is an enterprising builder, and that he has put himself in position to supply exactly what is demanded.

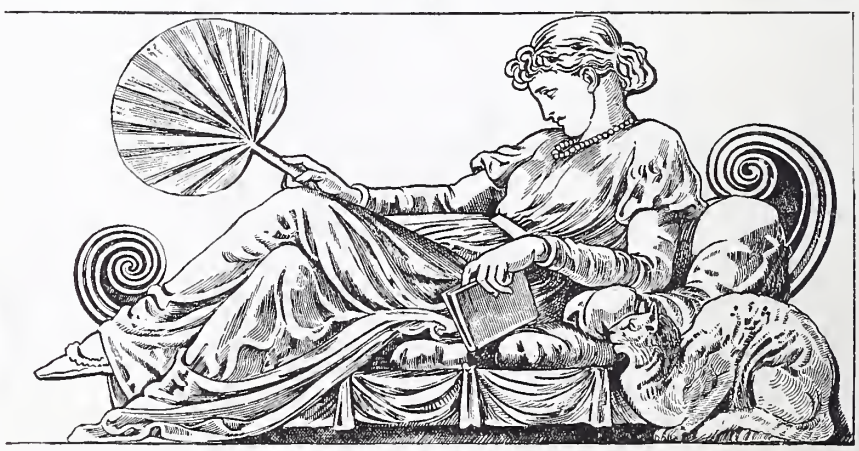
A correspondent of one of the daily papers, in commenting on architectural styles and fashions as manifested in the buildings erected in the National capital, says: "A disposition is also shown of late in building houses here to return to simpler forms and to abandon the so-called Queen Anne style of architecture, without in the least sacrificing originality or having recourse, as formerly, to the monotonous rows of brown-stone fronts, with their clumsy flights of steps and still clumsier iron rail-



An English Fireplace.—Detail of Figure in Frieze at the Left.

Feeder of the Fire—Faggots and Torch.

Supporter of the Fire—The Bellows.



Detail of Figure in Frieze at the Right.

ings. In the pretty northwest portion of the town, built all within the last five or six years, several houses have gone up of late very simple in their outlines, but bearing upon them a certain stamp of comfort which makes them attractive without looking *bizarre*. There is also a tendency to be less extravagant in the use of brick as a facing. A kind of hard sandstone, not unlike that employed in the Vanderbilt house at Fifth avenue and Fifty second street, New York, has been introduced here, and in several instances with great advantage, in breaking the monotony of whole streets of rather hot-looking brick dwellings. One house which few people pass without staring at it stands in Connecticut avenue, and is owned and occupied by Senator Miller, of California. It looks as if somebody had started right there on a tour to 'paint the town red.' Imagine the most fiery hue, a bright vermilion, covering the entire house—roof, sills, balcony, portico, everything, with the sun shining upon it for the greater part of the day, relieved by nothing except the shutters, which are of a bright green color—and you have only a faint idea of the sensation which this bit of outdoor decoration produces in the beholder. It looks almost like the palace of the evil one in the fairy tale or in the pantomime. But how appearances deceive. The occupant is one of the most mild-mannered, gentle and retiring of men."

Door Decoration.

BY GEO. C. HAITE.

The door, which is so frequently a source of anxiety to the ornamentist and decorator, might be made the means of greatly enhancing the artistic completeness of a room. Much of the difficulty experienced in its treatment arises from the desire to disguise its functions. For this reason doors having their panels covered—I cannot say decorated—with wall-papers, &c., no matter how beautiful or costly, fail to please, and the palpable effort at disguise is not only bad, but reprehensible, and whenever the position or purpose of a door is thus sought to be hidden the result is a failure.

In modern-built houses the architects are devoting mere care and thought to the design and proportion, and the cabinet-maker to the construction, than hitherto, and it is now, fortunately, not uncommon to find doors so original, thoughtfully proportioned and broken up into panels that they are in themselves perfect, and, as a piece of decorative work, charming. An attempt to still further decorate such doors as these would be unpardonable and a piece of vanity on the part of the artist; but, on the other hand, there are thousands of houses—many of a superior kind, if we take the rental as a criterion—the rooms of which are positively disfigured by deors out of all proportion to their position, many being too short and wide, too high and narrow, or in an intermediate state which is more aggravating than either, effectually preventing a successful treatment of the room as a whele. Such doors form a stumbling-block and eyesore to many otherwise comprehensive schemes of decoration. The embellishments becoming a necessity, the difficulty is—what to do? It may be only necessary to decorate it slightly to harmonize it with the rest of the room, or it may require much more substantial and heavy treatment, both in ornament and color; the surroundings will, of necessity, determine this point.

A most satisfactory and effective treatment is to be obtained by outlining the design in warm browns, allowing the figure of the wood to show through, but the door must be a new one, and capable of such treatment; if, on the contrary, as is far more likely, it be an old and badly-painted door, then some such treatment as I have shown in my illustration would prove effective. The dimensions of the panels were taken from an existing door divided into four, those shown being the upper ones. This door being disproportionate, and the panels consequently so, it has been sought to make it appear wider by running the flower-spray behind the center stile into the other panel; had the panels been too wide, a contrary treatment would have been followed. The desire to elongate panels may be realized by each having a separate design of some upward growth, and, if found necessary, marginal lines to still further help the illusion.

We might advantageously make our doors an object of interest by using them as an opportunity for displaying decerative ornaments. In such positions there is more latitude allowed and a greater freedom to the artistic fancy; thus, representations of the figure, birds, animals, &c., are here permissible, all of which are out of place and unfit for the walls of our dwelling-rooms, owing to the necessary repetition becoming objectionable and devoid of beauty, and to the accessories hiding and mutilating their parts. The subjects for such panels should bear the impress of having been designed to fit the place they occupy, and for no other purpose. There is plenty of scope for our selection, the panels of doors offering not only a valuable and legitimate means for the display of the wood-carver's art, but for porcelain painting, inlay, hand-painted or stencilled ornament needlework, painted silk or tapestry, the latter being sometimes particularly pleasing and effective.

EXAMPLE OF DOOR DECORATION.

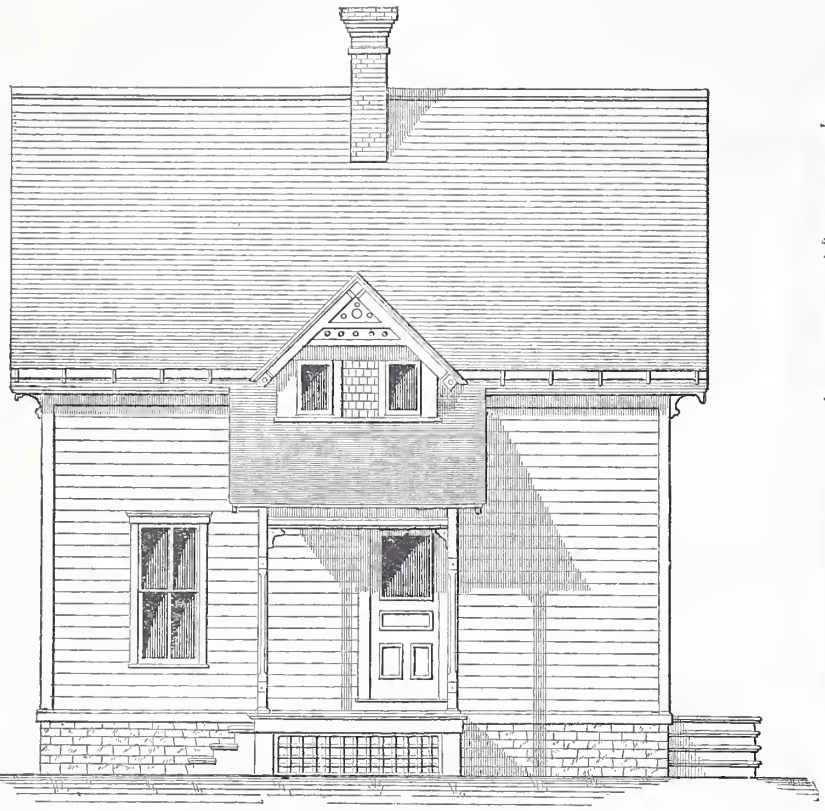
The Destruction of Forests.

The great pine forests of Michigan, Wisconsin and Minnesota are beginning to show the signs of exhaustion. There is a shortage of production this year in these States footing up about 600,000,000 feet. The average of "first quality" lumber has run down from 12 per cent. 10 years ago to 2 per cent. last year, showing the rapid deterioration of stock which is brought to the mills. The *Northwestern Lumberman* says on this subject: "The quality of the logs is much poorer than ever before, as many have been put in from land once cut over, and new land has been cleared of everything that will make a cull-board. The improvident lumberman, who in the past only cut the choice pine and left the remainder to be devastated by fire, now saws down his trees close to the roots to save an ox kerf; scrapes the ground with a fine-tooth rake to get every log that will make passable mill culls, and will discharge a foreman that leaves on the ground a log 6 inches in diameter." The reckless waste and destruction that have invariably followed in the footsteps of the lumberman can only be appreciated by visiting the tracts of land that have been despoiled of late years.

Cheap Frame Houses.

The perspective view of the design submitted by Mr. F. J. Grodavent in our competition of $800 houses was presented on page 47 of our issue for March. We now submit the elevations, plans, details and schedule of quantities.

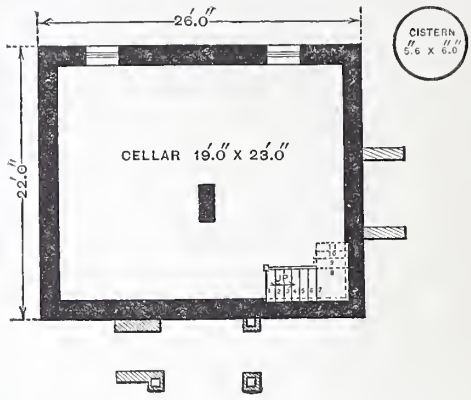
Mr. Grodavent directs attention to the arrangement of his plan as constituting a house with conveniences for a moderate-sized family. An outside entrance-way is obtained by the addition of a single door. The idea has been to make a convenient home within the limitations of cost, employing what would ordinarily be termed second-class material in its construction. With reference to the cost of this building, Mr. Grodavent calls attention to the fact that a short time since he furnished a plan very similar to the one he has here submitted, for three houses which cost for erection in the neighborhood of Rochester, N. Y., $850 each. Estimated on the same basis, he believes that this building would cost about the same figure, although some modifications of construction would probably bring it down to the limitations named. By an examination of the following bill of quantities submitted by Mr. Grodavent, and comparing the same with the list preceding, so far as relates to similar features, our readers will be able to determine for themselves whether the opportunity exists for cutting off an extra $50:



Cheap Frame Houses.—Thirteenth Competition.—Side Elevation of Mr. Grodavent's Design.—Scale, ⅛ Inch to the Foot.

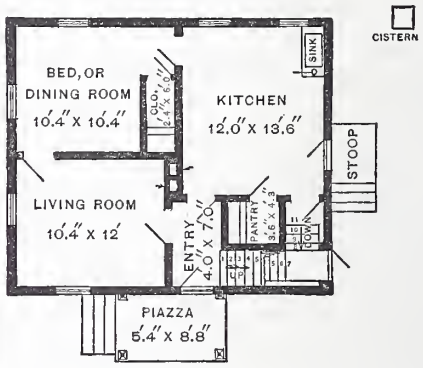
End or Front Elevation.—Scale, ⅛ Inch to the Foot.

102 yds. Excavation.
64 perches Stone Wall.
1900 Brick.
390 yds. Two-coat Plastering.
5434 ft. Hemlock Timber.
1413 ft. Hemlock Roof Boards.



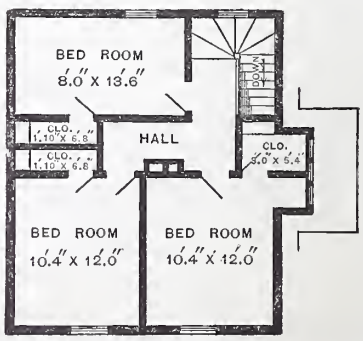
Cellar Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

8650 Pine Shingles.
1360 ft. 1-inch Flooring.
2000 ft. Clapboards.
96 ft. Water-Table.
56 ft. Corner Boards.
145 ft. Cornice.
Front Gable Ornament.
Dormer Finish.
Gutters and Leader.
Back Stoop, Porch Pillars and Finish. (Timber in Bill).
2 Cellar Windows, 2 Lights, 13 x 16 in.



First Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

6 First-Story Windows, 4 Lights, 13 x 30 in.
3 Second-Story Windows, 4 Lights, 13 x 26 in.
1 Second-Story Window, 2 Lights, 13 x 26 in.
(No Blinds, Weights or Pulleys.)
1. Front Door, 2 ft. 10 in. x 7 ft. 6 in. x 1½ in. thick.
2. First-Story Door, 2 ft. 8 in. x 7 ft. x 1½ in. thick.
5. First-Story Door, 2 ft. 6 in. x 7 ft. x 1½ in. thick.

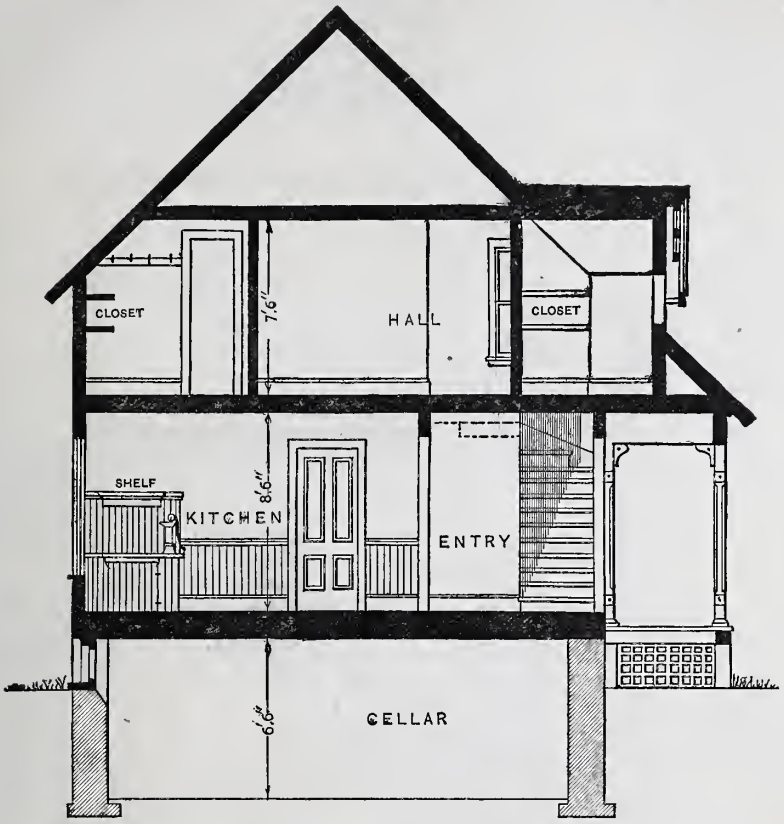


Second Floor Plan.—Turned to Agree with End Elevation.—Scale, $\frac{1}{16}$ Inch to the Foot.

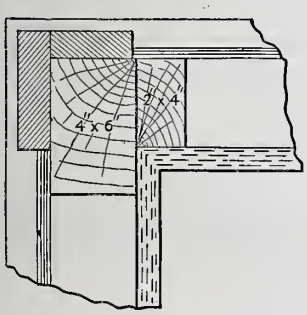
1. First-Story Door, 2 ft. 4 in. x 7 ft. x 1¼ in. thick.
3. Second-Story Door, 2 ft. 6 in. x 6 ft. 8 in. x 1¼ in. thick.
4. Closet Door, 2 ft. x 6 ft. 8 in. x 1¼ in. thick (Inside of Doors, all Ogee).
350 ft. 6-in. Base.
125 sq. ft. Wainscoting.
Sink, Pump and Connections.
Front Stairs.
Back Stairs to Cellar.
Pantry and Closet Shelves, &c.
Painting, 2 Coats.

Varieties of Roof Coverings.

The question of the material with which a roof shall be covered is of importance alike to the architect who designs the structure, to the builder under whose direction it is erected, and to the owner who pays the cost, whatever it may be. The range of materials from which a choice is to be made, in this country at least, is very wide, and embraces substances of the most diverse qualities—

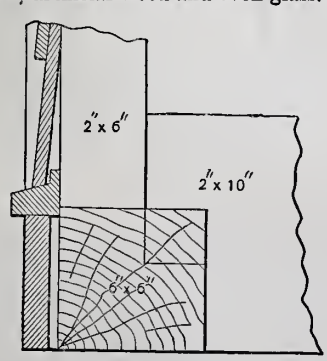


Cheap Frame Houses.—Cross-Section.—Scale ⅛ Inch to the Foot.



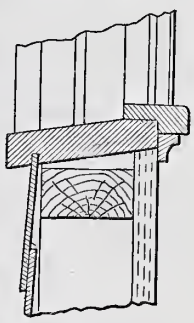
Section Through Corner.—Scale, 1½ Inches to the Foot.

everything, from thin sheet metal on one extreme to heavy plates on the other; from plastic substances to tile and slate, and from primitive materials like thatch, and temporary expedients like the boughs of trees, to canvas, artificial wood and even glass. Con-

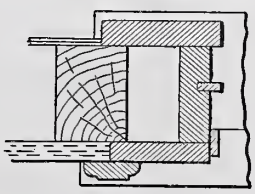


Section Through Water-Table.—Scale, 1½ Inches to the Foot.

sidering the country, as a whole, we have almost every variety of climate, and therefore, whatever peculiarities of roofs there may be in other parts of the world that owe their conditions to climatic influences, all are likely to be found useful somewhere or other within our own borders. On the other hand, throughout a considerable portion of the country both extremes of temperature are experienced, and therefore we have need of roofs adapted to shed the heavy snows of winter, and yet composed of such materials as will not suffer from the hot suns of summer. Our buildings, too, are of many different kinds. There is the pioneer's log cabin, and the unpretentious but comfortable and substantial farm-house which follows it a few years later; there is the average village or town house, with the stone building, schoolhouse and church; there are the residences of the wealthy in town and country, and the palaces of trade and commerce which arise in every important city. There are the public buildings of both State and nation, together with factories,

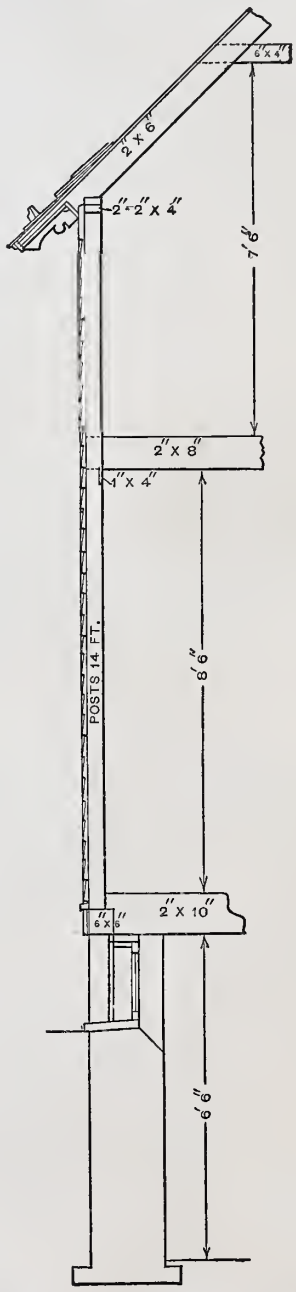


Vertical Section Through Windows.—Scale, 1½ Inches to the Foot.



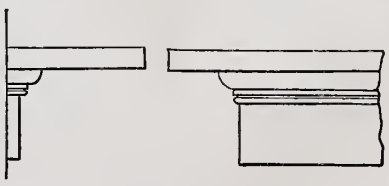
Horizontal Section Through Windows.—Scale 1½ Inches to the Foot.

mills, depots, sheds and a host of others, the roofing of each of which, considering the nature of the building alone, need not necessarily be like that of any other. In roofing some of these classes of buildings the choice of material is based solely upon grounds of cheapness and availability. In others durability is considered, while in still others durability in connection with fire-proof qualities are to be taken into the account. Sometimes the material of the roof covering is selected with reference to the architectural features of the building of which it becomes a part. Our enumeration of the reasons for the existance of so many roof coverings would be incomplete without some reference to the numerous materials available for roofing purposes which the resources of the country afford, and to the inventive genius of American builders and mechanics in adopting them to use and in producing new combinations. Our resources, among others, include probably the finest shingle timber found anywhere, and of several distinct



Vertical Section Through Walls.—Scale ¼ Inch to the Foot.

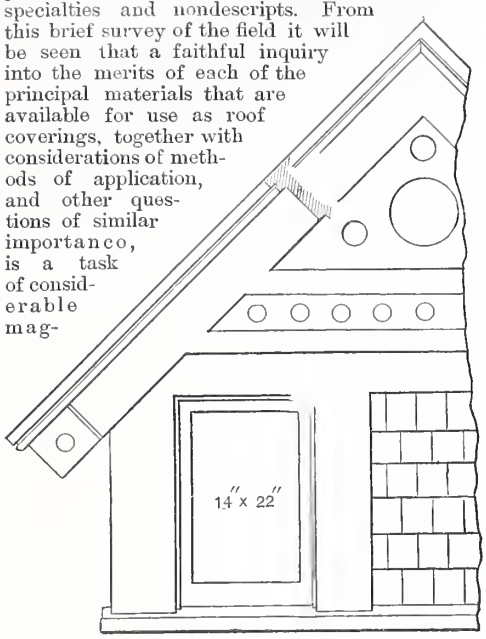
varieties. We also use lumber for roofs, of which we have an abundance, not only as commonly produced in the saw-mills, but in forms specially worked and variously reinforced, as shown in car roofs. We produce lead, zinc, copper and iron, all of



Kitchen Shelf.—Scale, 1 Inch to the Foot.

which find use as roof coverings, and the ingenuity of inventors has been taxed to produce new forms and new constructions of some of these to adopt them to varying requirements. We have slate of several different colors within our borders, and of

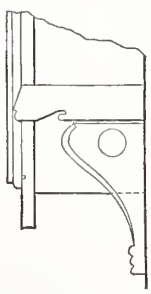
qualities unsurpassed anywhere We produce tile to a greater or less extent, while the enterprise of manufacturers has given us numerous forms of felt, asphalt and composition roofs, to say nothing of various specialties and nondescripts. From this brief survey of the field it will be seen that a faithful inquiry into the merits of each of the principal materials that are available for use as roof coverings, together with considerations of methods of application, and other questions of similar importance, is a task of considerable magnitude, and the work, if well done, would constitute a volume of value to all who have to do with either designing or erecting buildings.



Thirteenth Competition.—Elevation and Section of Dormer.—Scale ½ Inch to the Foot.

Paper Hanging.

The art of putting on or "hanging" paper, says an exchange, is very simple and is easily learned; but to make tasteful choice of paper for various situations is not so easy; hence the following remarks, which may be of service to the workman or others on whom the selection of paper may devolve:

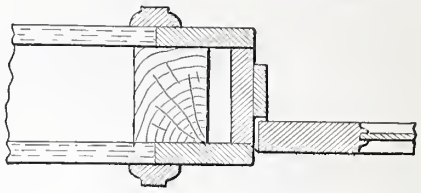


Bracket on Corner Board.

Walls to a room should be regarded only in the light of a framework to what the room contains, and should be decorated so as to bring into prominence, and not eclipse, the other parts of the chamber. Nothing destroys the effect of a room so much as a handsome but staring wall paper, or a wall so profusely ornamented as to strike upon the eye to the exclusion of the rest of the decorations, thus bringing forward what should be the background into the most conspicuous place. A modern drawing-room is always difficult to decorate artistically, because of the taste of its builders for heavy cornices, prominent mantel-pieces and rooms too lofty for their size; and as all these misnamed "embellishments" are too costly to remove by tenants, the only plan to pursue is to destroy their effect by exercising both taste and ingenuity. First, with regard to the ceiling, the ornamental plaster boss in its center should be removed and the ceiling tinted a color that harmonizes with the wall paper, as no harmonies can be hoped for when what produces them is surmounted with the glaring white of an ordinary ceiling. The tint used must be one that softens into the wall paper, not one that contrasts; thus, if the tone of the room is that of a soft gray-blue, the ceiling should be a clear flesh-pink; or should a grayish-green picked out with black be the chosen color, then it should be colored a subdued lemon.

Some people cover their ceilings with whole colored paper, and border it with a stenciled pattern representing the thin garlands so familiar upon Queen Anne decorations, but this is a more troublesome plan than the simple coloring, which answers all the purpose. The walls, if they are lofty, require a high dado. These high dadoes give a look of comfort and "home" that is absent from the modern, high-pitched room papered with one uniform pattern. The dado is divided 3 to 4 feet from the ceiling, and the coloring of the lower portion must always be heavier than that used on the upper, or a top-heavy look will be given to the room. When many pictures are to be hung up, the lower part of the dado should be of a whole color—either a whole colored paper or a painted wall—as pictures are only shown off upon such a background. Where a whole tint is used for the lower part of the dado, the upper portion should be decorated with a frieze paper of a good, bold pattern, but of subdued coloring and of tint that harmonizes with the lower Thus, the color used about the frieze should be the same as that on the lower part, but of a lighter shade, intermixed with some other colors that form a harmonious link between the two shades. Contrasts must be carefully avoided, but pale pinks, blues and ambers can be blended together above a subdued gray-blue ground. The two portions of the dado should be joined together with a light wooden (black or brown) railing, or with a line of paint.

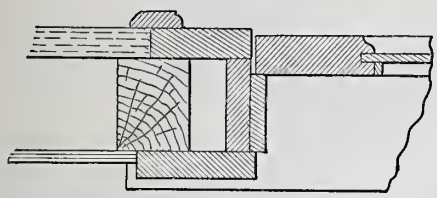
The dado decoration can be altered by placing the pattern paper upon the lower part and leaving the upper part plain colored, with or without a stenciled pattern upon it. This will suit a room where not many pictures are required, or that is already rather dark. Some part of the wall should always be in plain color, as the eye requires rest; and no pattern, however subdued in hue, can give the relief to the mind that a bit of plain coloring affords, and this scarcity of ornament in one part of the room is amply repaid by the effect it gives to such parts as are bright and require to be bright. The true theory of effect is to use but one or two bright colors in a room, and to surround them by soft and subdued tints that throw up and do not destroy their brilliancy; a number of bright colors placed together destroy each other, and leave no impression upon the mind but glare and vulgarity. Having settled upon your paper and ceiling, have the woodwork and cornice of the room painted either a shade lighter or darker than the walls, and shroud up the mantel-piece with curtains, &c., of satin sheeting embroidered with



Horizontal Section Inside Doors.—Scale, 1½ Inches to the Foot.

Front Gable, with Sections.—Scale, ½ Inch to the Foot.

crewels, and instead of the usual looking-glass over the fireplace, have a mirror surrounded with brackets holding china, or have a black, wooden mantel-piece made with squares of looking-glass set in. The background of your room being thus completed in a manner really to be a background, your furniture will look twice as well as if it were stared out of countenance by the walls; and one need hardly add that all your friends

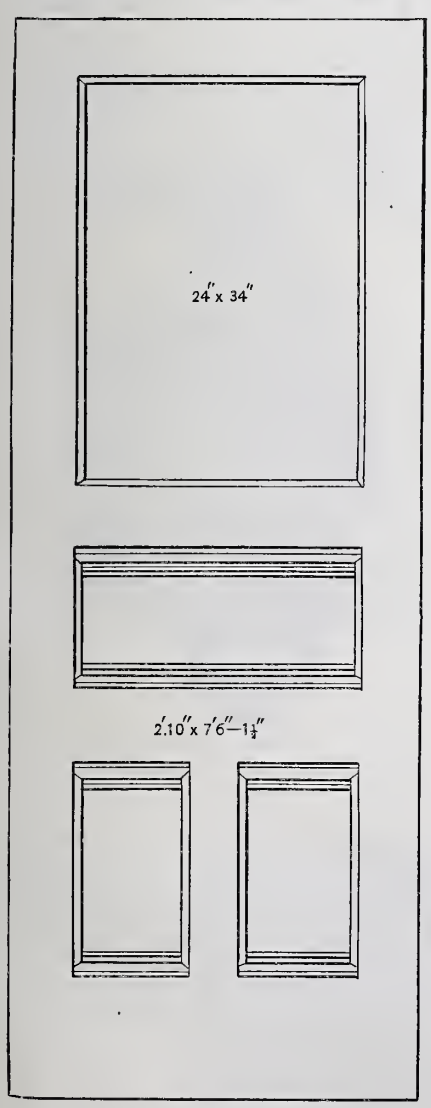


Thirteenth Competition.—Horizontal Section Front Door.—Scale, 1½ Inches to the Foot.

will delight in a room that throws up and brings out their dresses and faces, instead of killing them by its glaring tints.

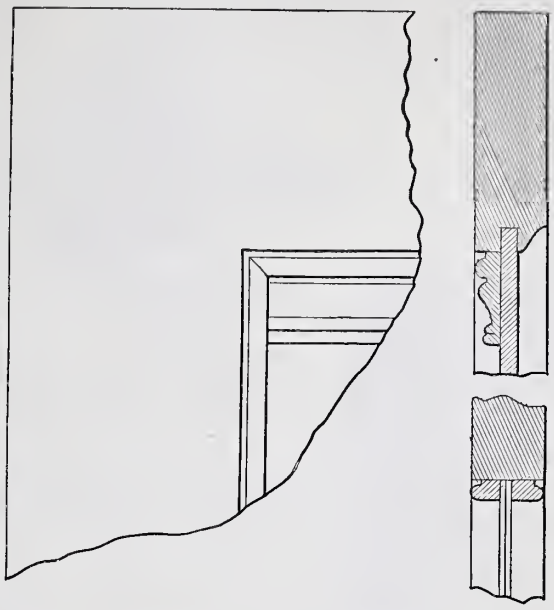
Tiles.

There is no question, says the *Crockery and Glass Journal*, but that the manufacture of tiles is to become one of the important industries of this country, and, indeed, the number of factories now in operation indicate that



Front Door.—Scale ¾ Inch to the Foot.

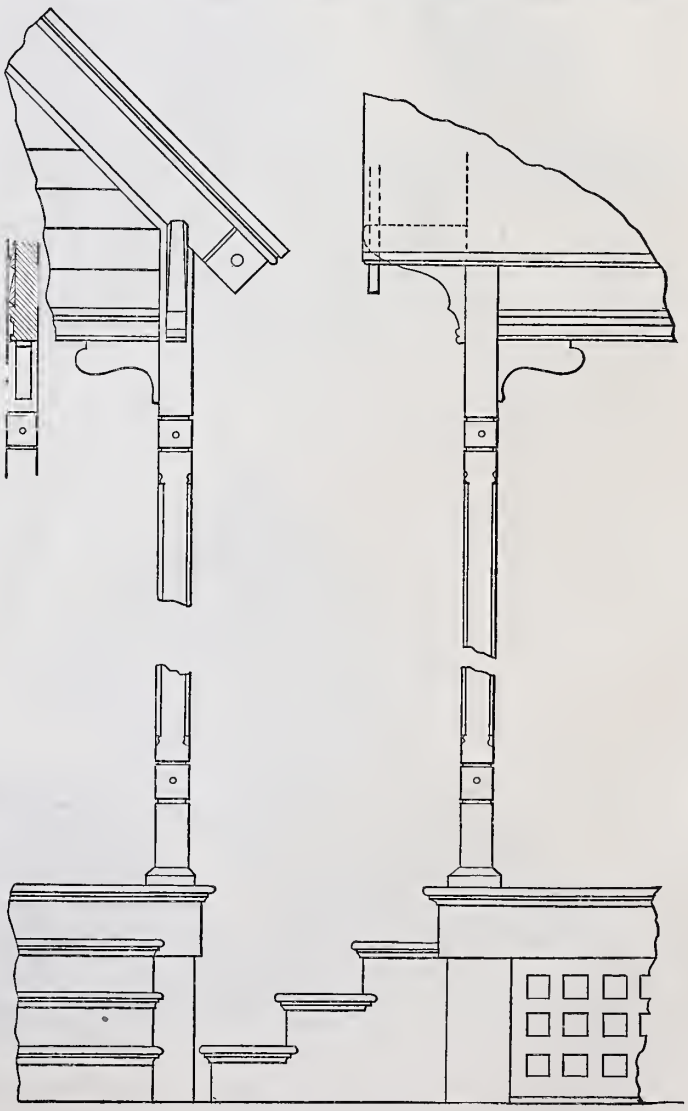
the era of tile manufacture has already begun. The Western section of the country has taken the advance step in this matter, and the large works established at Indianapolis, Ind., have a capacity for turning out encaustic tiles that approaches some of the larger factories abroad, and much of the work produced by them finds its way into the leading public buildings that are now being erected in this country, notable among which is the Produce Exchange, in this city. The phenomenal success of the Lows, at Chelsea, in manufacturing a modernized form of the



Details of Front Door.—Scale, 3 Inches to the Foot.

Palissy tile is still fresh in the minds of those having any interest in this branch of pottings. Followers are not wanting, but thus far the competition raised has not materially affected the business of the Lows, and, indeed, the nearest approach to their peculiar style has been produced in an out-of-the-way village on the coast of New Jersey. These goods have not yet been placed on the market. The manufacture of tiles is generally conceded to be the most exacting branch of the potter's art. Much time, money and patience have been exhausted in applying steam or other motive power to the manufacture of tiles, but, so far as we have been able to learn, nothing has yet been found to give the same satisfactory result as the quick-acting screw press designed and patented by Prossner in 1840. Hydraulics, although exerting unlimited pressure, has been found inefficient, for the reason that it was not coupled with the judgment of an operative, and it is generally conceded that the simple secret in tile-making is not the direct pressure of the press, but the quick compressing blow given by the return motion of the screw in bringing the die down upon the dust or clay the second or third time. The firing of tiles is deservedly a more exacting part of the business, for the reason that unless there is perfect evenness of heat throughout the kiln there will be a want of uniformity in the shrinkage, which produces a consequent variation in sizes. As the use of tiles in this country is only in its infancy, there is no reason to doubt but that the industry is in the same condition. The bulk of the tiles used here, however, come from Europe, where their processes are perfected in such a manner that the production is reduced to a minimum of cost. At present tiles are rather an expensive luxury which very few, excepting the moneyed class, can afford to use, but there is a prospect that the competition that is rising here among manufacturers will have a tendency to reduce the prices to such figures that it will be possible for the houses of the masses to receive these durable and fascinating additions. Plain encaustic tiling is at such figures now that it can be laid in large spaces for as low as 45 cents per square foot, and look pretty well at that.

A German correspondent of one of the English architectural papers mentions a new covering material called roofing linen. This material consists of a layer of coarse linen between two layers of thin roll paper. The thickness is somewhat less than that of the ordinary felt material that is used for roofing purposes. The cohesion of the three layers is effected by an asphalt composition of special properties. This composition or paint, besides its use as a cement between layers, is freely applied to roofs after their completion, and again about six weeks afterward.

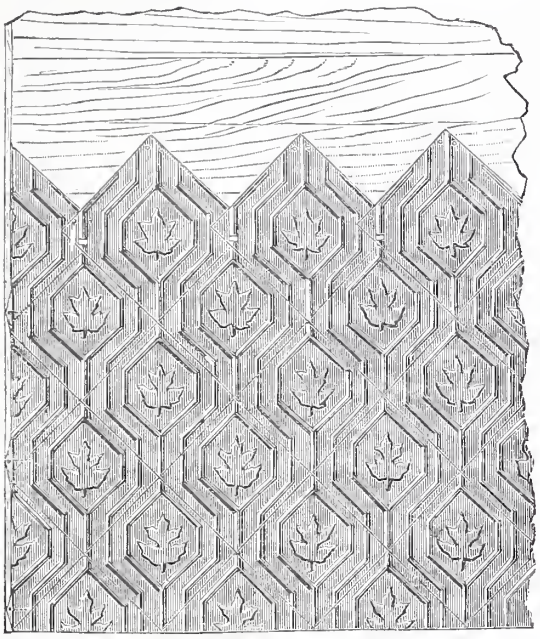


Details of Piazza.—Scale, ½ Inch to the Foot.

NOVELTIES.

New Metallic Tile.

Another candidate for favor in the way of a metallic roof covering is illustrated in the accompanying engravings. The article shown has recently been patented in the United States and Canada, and is now being manufactured and introduced to the trade by Messrs. West, Peachey & Montross, of Simcoe, Ontario. This tile or shingle, as may be seen by examining the complete view afforded of one of the pieces in Fig. 2, differs from others in the market in the fact that it is square in its general shape. By stamping there is imparted a figure and some ridges or corrugations which stiffen the plate and contribute to the constructive features upon which the manufacturers depend for its weather-proof qualities. In laying the tile are applied diagonally, and the roof covered by them presents a very ornamental appearance, as may be gained by inspection of Fig. 1. The square shape of this tile has been chosen primarily for the purpose of cutting stock to a good advantage, and also for constructive reasons which will appear from the description. Another point that should be mentioned in this connection is the fact that the tile in use have a uniform lap on all sides. This is illustrated in Fig. 2. The lower inclined edges of the upper shingle lap over the adjoining ones in the course next below, as indicated by the dotted lines *a a a*. The two corrugations in the upper inclined edges of the lower course fit closely into the corrugations of the lower inclined edges of the upper course. The point or lip c^1 engages with the shingles on each side below through the opening c. This opening does not go clear through to the sheeting, but is only through the side shingles, as will be seen by examination of Fig. 2, and the roof is protected by the upper corner of the lower shingle, which extends under the space where it occurs. In other words, in the small square indicated by the dotted lines in Fig. 2, where the two side tile join, there are four thicknesses of material in the finished roof. The lip c^1 extends through two of them and comes against the surface of the lower one



Novelties.—New Metallic Tile.—Fig. 1.—General Appearance of a Roof Covered with West, Peachey & Montross' New Metallic Tile.

By the lapping, all nail holes are likewise effectually covered. The position of the nails is clearly shown in the several shingles displayed in Fig. 2. The nailing, in combination with the lip c^1 already described, it will be seen, effectually fastens each piece of which the roof covering is composed at all four corners. The double ribs form a double obstacle against snow or rain driving between the courses, and the manufacturers state, in addition, that they make it impossible in roofs of one-fourth pitch or over for snow or rain to drift through under any circumstances.

The construction used in this shingle makes a much narrower lap sufficient than would otherwise be required, resulting in economy of material. The manufacturers point out that a given quantity of metal worked in this form will cover effectually a greater area of roof than can be done by any other tile so far introduced, and, therefore, it must be the cheapest to employ. They also call attention to the fact that ample provision is made in the design and construction of this shingle for contraction and expansion. By the peculiar design of the raised portion the shingle is stiffened in all directions, thus preventing warping or buckling. The nail holes are made larger than the nails, so that the shingle readily moves under their heads all that is required, independent of the rest of the roof. In introducing these goods the manufacturers recommend them for use on all kinds of public and private buildings whose roofs have an inclination of quarter pitch or over. They also offer them as sidings for elevators and the like. No more difficulty is experienced in laying these shingles than with other metallic shingles, and very explicit directions are given for accomplishing this work. The shingles are manufactured out of roofing tin, I C and I X gauges, out of steel plates tinned, of both I C and I X gauges, also of sheet iron painted and of galvanized iron.

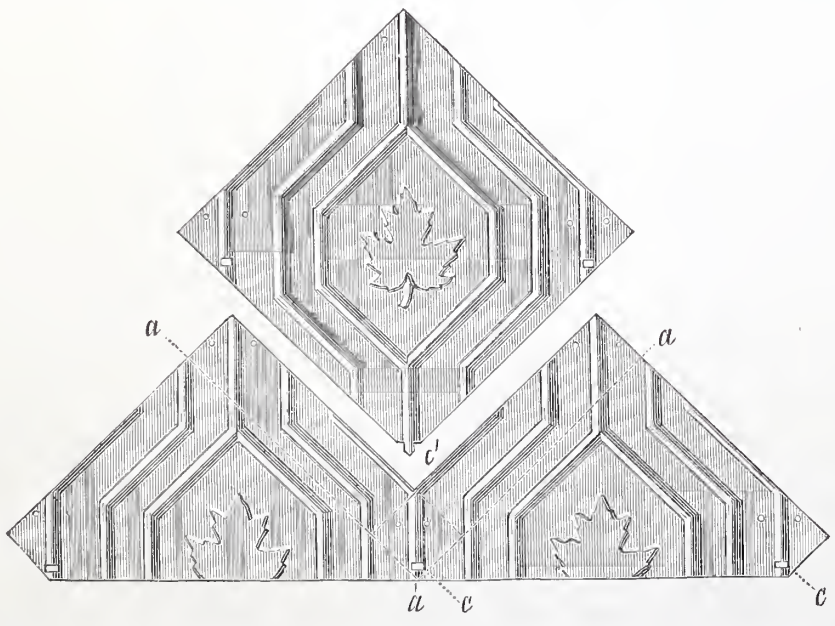


Fig. 2.—View of a Detached Tile, and Diagram Showing the Laps and Methods of Fastening.

The fact that these manufacturers are soliciting an American trade on these goods, although their factory is located in the Dominion of Canada, led us to inquire a short time since concerning the difficulties, if any, which American customers would encounter in getting these goods through the Custom House. In reply Messrs. West, Peachey & Montross assure us that United States purchasers can rely on getting these goods promptly. They say they have agents at both Detroit and Buffalo who receive the goods and make entry to pass the customs and forward the goods on to their destination Their arrangements are such that a very slight delay, a few hours at most, we are assured, will ever occur in getting goods across the line. We understand that a factory in the United States is in contemplation. Messrs. M. & L. Samuel Benjamen & Co., metal dealers, Toronto, are handling these goods in a wholesale way.

Champion Safety Sash Lock.

Two forms of what are called the "True" Champion safety sash lock and fastener combined are shown in Figs. 3 and 4 of the engravings. These goods are manufactured by George Hasenpflug & Co., No. 52 Canal street, Cleveland, Ohio. The first shows the side lock applied to the face of the sash, while the second shows the form used where it is desirable to mortise in putting the fixtures in place. By examination of the engravings it will be seen that the essential principle of this lock is an eccentric, which when properly turned brings a pressure to bear against the stop. The manufacturers claim for it neatness in appearance, easy adjustability, effectiveness, and that it can be applied without injuring the sash. The construction of the lock shown in Fig. 3 is such that it may be placed on either upper or lower sash, and when used upon the upper sash it can be so arranged that the lower sash may pass over the upper lock. This is accomplished, when the lip is part on the lower sash, by sawing off 2 inches of it just below the upper lock and fastening it in place again upon the upper sash. For this purpose locks with loose keys are employed. The form of mortise lock shown in the second

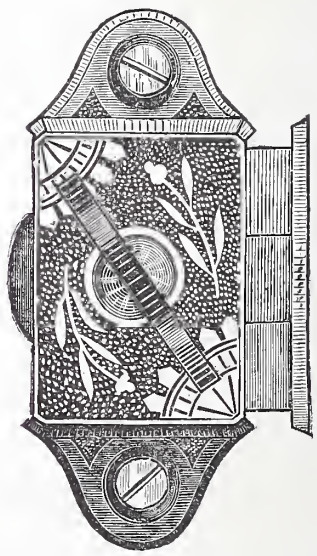
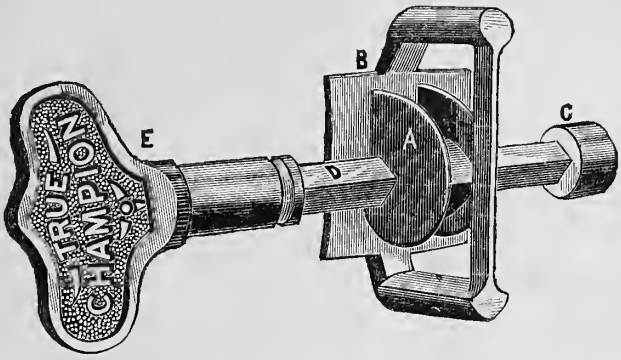


Fig. 3.—"True" Champion Window Fastener.

engraving is placed in the jamb. If used with the key it is found most convenient to place it to the right, but if used with the attachment it may be placed to the left of the sash. A feature in the construction of these locks is that, wherever it is inconvenient to place all the locks on the same side of the window in a building, they can still be made to lock one way by simply reversing the presser and the eccentric.



Novelties.—Fig. 4.—"True" Champion Sash Fastener.—Form Arranged for Mortising.

New Joint for Felt Roofing.

The Cincinnati Roofing Company, Cincinnati, Ohio, are introducing two and three ply felt roofs, a special feature of which is the interlocking joint illustrated in Fig. 5 of the engravings. In the preparation of the felt, the layers of which are cemented together, a portion of the edges are left uncemented,

Fig. 5.—Interlocking Joint for Felt Roofing.

and in the process of laying they are opened and slipped together, as shown in the engraving. By this means the upper layer forms a cap over the nail heads and their washers, and the several parts, being thoroughly cemented in the process of laying, form a joint that is much more desirable than an ordinary lap joint, with which roofing of this kind is usually laid. The roofs at the Exposition Building at New Orleans, now in process of construction, have been covered with what is known as the "A A brand" of roofing felt laid by this company, the joints of which have been made as indicated in the engraving.

New Saw Jointer.

Fig. 6 of the engravings shows a device which is being introduced by B. S. Bozard, No. 354 Fulton street, Brooklyn, for the purpose of utilizing an ordinary three-cornered file in jointing saws. In the use of three-cornered files, it is well known that their corners become worn and useless long before the middle portion has been worn at all. Mr. Bozard's improvement looks to a utilization of this portion of a three-cornered file for the purpose of jointing a saw, instead of using a flat file for that purpose, as is ordinarily the case. His improvement consists in a gauge or holder, which is is very clearly illustrated in the engraving. It is composed of three pieces of metal, two of which form the lower sides or guides, and a third of which forms the cap or clamp. A file is placed in the gauge, as shown in the engraving, and is held in place by means of the set screw shown at the top. One of the side gauges is adjustable to accommodate the thickness of the saw, and is fastened in position by the lower of the two screws shown in the cut. After the three-cornered file has been fastened in place in this way, it serves a very satisfactory purpose in reducing the unevenness of the teeth in a saw. The jointer is of a character to be used upon all kinds of saws with the exception of circular saws.

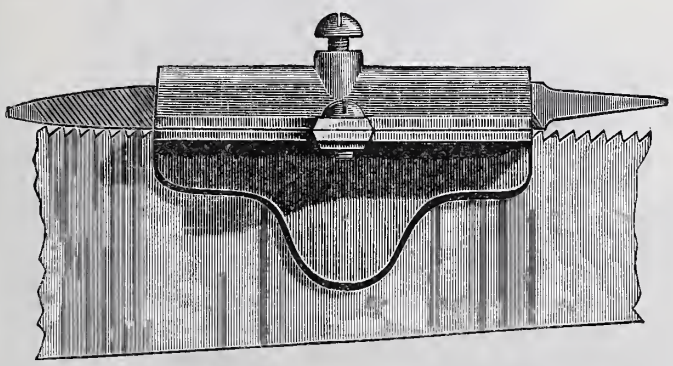


Fig. 6.—Device Utilizing a Three-Cornered File as a Saw Jointer.

Improvements in Saws.

The Harvey W. Peace Company, Limited, of Brooklyn, N. Y., have recently perfected some improvements in hand-saws, among which may be mentioned the handle shown in Fig. 7. This handle has a reinforcing plate along the lower portion, so fixed in position as to greatly strengthen the handle at the place where it is the weakest. Among the advantages derived from this improvement, to which manufacturers direct attention, may be mentioned that the user of these saws is brought nearer his work, and the weight of the saw is brought nearer the wrist of the operator than is usual. By this means the feeling of "heavy at the point" which many saws possess is entirely avoided. The operator also has complete control of the saw. The handle is carried forward on to the blade in a way to stiffen it, while for the purpose of strengthening the handle, since it would be nearly split in two, the nickel-plated reinforcing plate shown in engraving is applied in the weakest part. This serves the useful purpose of stiffening the hilt of the blade and strengthening the handle. In addition to these improvements the saws manufactured by this company have the hand-piece of the handle so shaped as to fit the hand better than the usual shape and to avoid cramping the fingers.

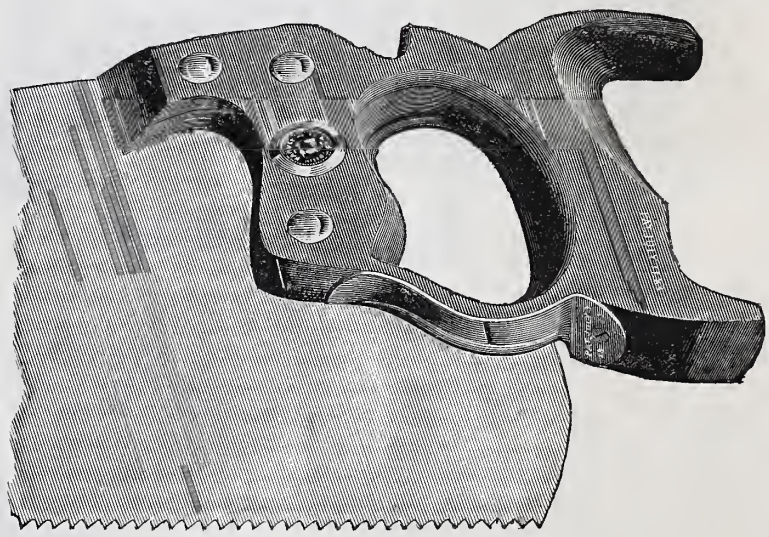


Fig. 7.—New Reinforcing Plate for Saw Handles.

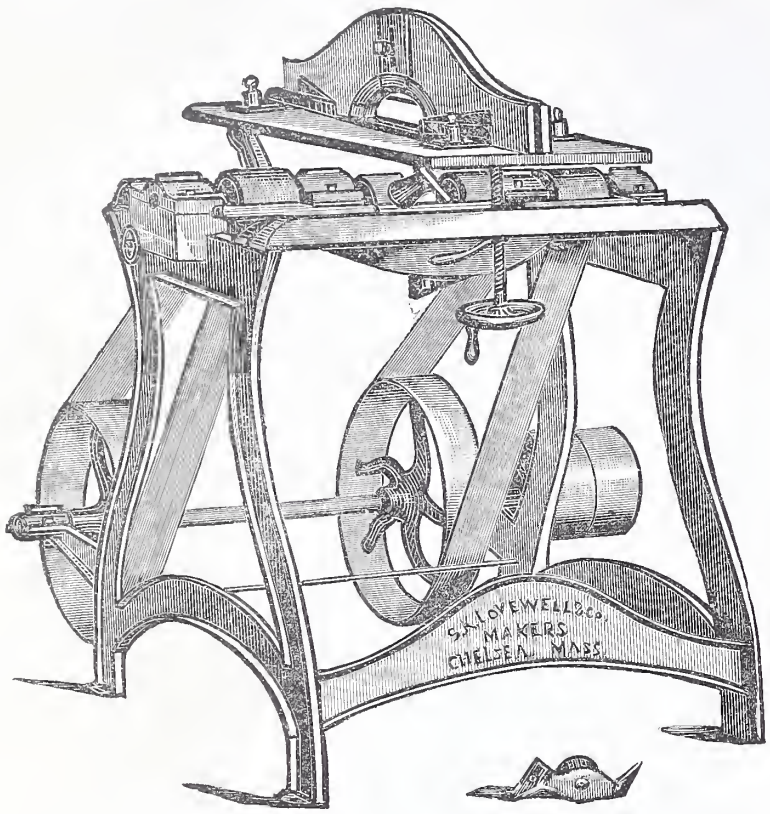
Eclipse Sliding-Door Hanger.

The Eclipse sliding-door hanger, manufactured by the Eclipse Door Hanger Company, No. 84 South Market street, Chicago, has guide irons which are fastened to the back of the track board above the center and sides of doorway. Brackets support these guide irons, and are fastened with an adjusting screw to the setting. By opening the pocket at the center of the bearer, and running a door out from between the walls, the track can be raised or lowered by means of the adjusting screw just mentioned. By this means, no matter what the settling of the house may be, the track can always be kept straight and level, and the doors plumb when opened and closed. The door is suspended by bolts, connecting it with the tracks, which are flattened to receive a wrench. The bolts on the top of the bars are screwed with large screws driven into the door rail and tenons. By inserting a thin wrench between the top of the bar and its frame, the door can be raised or lowered as desired. The manufacturers estimate that builders save from $1 to $2 per set in price and labor over the ordinary double-track hangers. No part of the house is examined more closely than the working of sliding doors, and, therefore, it is to the interest and reputation of every builder to discriminate in buying, so as to secure that which he is satisfied is the best for his purpose. The Eclipse Door Hanger Co. have received numer-

ous flattering testimonials from architects and builders in Chicago, and stand ready to furnish all desired information about their goods.

Panel-Raising Machine.

Messrs. S. K. Lovewell & Co., of Nos. 31 and 33 Broadway, Chelsea, Mass. are putting upon the market a new panel-raising machine which they have just brought out, and which is shown in Fig. 8 of the engravings. The manufacturers state that this machine will raise a panel on one or both sides at a single operation. It will also produce work square, O G or beveled of any desired width up to 3 inches. The machine is said to work equally well in either soft or hard wood, and the statement is made that it does not split or tear the stock, but leaves it smooth and in good condition. It is claimed for it that a very material saving of stock results from its employment as compared with other machines. The statement is further made that one man can do 400 doors in 10 hours, paneling on both sides. The frame is cast iron, and is made exceptionally heavy. The shafts and spindles are of wrought iron and steel, and the heads are of composition. The steel spindles are made very large. The knives are set so as to give a drawing and shaving cut, and, taken in connection with the match-iron or cap to the knife, a smooth cut across the grain, in many cases requiring no additional finish, is obtained. The table is hinged at one end, and raises and lowers by means of a screw and wheel. One head is stationary, while the other is adjustable endwise by means of a screw and wheel, which affords an opportunity of obtaining any thickness of panel. The guides are adjustable on the table, and are held by thumbscrews.



Novelties.—Fig. 8.—Paneling Machine, Built by S. K. Lovewell & Co., Chelsea, Mass.

Automatic Knife-Grinding Machine.

The Egan Company, successors to the Cordesman & Egan Company, Nos. 232 to 250 West Front street, Cincinnati, have brought out an automatic knife-grinding machine, which may be described as self-operating and stopping. The general appearance of the machine is shown in Fig. 9 of the engravings. It is intended for grinding all kinds of planer knives, both long and short. Tho stroke of the machine is adjustable to any length of knife up to 32 inches. The great objects to be attained in the use of a machine of this kind are the improvement in the running of planers secured by keeping the knives and cylinders in perfect balance, and to make what has always been a job of no small proportions in most factories simple and quick, and the work more perfect than by the old way. The advantage of making a machine perfectly automatic is to enable the operator to have one set of knives always ground while the planer is in operation. The machine here shown can be set so as to of the machine is slightly concave, thus grind any depth of cut wanted, and will takecare of itself when once set. The grinding enabling the operator to whet up the knives twice as often as is possible upon the old plan. The frame is cast all in one piece, and has a good floor, bare, which does not take up much room. It is entirely self-contained, the shaft and driving works of the carriage being all on the same frame. The carriage has a steady traverse movement forward and backward. It also has a horizontal motion to and from the grinding-wheel, so as to give great wearing accommodation to the wheel. The horizontal movement is adjustable by the hand-wheel and weighted lever shown in the front of the machine. The movement of the carriage, the makers assert, is very even and perfect, and the reversing apparatus is noiseless and without jar. The traverse motion is very easy and steady. In all its parts, the manufacturers assure us, tho machine has been carefully devised and thoroughly constructed. They offer it as being the most perfect automatic grinding machine yet introduced, and claim for it advantages and conveniences possessed by no other machine made.

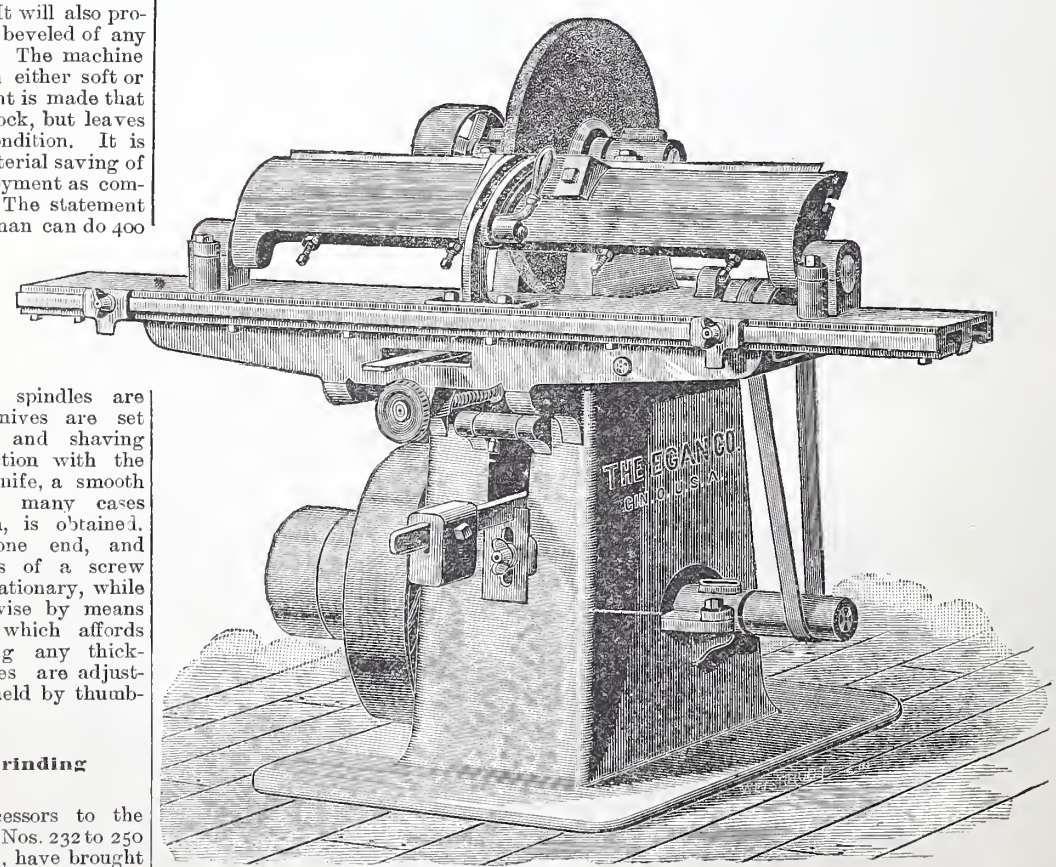
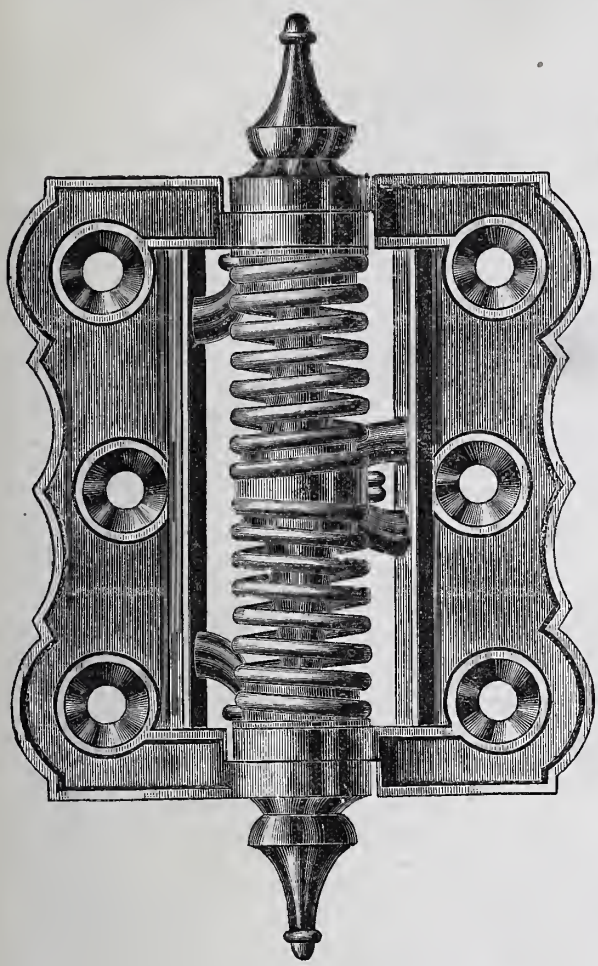


Fig. 9.—Automatic Knife-Grinding Machine, Built by the Egan Company, Cincinnati.

The Devore Spring Hinge.

The Devore spring hinge, manufactured by the Freeport Spring Hinge Company, which is shown in Fig. 10 of the engravings, is offered by the makers as the most practical low-priced spring hinge in the market. It is composed of very few parts, and in action is strong, quick and positive. The tension is uniform. The spring, on account of the peculiar manner in which it is attached to the flanges of the hinge, and to the false pintel around which it is wound, is double-acting. It serves to hold the door closed until it has been swung through an arc of about 90°. Then it exerts its force in the opposite direction, and holds the door open. The false pintel is in line with the axis of the hinge when the door is shut, as shown in the engraving, but as the door is opened it moves forward, thus changing the direction of the force of the spring. The spring is made in two parts, divided in the center and coiled in opposite directions. A larger quantity of wire is got into the coil by this

means, making this spring hinge superior in this respect to some which have preceded it. The makers announce that they are now furnishing 3 x 3 screen-door hinges, and will soon be prepared to ship other sizes, both



Novelties.—Fig. 10.—The Devore Spring Hinge, Manufactured by the Freeport Spring Hinge Co., Freeport, Ill.

surface and mortised, and both single and double action.

Hugunin's Sash Balances and Locks.

The sash balances and sash locks made by R. B. Hugunin, Hartford, Conn., have been known to the trade for some time, hut new patterns have this year been put on the market, which are intended to take the place of the former styles. The articles embodying the latest improvements are represented in the accompanying cuts, Figs. 11, 12 and 13. The sash balances shown in Figs 11 and 12 are adjustable mechanical substitutes for sash weights, halancing sashes automatically by controlled friction, and are made in three sizes and widths, Nos. 1, 2 and 3. They are intended to simplify and lessen the expense of fitting up windows by avoiding the use of box casings, pockets, and the hanging of the sash with weights. They are made either with or without the locking attachment, and are inserted in the sash channels of the frame, and not attached to the sash, an arrangement which, it is mentioned, permits the ready removal of the sash for cleaning, &c.

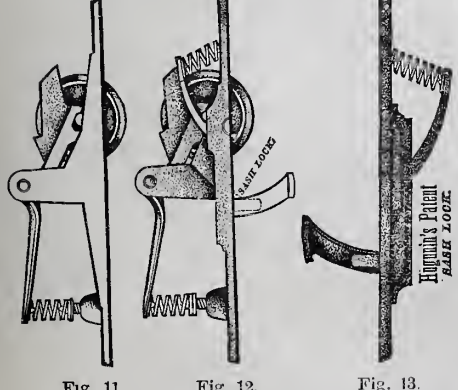


Fig. 11. Fig. 12. Fig. 13.

Figs. 11, 12, 13.—Hugunin's Sash Balances and Sash Lock.

Fig. 11 represents the sash halance without the locking attachment, and Fig. 12 represents it with the locking attachment. They operate on the same general principle as the former styles, but in these newest goods the roller lever, with the axle-holding bearings and roller clamp are made in one piece, and the pressure-adjusting arrangement is on the lower end (instead of the upper, as in the old style), so that the pressure adjustment of the roller against the sash may be made from underneath the sash when the latter is fully raised. By this arrangement, in case too much or too little pressure be given in the adjustment—which can only be ascertained hy raising and lowering the sash—the readjustment is easily effected without removing the sash, for the sashes can always be raised so as to expose the adjusting screw, while in the former style they could not be lowered to it. A further advantage is mentioned, as a result of this arrangement, that the balances are so placed in the frame as to be out of sight when the sashes are closed, while with the old style they were exposed over the top of the lower sashes when closed.

The new locking attachment to the balance, represented in Fig. 12, with engaging plate for the sash, permits the self-locking of the sash when closed, or when open for ventilation, within the length of the engaging plate, by means of the tongue of the lock in contact with the plate, the unlocking being accomplished by pressure on the exposed handle of the lock.

The new patent sash lock represented in Fig. 13 is made in several styles, and is intended for use with sashes hung with weights, and is so constructed as to be self-locking when the sashes are closed, and at intermediate points of opening up to 4 inches. The sashes are closed and locked without handling the locks. The new locks are malleable, with handles finished with bronze or made of real bronze, as desired.

The Ellrich Screw-Driver.

The Ellrich Hardware Manufacturing Company, Plantsville, Conn., for whom the Alford & Berkeley Company are special agents, at 77 Chambers street, New York, are making a screw-driver, a portion of which

Fig. 14.—The Ellrich Screw-Driver.

is represented full-size in Fig. 14, which shows its construction. The dotted lines are intended to indicate the shank of the blade as it enters the handle. This is to prevent the blade from turning. In the wood of the handle four holes are bored, giving an opening from the space that receives the shank of the screw-driver to the outside of the wood of the handle. After the steel blade of the screw-driver has been inserted in the handle, as represented in the cut, the ferrule, which serves also to complete the socket, is cast on the screw-driver, the molten metal flowing into the holes in the wood of the handle and into all the interstices, thus securing a very strong and satisfactory fastening for the blade, as well as giving an opportunity for a fine finish. The manufacturers call attention to the fact that the blades are forged under a hammer from Jessop's cast steel, spring tempered, finished in first-class manner, and warranted in every respect.

The New Wentworth Saw Vise.

In our volume for 1880 we described the Wentworth saw vise as then manufactured. It has been recently improved and Fig. 15 of our illustrations shows the form in which it is at present offered the trade. It will he

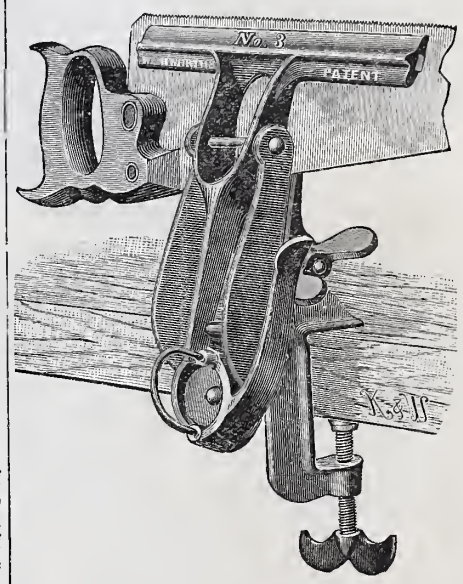


Fig. 15.—The New Wentworth Saw Vise

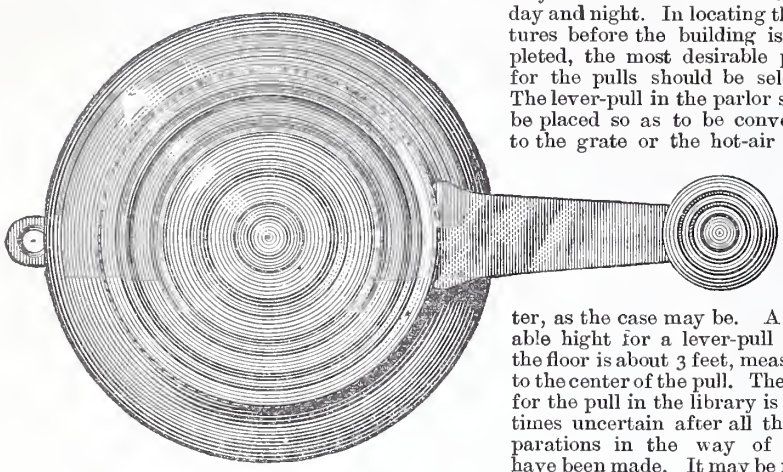
noticed that it includes a screw clamp for attaching to a work-bench, thus rendering it very convenient for use. It is so arranged that by simply turning a thumb-nut it can be tilted to any desired angle. A flexible rubber cushion or muffler between the jaws prevents vibration and renders saw-filing noiseless. The makers, the Seneca Manufacturing Company, Seneca Falls, N. Y., guarantee it to make no more noise than would be caused by filing on a solid piece of iron. The jaws open and close hy turning a cam lever. The parts have been very carefully considered both in point of design and finish. Ample strength is provided and handsome appearance is at the same time secured.

With reference to the durability of lead roofs, one of our subscribers draws attention to a statement that occurs in the letter of a foreign correspondent of one of the daily papers, writing about the Tower of London. The White Tower was built hy William the Conqueror. It is a quadrangular structure 116 feet by 96 feet and 92 feet high. The external walls are 15 feet in thickness. It has a lead roof and was built in the year 1079. Accordingly, argues the writer quoted, it has stood upward of 800 years and is said to be in excellent condition at the present time. This writer's statements, it may he remarked, are not altogether satisfactory. It is possible that the roof is question has been repaired in the time mentioned, if not wholly replaced one or more times. We speak simply from the probabilities of the case, and not from absolute knowledge. The fact that the building was erected 800 years ago and covered with a lead roof is hardly proof that lead roofs last 800 years.

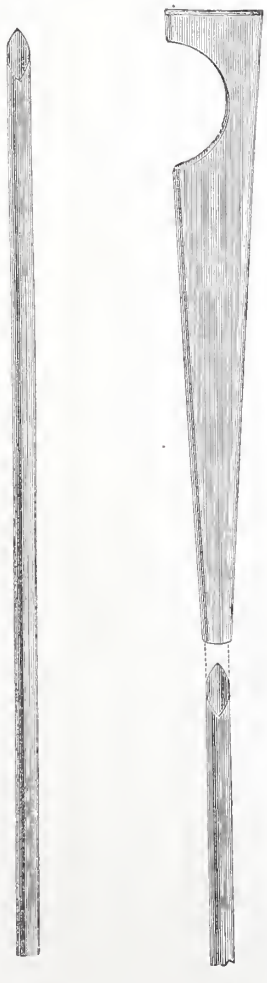
A schoolhouse, 70 x 70 feet in plan, and two stories with deck roof in hight, is in course of construction at Tiffin, Ohio. The structure is of hrick, with terra-cotta trimmings. The plans were furnished by Mr. F. K. Hewitt, of Tiffin, and the cost is estimated at $20,000.

Hanging Bells with Wire in Tubes.

Our articles so far on bell-hanging have anticipated running the wires as required without any protection or guidance. Where houses are belled in the process of construction, it is desirable to run the wires inside the walls, and to do this tin tubes, or some other means of protecting them and of forming proper channels through which they may pass, are required. When the building is about ready for plastering, having the floors laid and the partitions up, the bell-hanger visits the premises with bell-tubing and tools in hand. The materials which he requires for the purpose are illustrated in the accompanying engravings. After receiving his orders from the superintendent or the owner, as the case may be, he commences his work. Bells are a part of the finish and furniture of a house; therefore it is necessary that they should be adjusted to suit the position and size of the furniture. Care must be exercised that the lever-pulls used in hanging the bells are not hidden or made inconvenient, and that they are not located where the bookcase or other tall pieces of furniture are intended to stand. Some questions, therefore, that must be considered preliminary to putting the nosing for the wire are like this: What place is the bed intended to occupy in the chamber? This is necessary, that the pulls may be located where they may be convenient for use both day and night. In locating the fixtures before the building is completed, the most desirable places for the pulls should be selected. The lever-pull in the parlor should be placed so as to be convenient to the grate or the hot-air register, as the case may be. A desirable hight for a lever-pull above the floor is about 3 feet, measuring to the center of the pull. The place for the pull in the library is sometimes uncertain after all the preparations in the way of tubes have been made. It may be necessary to fit the pull into the side or front of the bookcase. This work, when required, may be done in such a manner as to make the pull look like an appropriate ornament to the bookcase. Engravings of bell levers of the kind used with tubes are presented herewith. For these engravings, as well as others which have appeared in this series of articles, we are indebted to Messrs. J. B. Shannon & Sons, Philadelphia, who make a specialty of bell-hangers' supplies.



Bell-Hanging in Tubes.—Lever Bell-Pull.



Bell-Tube.

Bell-Tube Mouthpiece.

In tubed bells the pulls are not of necessity placed near the ceiling, as must be done when the wires run on the outside of the plaster. The latter construction in a bedroom necessitates the use of a cord and tassel. The cord and tassel is made less objectionable by being made ornamental, but still it holds the dust, and moths destroy its beauty, and it soon shows that it has been used. These points suggest what is to be avoided in locating bells before the completion of the building. Bell-levers in bedrooms are preferably placed so as to be convenient for a person in an ordinary bed to ring them. They are placed 3½ or 4 feet from the floor to the center of the pull. Two bells are usually employed in each of the best bedrooms—one to ring a bell in the kitchen and one to ring a bell in the servant's sleeping-room. In locating the pulls they should be placed far enough apart to allow one to come on each side of the bed. Sometimes a cord is attached to the knob of each bell-lever and allowed to extend across the bed, so that by pulling the cord both bells will be rung at once, thus making sure to attract the attention of the servant. The same device in some instances may serve to frighten away burglars.

Bell-Tube Lever Blocks.

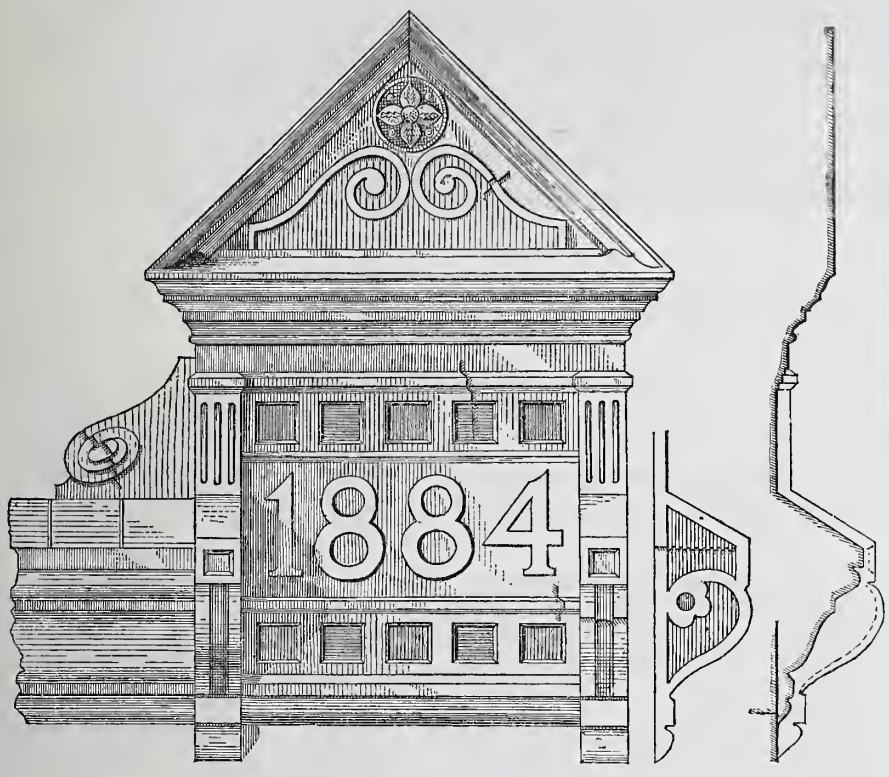
After having determined the number and places of the bell-levers, the next thing is to obtain as many pieces of lumber for plugging the walls as may be required. For this purpose pieces 3 x 4 inches wide and 5 inches long are used. The plugging is accomplished by cutting out a brick and inserting in its place the block of wood. The block is driven in place and wedged as tightly as possible. These plugs are the foundation against which the bell-levers are screwed after the plastering is done. In order to have a place left for the lever, screw to the plug a wood bell-block of the kind shown in the accompanying engraving. Place a tin bell-tube mouthpiece against the block—so close, indeed, as to prevent the plaster from getting between the block and the mouthpiece, thus falling into and stopping up the tube. Attach a piece of tin bell-tube to the end of the piece so located, the latter, it will be found, being small enough to slip into the bell-tubing. Follow this with another piece attached in some manner to the first, and so continue until such length as is convenient to handle, or as much as will reach to the cellar, has been arranged. Make the mouthpiece and tubing fast to the wall by nails, one driven on each side of the tube, or staples of suitable size may be used for the purpose. Use care to keep the bell-tube in a straight line, for it must be free from bends. Bore a hole in the floor through which to pass the tubing. Make calculations so as to avoid boring through a joist. As variations of the place in which the pull is to come, a little one way or the other, make but very little difference in the use of the bell, a little care in matters of this kind will save considerable labor. The nearer the tubing can be kept to an exact plumb-line the better the bells will ring after they are hung. If the tubes are plumb, there will be no rubbing or chafing of the wires in them.

As it is common for plasterers to lath and put one coat of plaster on the ceilings and on the inside wooden partitions before they plaster the walls, if the bell-tubing is run on the walls it must be protected from injury by the plasterers' scaffold while this work is being done. The scaffold boards used by plasterers are handled a good deal before the work is finished, and accordingly the danger of damage to the bell-tubing, if left unprotected, is considerable. Nail a plasterer's lath each side of the tube, which are to be taken down before the walls are plastered. If the bell-tube is struck and much injured by the plasterer, the bell-hanger should be notified, so that he may repair the tube before it is covered up. If the bell-hanger fails to come, an unplastered strip about the tube should be left, so that the necessary work may be done and the plaster afterward supplied. To repair a tube after the plastering is finished is an unpleasant undertaking. For the bell-hanger it is a time-consuming, troublesome job, the plasterer having an increased amount of patching-up to do. Work of this kind is neither creditable nor profitable to either of them. Care should be taken that the tubes are free from injury for the reasons above mentioned, and for others that will occur to any one who gives the matter any thought at all. When the carpenters are about done in the house, and just before the painting is commenced, or after the painters are at work in the upper stories of the house, in case they follow the carpenters closely, the bell-hanger takes out the round bell-blocks before mentioned, stretches his wire well and runs it down the tubes into the cellar. He ties the end of the piece in the eye of the bell-lever, screws in the box of the bell-lever and then puts the lever in its place, and so that it works freely. He next screws on the cap. When this is done a helper should be in the cellar to pull the wire down as often as it is pulled up by the lever, in order that the bell-hanger may be certain that all works freely, as it must be made to do before it is left. He gets the wires in all the tubes, has all the levers in their places, and then goes to the cellar. If the spike crank is used he drives such a one in position, or if the plate crank is used he screws one of the latter in place, and repeats this until all the cranks that are needed are ready for hanging the wires where they come together to make a straight line to the bells that are down-stairs. When there are several bells, as many cranks as are wanted on one plate may be used. Having put the bells in the place where they are to remain, with a check-spring attached, so that the lean of the bell will be slightly toward the

Astragal for Covering Wires.

spring, all as has been described in previous papers, he adds one wire and makes it fast to the bell it is to ring. It is well to try each bell as it is hung; particularly is this necessary unless the bell-hanger is well assured of his own knowledge and experience, so as to venture to complete the work without testing as he goes.

Hanging bells with wires run in tubes that lead directly to the cellar makes much better work than to bore holes and run wires through the house on the outside of the plaster, as must be done in a finished house. The labor and cost of the two ways of doing the work do not differ materially, but the difference in durability and easy ringing is all in favor of tubed bells. Where there are several bells coming together, a board upon which all of them can be put should be provided. For this purpose a board long enough to allow 12 inches in length to each bell is required. The bunch of cranks that is put upon the bell-board should be at least 1 foot from the nearest bell, and so placed that the crank is a little lower than the eye in the bell carriage. General directions contained in in our previous articles are applicable in thiswork, and need not be repeated.



Galvanized-Iron Work.—Fig. 1.—Pediment Sign-Block and Cornice.

Building and Pavements in Mexico.

While there are no 13-story, or even five-story, buildings in Mexico, writes a correspondent, stone structures two, three and even four stories high prevail in the central business quarters. Most Americans coming here will be surprised, I fancy, to find that there are streets as handsome, as substantially built and as full of wealth as the average thoroughfares of commerce in large cities at home. Mexico is no mushroom growth. Its universal stone is handsome and its air of solidity is extremely pleasing. Humboldt's admiration for the breadth of Mexican streets, however, seems odd. Compared with American urban thoroughfares, save those of the older parts of Boston, they are very narrow. A railway track and two carriages will fill the space from curb to curb in more streets than one. The sidewalks are ludicrously narrow. It is sometimes impossible for two persons to walk abreast, and four arm-in-arm would monopolize the breadth of most of them. But the pavement of the driveways is generally clean, and no one hesitates to go in the road if there is no room on the walk.

The central streets are paved with stone blocks, not quite cobble stones, nor yet of comfortable size. They are ill laid, and it is rough riding on them. Indians water the streets by hand, as well as sweep them with little whisk-brooms, the brush tied in the middle without a handle, so that both sides are available. It is a wonder that street-sweepers survive an hour of their backaching work. The Indian endurance is deservedly famous It is a comical sight, this sweeping and sprinkling by hand, with a basin full of water at a time. On the broader drives one will see half a dozen stout fellows laboring at an old-fashioned hand fire-engine pumping water through a hose upon the thoroughfare. There are modern watering carts in town, but, judging from the appearance of things to-day, they will not be universally employed for an age.

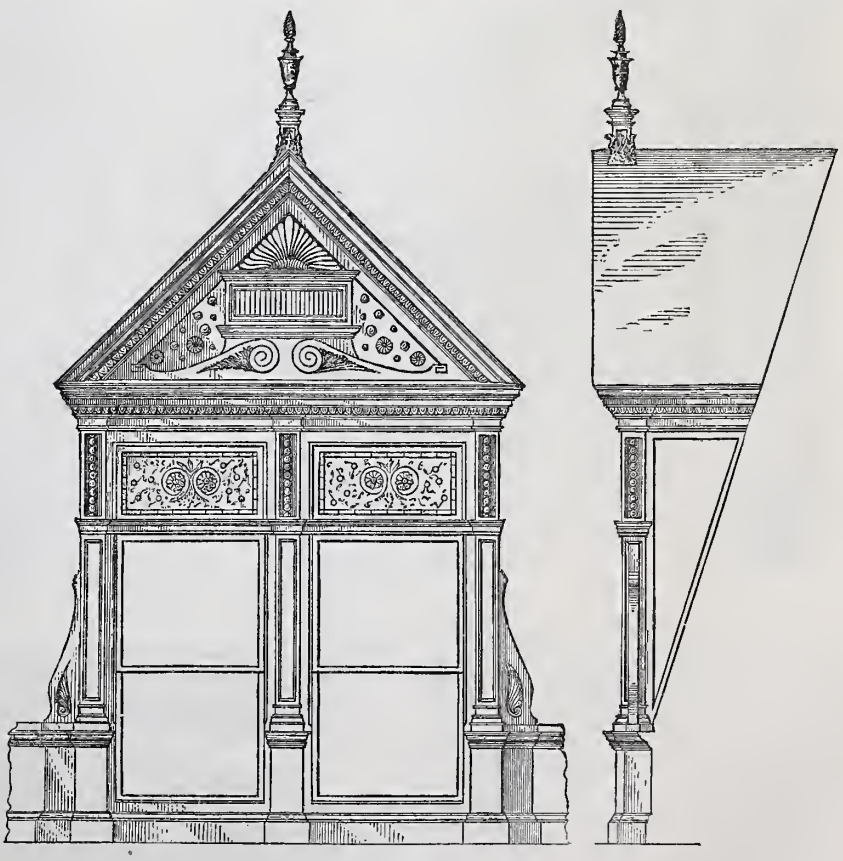


Fig. 2.—Dormer Window in the Modern Style.

Builders' Sheet-Metal Work

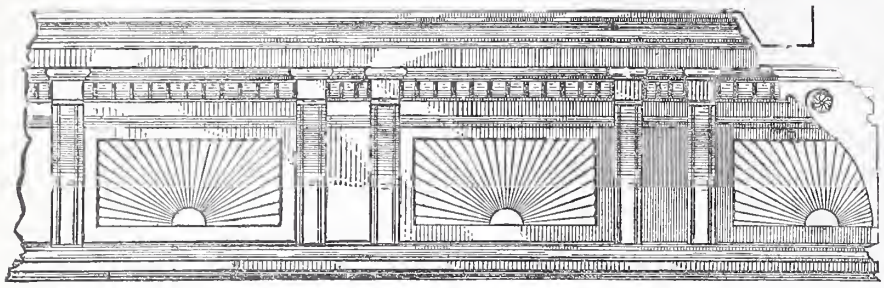
BY A. O. KITTREDGE.

GALVANIZED-IRON CORNICES, ETC.

In several articles bearing the general title of "Builders' Sheet-Metal Work" which were published in former volumes of *Carpentry and Building*, attention has been directed to features of construction of galvanized-iron cornices, to joints between moldings, to methods of putting up and to other similar points to which it is worth the while of the intelligent builder to give careful attention in managing work of this kind. In the present article I propose calling attention to some designs of galvanized-iron work selected from new catalogues either published or about to be published by prominent manufacturers of this line of work. The designs are interesting, since they exhibit in a marked manner the application of sheet metal to many purposes of design and finish, and they are valuable, because they show desirable forms for working sheet metal so far as the nature of the material itself is concerned. The selection of designs presented has been made with a view to presenting as large a variety as possible, both in the articles shown, and also in specimens of work from different designers, as well as in the number of manufacturers from whose books they have been taken. Tho space that can be devoted to this subject, however, makes it impossible to present more than a suggestion of what is available in this direction. Figs. 1, 2, 3, 6, 8 and 9 are from a catalogue recently issued by Messrs. Backus & Brisbin, New Orleans. Figs. 4 and 5 are from advance sheets of a catalogue about to be issued by Messrs. Carpenter, Annear & Co., Louisville, Ky., and Fig. 7 is from a catalogue now on the press for Bakewell & Mullins, Salem, Ohio. Figs. 1 and 9 are from designs by John R. Church, Rochester, N. Y., while Figs. 2, 3. 6 and 8 are by Gould & Angel, Providence, R. I. All of these designers are favorably known to our readers on account of specimens of their work which have heretofore been published. The other designs had their origin in the establishments from which they are issued.

Fig. 1 is a characteristic design in galvanized-iron work, being a sign-block and pediment combined, and is intended to give

hight to the building on which it may be placed. The cornice of the building, of which a profile is shown on the right, terminates against trusses or stop-blocks, which form the base of pilasters supporting the pediment. The figures "1884" might be changed for letters, thus indicating the name of the block or owner of the building upon which the design is used. By close inspection of the panels above and below the sign-board it will be seen that corrugated iron has been used in them. In part the corrugations run vertically and in others horizontally, The sides of the trusses are also corrugated. There seems to be a growing tendency upon the part of designers to employ corrugations in sheet-metal work. This is highly commendable for broken surfaces, either crimped or corrugated, give far better results than plain surfaces, and the use of corrugations is in keeping with the nature of the material.



Galvanized-Iron Work.—Fig. 3.—Cornice with Sun Panels in the Frieze.

Fig. 2 shows a dormer window in what may be termed the modern antique style. It is a typical design and displays very happily the adaptability of galvanized sheet iron for work of this character. Stained glass windows in the upper part are made to harmonize with the general design of the work. Figs. 3 and 6 show cornices that are also of the same general order of design. In the former a sun panel of a rectangular form is is used between the brackets, while in the latter it appears in a semi-circular form below what may be termed suggestions of modillions.

In Figs. 4 and 5 two cornices are presented which are of a character to be found very serviceable upon street fronts of business buildings and as the finish of public buildings. Fig. 4 is so drawn as to show the side of the truss or terminal block. It will be seen that this cornice has comparatively slight projection, and that it is very compact and well-considered in all its details. In Fig. 5 it will be noticed that the sides of the brackets employ corrugated panels, while the dentil course is also molded or corrugated on the face, so to be in keeping with other parts. Both of these designs employ stamped ornaments freely and in a way to indicate an appropriate use for enrichments of this character. Fig. 7 shows a cornice the leading feature of which is a heavy cable molding in the bed course, the alternate strands of which are enriched with leaves. The lower edge of the fascia is enriched with semicircular drops, in which are sunk half-balls or rosettes. The face of the truss or stop-block is ornamented with a rosette and leaf, and across the lower portion are semicircular drops corresponding to those in the fascia already mentioned. Fig. 8 shows a design for an oriel window, the entire casing of which, including the balustrade, is intended to be of galvanized sheet iron with pressed-ziuc ornaments in the panels. The plan below the front elevation indicates construction. This design is in keeping with the requirements of modern buildings, and shows in a very happy manner the adaptation of galvanized iron to work of this kind. Fig. 9 shows a conductor-head adapted to receive a gutter or valley between two gables. The profile of the cornice molding is shown to the left, while the counterfeit of an antique conductor fastening is shown in connection with the pipe.

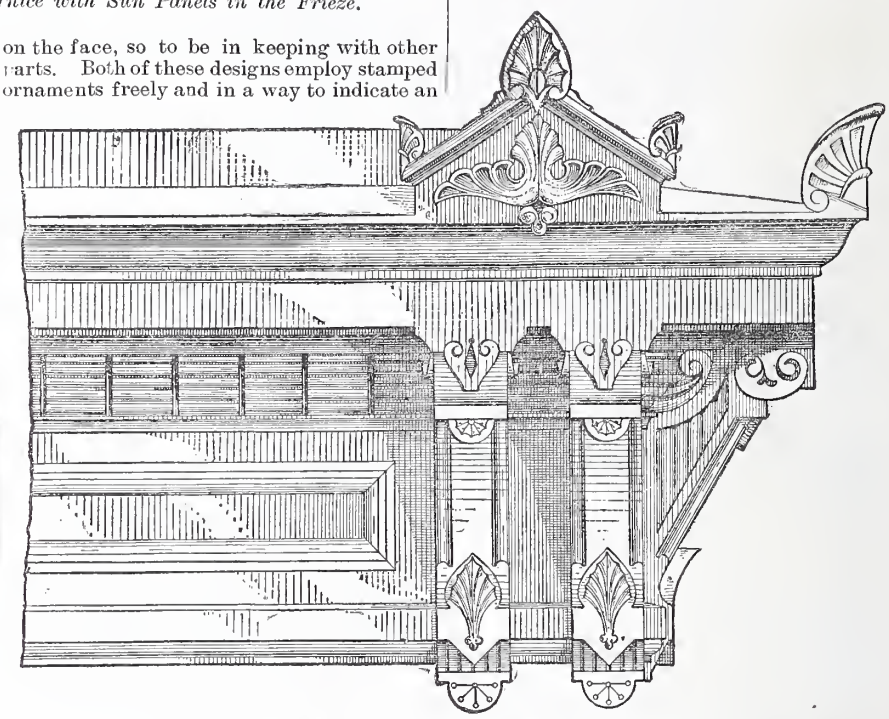


Fig. 5.—Cornice with Fancy Brackets, Molded Dentil Course, Paneled Frieze, &c.

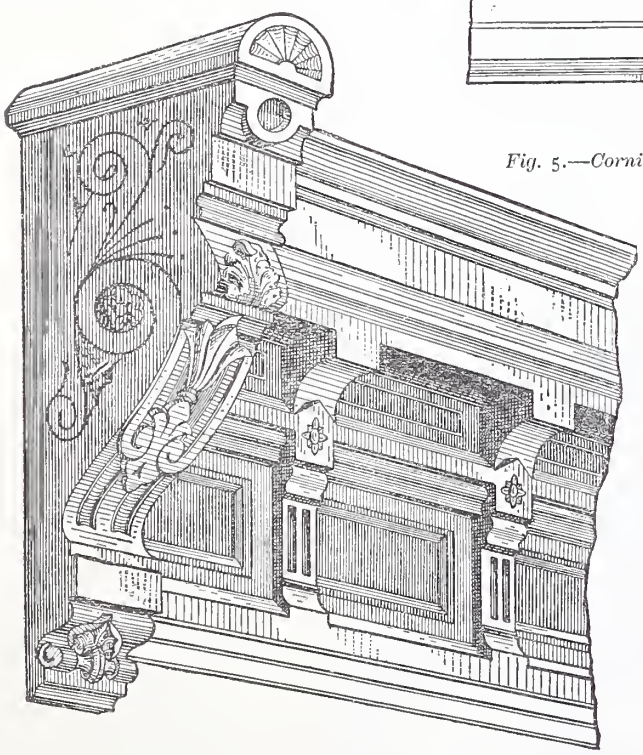


Fig. 4.—Cornice with Truss or Terminal Block.

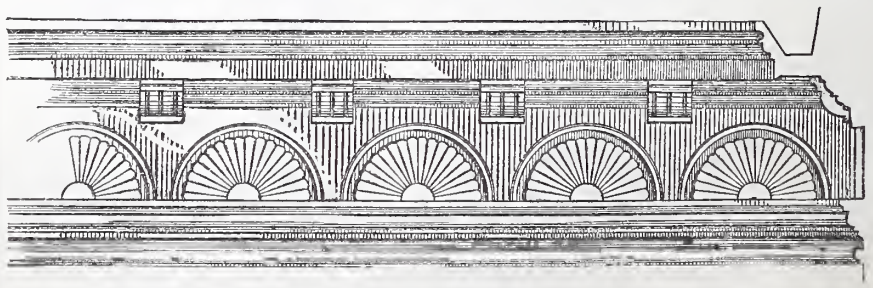


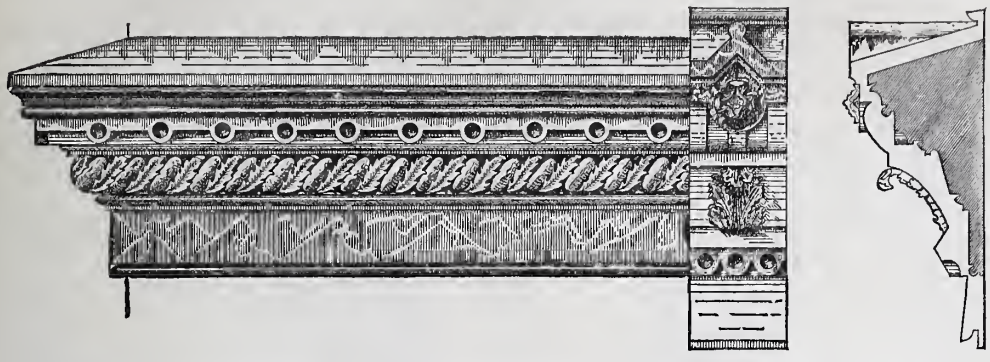
Fig. 6.—Cornice with Semicircular Sun Panels in the Frieze.

NEW PUBLICATIONS.

HINTS ON THE DRAINAGE AND SEWERAGE OF DWELLINGS. By William Paul Gerhard. Size, 8 x 5½ inches, 300 pages, 282 engravings. Published by W. T. Comstock. Price, $2.50.

This work originally appeared, in part at least, as a series of articles over the *nom de plume* of "Hippocrates," in the columns of *Building*. Mr. Gerhard is a very careful writer, and is for the most part safe in his conclusions, and accordingly this volume forms a very desirable addition to the literature of plumbing. The author's aim throughout has been to give an account of the usual condition in which plumbing work done years ago—and, for that matter, some done quite recently—may be found, and to give suggestions on the proper manner of doing the work. He has chosen the title "Hints," because he considers that the present volume is much less than an exhaustive treatise on the subject. The book is composed of 12 chapters, the titles of which will afford our readers an idea of its scope. They are: Fresh Air *vs.* Sewer Gas; Necessity of Ventilation in Rooms; Sewer and Waste Pipe Systems as Usually Found in Dwellings; Traps and Systems of Traps; Details of Traps; Insecurity of Common Water-Seal Traps; Defects in the Plumbing Work of Dwellings; Cellar Drains and Drainage of Cellars; Usual Defects of House-Drains; System of Internal Sewerage as it Should Be in a Dwelling; Plumbing Fixtures and Removal and Disposal of Household Wastes. Every one of these subjects is profusely, if

not exhaustively, illustrated, and the work cannot fail to be of interest and value to all who have any occasion to consider the general subject of pure air, pure water and pure soil.



Galvanized-Iron Work.—Fig. 7.—Cornice with Enriched Cable Molding in The Bed Course.

OUT OF TOWN PLACES. With Hints for Their Improvement. By Donald G. Mitchell. Size, 5 x 7 inches, 295 pages, with illustrations by E. C. Gardner. Bound in cloth. Published by Chas. Scribners' Sons. Price, $1.25.

Many years ago we remember reading some of the volumes written by "Ike Marvel," and were greatly delighted with their freshness and the attractiveness of their style. Their memory lingers still as as one of the pleasantest connected with our early reading. One of those old volumes has lately been reissued with a change of name, and has been modernized by the introduction of some very appropriate sketches by E. C. Gardner, of Springfield, Mass., a well-known architect and writer on building and architectural topics. The text seems to be as fresh as though it were written but yesterday, while the sketches serve to suit it to the times and give it a new interest to those who read the book 20 years ago, while they render it entirely acceptable to those who examine it now for the first time. The author in his orginal preface, dated 1867, said that the aim of the volume was to stimulate those who live in the country and who love the country to a fuller and wider range of thinking about the means of making their homes an enjoyment. He described the book as a tract for homeliness, and put it forth with the hope that it might be useful. In his present preface he thinks that the simplicity of the volume and its commonplace suggestions may have good results. The book contains many hints and suggestions that are invaluable to those who live on farms or in country towns, as well as for those who live in the suburbs of some of the cities; all this is presented in a most charming style, and every page is readable from first to last. The book is comprised in five general divisions. The first describes an old-style farm. The second is entitled "Advice for Lackland," and treats of the various vicissitudes through which an imaginary friend of the author passes in organizing a country place. The third chapter is "Wayside Hints." The fourth, "Laying Out of Grounds." This discusses landscape gardening, farm landscapes, equipment of public gardens, &c. The last division is entitled "Mr. Urban and his Country House," and is quite as readable as any that precedes it.

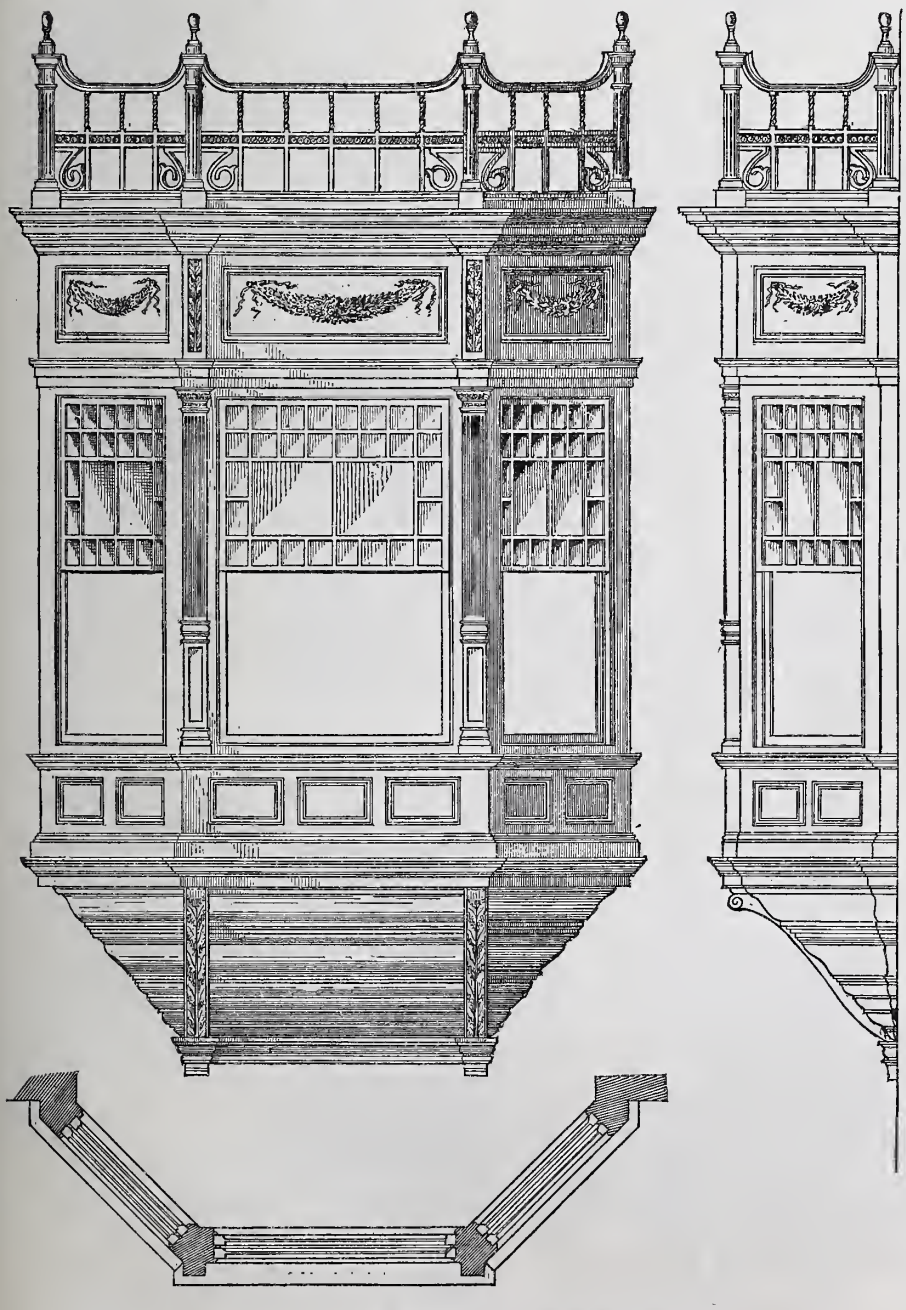


Fig. 8.—Oriel Window in Galvanized Sheet Iron.

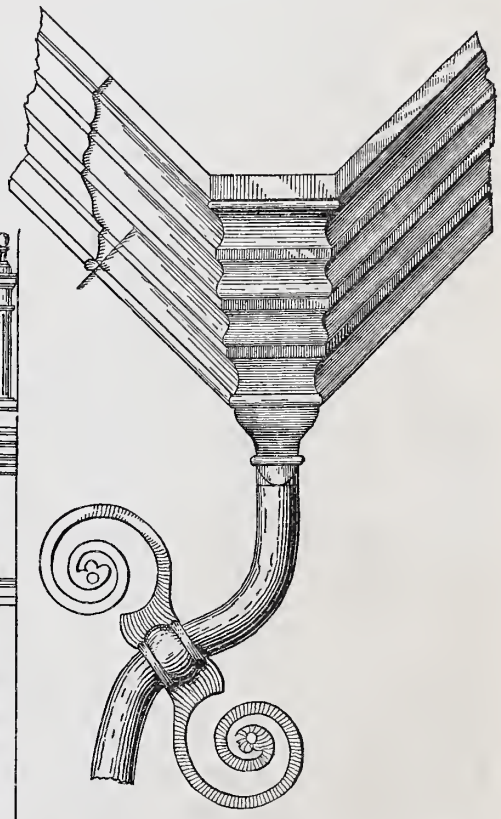


Fig. 9.—Conductor Head for Gutter Between Two Gables.

FOUNDATIONS AND FOUNDATION WALLS. By George T. Powell, to which is added a Treatise on Foundations, by Frederick Bauman. Revised and changed by the addition of much new matter. Size 6 x 9 inches, bound in cloth, 166 pages, illustrated. Published by William T. Comstock. Price, $2.

The former edition of this work was received with much favor by the building public, but in the lapse of time many improvements in the work have been suggested. The importance of the subject leads the publisher to believe a second edition, thoroughly revised and brought down to date, would prove valuable. After consultation with the author it was decided to recast the whole thing and make it practically a new work. The result is the volume before us. It contains much that is of importance to every architect and builder, and it should find a place in every library.

CORRESPONDENCE.

A Question of Insurance.

From R. P., *Faribault, Minn.*—A question of insurance arises which I would like to see answered through the paper. A house that was built some 18 months ago, and which had been finished inside by painting and papering, was partially destroyed by fire. The roof was burned off before the fire department succeeded in arresting the flames. As a consequence, the rooms were flooded with water and the plaster was wet through and the paint damaged or ruined by the flames. Although the house was insured, the general agent of the company did not adjust the loss for some two weeks after the fire. During that time the walls and woodwork were still further wet by melted snow and rain. The question arises: Is the insurance company resposible for damage done by fire aud water or only by fire?

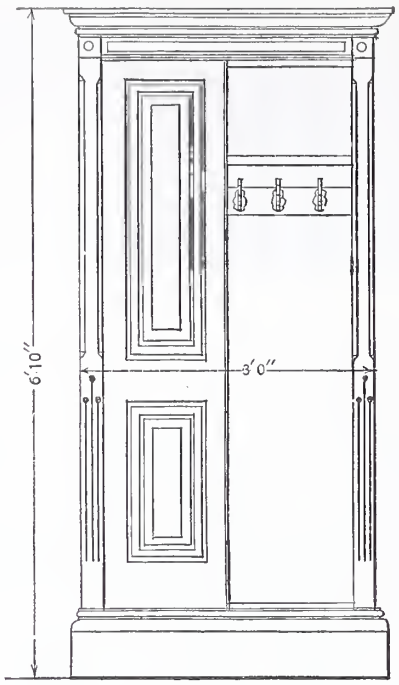
Answer.—We think that the question that our correspondent raises is probably one of fact, and is to be answered solely by the conditions of the policy which was written on the risk mentioned. By examination of that instrument it will probably be found that the liability in this case, as in others, depends upon the conditions in the policy. In general terms we believe it is the custom of insurance companies to guarantee a loss from fire in the broad sense that it covers, also, damages that may be incidental to the process of putting out the fire. In the large cities the insurance companies sometimes maintain what is called the Insurance Patrol. This consists of a corps of well-trained men with all necessary appliances for protectiug goods that may be in a building at the time of a fire, and which would be damaged by the water if not cared for. The insurance companies find it cheaper to take care of property in this way than to pay what they would otherwise be liable for under their policies. If our correspondent's question with reference to the insurance companies' liability for damage from water refers to the damage done by the rain and melted snow subsequent to the fire and during the period which elapsed between the time of the fire and the date of the adjustment, a point is raised that we are hardly prepared to answer. The liability of a company, in all probability, would depend largely upon circumstances. If the building during this interval was practically in the hands of the insurance company pending an adjustment of the loss, and on this account was out of the control of the owner, so that he was unable to protect his property, it would seem that, in equity at least, the insurance company should make up the additional loss. What the law may be, or what custom may recognize in the district in which our correspondent is located, we cannot say. We suggest that it would be a very difficult matter to determine what amount of loss was sustained by the damage done the building subsequent to the fire on account of water, and what occurred at the time of the fire. Sometimes insurance companies consider it to their advantage to restore a building to its original condition rather than pay the amount of policy, and they frequently reserve the right to do this. If such a clause existed in the policy in question, and if the company had finally decided to rebuild the building, it is very evident that any loss that was sustained subsequent to the fire and before the work of rebuilding was commenced would fall upon the insurance company. No one would ever think of a claim being entered against the owner for it. This view of the case would seem to indicate that the insurance company, in equity at least, is liable for the damages which result directly and indirectly from the fire, from the time that that fire occurs until a settlement has been made aud the property restored to the owner. If any of our readers have had experience in matters of this kind we shall be glad to have statements from them for publication.

Palmer & Storke Plane.

From M. M. K., *Lima, Ohio.*—If "W. S. W.," who inquires in the March number where he can get the Palmer & Storke plane, will write to No. 3 Green street, Auburn, N. Y., he will be supplied with the implement.

Wardrobe.

From P.—Readers of the paper who have expressed a desire for desigus of furniture and cabinet work may perhaps find



Wardrobe.—Fig. 1.—*Elevation.—Scale, ½ Inch to the Foot.*

something of interest in the inclosed drawings, representing a wardrobe. I show an elevation with oue of the doors removed, an

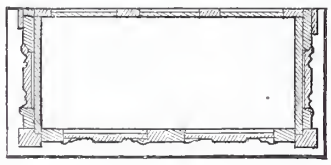


Fig. 2.—*Plan of Wardrobe.*

end view, a plan and a vertical section, together with details indicating construction.

The Carpenter's Sister.

From J. R. L., *Chillicothe, Mo.*—Some time since, when we were looking for our

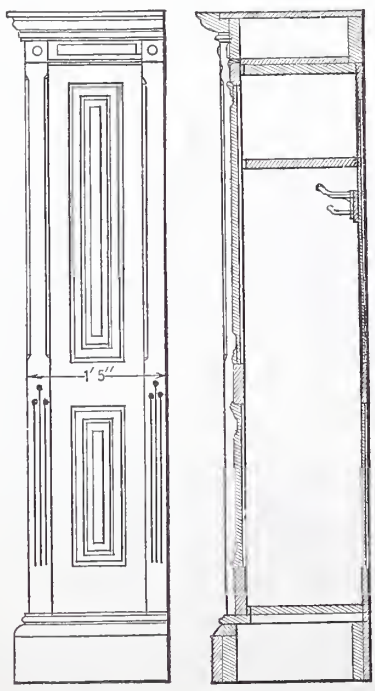


Fig. 3. Fig 4.

Figs. 3 *and* 4.—*End Elevation and Section.—Scale, ½ Inch to the Foot.*

ever-welcome friend and helper—*Carpentry and Building*, I mean—a woman came into our shop and stated that, while she was not a carpenter, she was a carpenter's sister. In the course of her remarks she told us so much truth about the trade that perhaps, her avowal to the contrary, the brotherhood of carpenters would be justified in calling her a sister carpenter. At any rate, I think that common courtesy would accord her some distinctive title or name that would commemorate the service she has rendered the trade. Like her brother of whom she spoke, I was compelled, some 25 years ago, to lay down Greek and mathematics and take up in their place the jack-plane and hand-saw. I therefore think I can sympathize with him in that respect, at least. If you will allow me the time I would like to chat a few moments on this subject. I will take a handful of shavings and brush off the dust from my tool-chest, thus giving you a carpenter's seat, while I will sit on the work-bench. The subject on which I want to talk is the desirability of the carpenter's calling. It is noon-time, and as our venerable friend, "W. B.," of Springfield, Mass., whose communications, by the way, are very few of late, was wont to forego his noon-time nap for the sake of study, I will deny myself mine in order to consider the subject named.

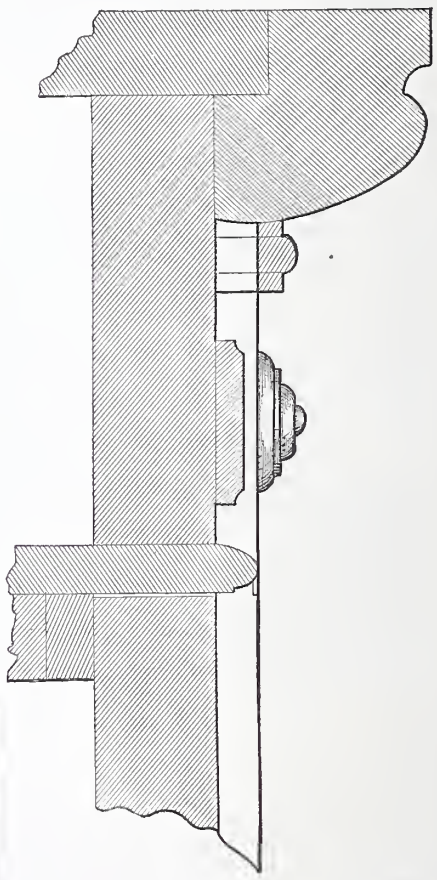
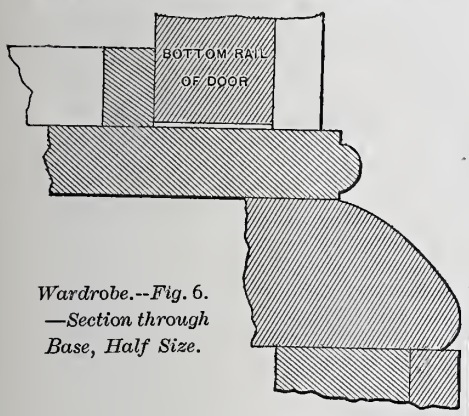


Fig. 5.—*Section through Cornice, Half Size.*

Unlike my venerable friend, however, it is not necessary for me to cover my head with my work-apron in order to keep off the flies. The covering that nature provided is still there, and is in good order, although the silver locks are widening. I pretend not to notice them, for I have not yet been willing to acknowledge the heavy hand of time. The question, however, is, Is carpentry a desirable calling? Well, I should say it is, from various points of view. What would our rich men, for example, do without carpenters? What would Mr. Vanderbilt, for instance, with all his wealth, be without the assistance of carpenters? What knowledge do the millionaires possess that is comparable to our accomplishments? What do any of the rich men of the country know about framing hip roofs, cutting valley rafters, or getting out rail for winding stairs? Of course, they can pay for all this after it is done, but they canuot do it themselves under any circumstances. From this it is evident that we are able to build and finish houses without the help of rich men, but that they cannot build their palaces without our aid. It is true that the trade of the carpenter

is not what it should be, and it must be admitted that it is not held as high in the estimation of many as it deserves. Many carpenters are looked down upon and are classed with greasy mechanics; but those who affect disdain in our presence, when they want a nice piece of work done, are always compelled to come to the carpenter to obtain it. Of all the trades in the world, so far as my experience extends, I prefer the carpenter's trade. It is the one trade in which the educated man can find full scope for his skill and knowledge, and still find full play for his mental powers. After working at the bench all day or at framing a roof, he can take up a book on construction or architecture in the evening, and by studying some knotty point in framing, or some other similar feature, may pass the time agreeably, and while gaining recreation obtain a better idea of the nature of the practical work to which his labor is devoted. By persistently pursuing this plan he is enabled to climb up the ladder and to advance day by day both in his work as a mechanic and also in acquiring a position for himself in the world.

I have a suggestion to make to the carpenter's sister who proved such a welcome visitor to our shop. Why do you not learn architecture? You perhaps think it is no employment for a woman—that it is an innovation you are not prepared to make. Perhaps you say that women do not employ such means for making a living. In answer to this it may be said that it was a greater innovation when women began to study medicine, yet they have acquired a position in the profession which is greatly to their credit, and which has also benefited the community. I think that architecture is a profession in which women may work to advantage, and in which the peculiar order of talent which you seem to possess could be employed to the greatest advantage. In a class in architectural drawing that I attended years ago in Lowell, Mass., there was a woman. She was very successful in her studies then, and is now earning a competence in the practice of her chosen profession. If she should see this letter she would recognize the writer by the initials and would indorse what he has said. I mention the circumstance for the benefit of the carpenter's sister to whom this is specially addressed, and of all others who may read it, as indicating another channel in which women's work may be utilized to advantage. In conclusion, I desire to say to carpenters' sisters in general that their suggestions are always thankfully received by the best men in the trade, and that their bright wits frequently solve problems which otherwise would remain unsolved.



Wardrobe.--Fig. 6. —Section through Base, Half Size.

Note.—In reference to the above we would remark that it is barely possible that "Shirley Dare" (the *nom de plume* of the carpenter's sister referred to) has a position in life equal to what might be expected to come from following architecture as a profession, and that this will be the best of reasons for her not acting on this correspondent's well-meant suggestion.

Operating a Variety Molder.

From C. M. R., *Wheeling, W. Va.*—The writer was at one time operating a variety molder. Among other jobs to be performed was the "octagoning" of the shaft of some walnut stair balusters. After several were reduced to splinters in my hands, with great risk to my fingers as well as to my life, I hit upon the idea of turning the bit upside down, or, in other words, so that the bevel of the bit should strike the wing first. This experiment proved an entire success, and I never had balusters break afterward.

Fire-Proof Paint.

From E. B. S., *Fullerton, Neb.*—Some time ago there appeared in *Carpentry and Building* a note in regard to a new fire-proof paint recently tested in England. Can any of this paint be procured in the market? If not, can any fire-proof paint of real merit be obtained, and from whom?

Answer.-There is not to be had at present in this market any fire-proof paint which can be recommended except with very well-defined limitations. For weather exposure there is no paint made which can in truth be claimed to be fire-proof. For inside work of factories, stores and other buildings, the fire-proof asbestos paints manufactured by the H. W. Johns Manufacturing Company are recommended. But these paints will not stand weather exposure. If our correspondent will give us some better idea of the use to which he intends to apply the paint concerning which he asks, we can, perhaps, advise him more wisely.

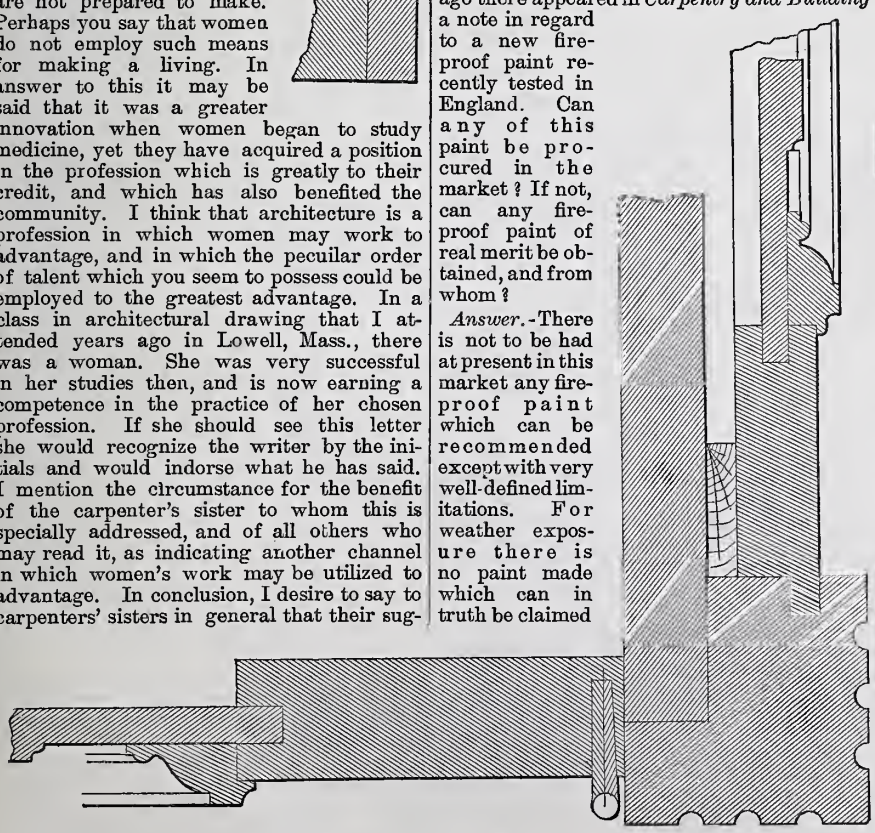
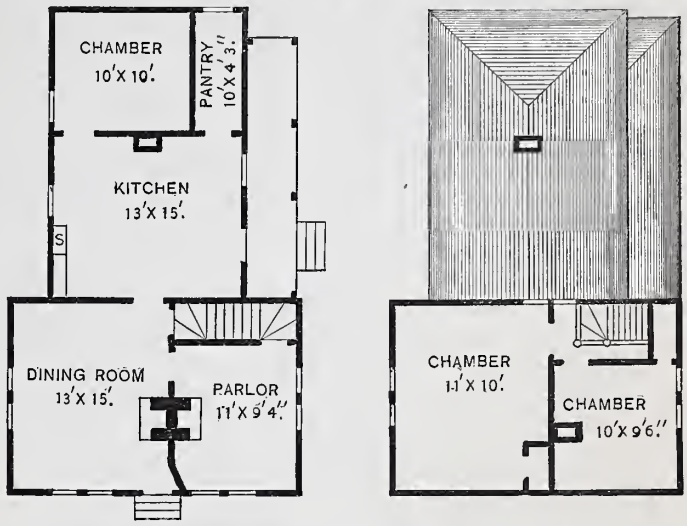


Fig 7.—Horizontal Section through Corner, End Panel and Door, Half Size.

Arrangement of Rooms.

From L. S. A., *Rutland, Vt.*—I take this opportunity of submitting a plan for general inspection in answer to the correspondent, "A. J. R.," who seems to have trouble in arranging the rooms in his house. I do not claim to be an authority on matters of this kind, but I submit the inclosed sketches as showing how I would divide the house under the circumstances named. Referring to other particulars forwarded by your correspondent, I think the building would be improved if the studding was 16 feet long instead of 14. Much better conditions would be afforded by the former size, and the appearance of the building from the outside would be bettered. The plans speak for themselves, so that it is not necessary for me to enter into particulars.



Arrangement of Rooms, Suggested by L. S. A.

Wooden Railroad Bridges.

From W. P. D., *Cleveland, Ohio.*—In the February issue of *Carpentry and Building* a correspondent signing himself "Engineer" presented plans for a wooden railroad bridge, 46 feet clear span, upon which he invited criticism. I expected to see some answers to his invitation in the March number, and was disappointed. I hope the readers of the paper do not all approve of "Engineer's" plans. I, for one, do not, for the following reasons: First, there should be counter braces for the middle panel on each truss, say two pieces, 6 x 6 inches. Second, the end braces are not secured to the chord timbers in a workmanlike manner. Third, the trusses should be braced vertically by extending the floor-beams at the panel points, say 6 feet beyond the trusses, on both sides of the bridge, and bracing from the end of the floor-beam to the top of the truss, in the same general manner as shown in the design submitted by "Bridge" in the same number. Fourth, the chord timbers break joint in the same place, which I consider a bad feature. More especially is this so in the case in point, where the floor-beams rest upon the chord. The chord acts as a loaded beam between panel points, which throws a strain upon the splice bars, which, from their design, they were not calculated to sustain. Another feature to which I object is spiking the rails to longitudinal stringers. This, in my estimation, is a very poor plan wherever it can be avoided; but should it be necessary to employ this plan, as it is in some cases, for example, to gain head-room, there should be a tie-rod put in, say, every 10 feet in order to keep the stringers from spreading when a train is going over the bridge. Another bad thing about laying the rails upon longitudinal stringers is that there can be no guard-rail put on when this construction is employed.

My plan would be to place cross-ties, 7 x 8 inches in section and 9 feet long, upon the stringers, 16 inches from center to center.

Every third tie should be bolted to the stringer by ¾-inch bolts. Every tie should be notched 1 inch over the stringers, and on the ends of the ties guard-rails should be placed made of 6 x 8 inch oak, notched 1 inch over the ties and bolted to every third tie by a ¾-inch bolt.

The design, as a whole, I consider rather bad, and not nearly so good as the plans submitted by "Bridge" for the same span. This latter design commends itself to me as a good one. His plan for securing the main braces to the bottom chord is especially commendable.

Note.—With reference to our correspondent's disappointment in not seeing criticism on the bridge designs published earlier, it is only proper to remark that the crowded condition of our columns makes it necessary sometimes to hold over communications much longer than their writers like to see. We feel it necessary to maintain variety in this department at all times, and should we publish all the letters we receive on any one subject that may be up for discussion as fast as they come to hand, it would result in giving the paper an appearance of discussing one topic, whatever it might be, to the practical exclusion of all others. Our correspondent's letter above published bears date March 26, and its appearance so long after is explained by the above facts.

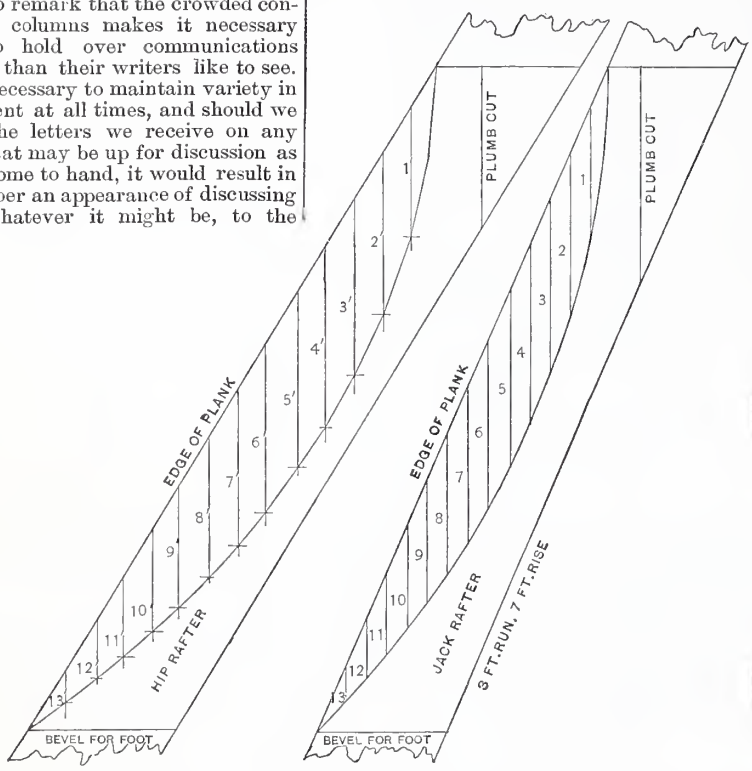


Fig. 1. Fig. 2.

Hip Rafters.—Plan of Obtaining the Profile of Hip Rafters, Suggested by H. T. L.

An Appreciative Subscriber.

From C. H., *Butler, Mo.*—As a publisher can only tell how well he is pleasing his patrons by some form of acknowledgment aside from subscriptions, I desired to refer to the particular features of *Carpentry and Building* that has most interested me, and perhaps given me the most information, viz., the designs submitted in competition for prizes and "Studies in Suburban Architecture." As *Carpentry and Building* is read by readers mostly interested in designing, constructing or building, these features cannot become tiresome, and illustrations of good designs convey ideas and educate the eye in a way that could not be done in any other manner.

Quartered Oak.

From D. M. McC., *Florence, Pa.*—Will you please explain, through *Carpentry and Building*, the meaning of the term "quartered oak," as sometimes given in price lists of building materials?

Answer.—The term "quartered oak" is the same as quarter-sawed oak, and relates to the manner in which planks are cut from a log. As our readers generally understand, lumber as ordinarily manufactured is cut from the log in regular courses after it has been squared on the carriage of the sawmill. Plank produced in this manner are known as bastered sawed, and exhibit various peculiarities, as we have heretofore explained, in the process of shrinking and warping. Quarter-sawing, on the other hand, anticipates cutting the plank from the log radially; in other words, in such a manner that the tendency to shrink and warp will leave the board in much better shape than would otherwise be the case. We have before this fully explained the subject of quarter-sawing, and therefore we trust this brief answer to our correspondent's question will be satisfactory.

Hip Rafters.

From H. T. L., *Ontonagon, Mich.*—According to a promise made some time ago, I send herewith some sketches showing my method of finding the profile of a curved hip rafter. In practice, I find the length and bevels for any common rafters, and also for the hips, the same as though they were to be straight, and lay them out in that way on boards wide enough to make the curve. It is best to have them planed and jointed on the back I then strike the curve of the common rafter. It may be struck with a trammel from one center, as in the sketch, or of any shape that may suit the fancy or conditions of the case. Next I divide the length of the rafter on the jointed edge of the pattern into any number of equal parts and draw the lines, as 1, 2, 3, &c., in the sketch, Fig. 2, on the same bevel as the plumb cut. I proceed in the same manner with the board for the hip rafter, being careful to divide it into the same number of equal parts, and draw the lines parallel with its plumb cut. I find it convenient to number the lines on the patterns the same as I have in the sketch; then, with the dividers or rule I lay off 1′ on the hip equal to 1 on the jack, 2′ = 2, 3′ = 3, &c. I then spring a light staff or edging and draw my line through the points thus obtained. If the work is done correctly the two sides of the roof will meet exactly on that line. It will be readily seen that it makes no difference whether the hip is to be set on a square, hexagon, octagon, or at the angle of any other regular figure, providing run and length are first properly set off. With regard to Fig. 3, I will say that those who have studied geometry will have no trouble in understanding it, and to make it clear to those who have not would take up too much space. I hope that Figs. 2 and 3, will be understood and tested by all who have not a better plan to offer.

Note.—The geometrical method shown in Fig. 3 of our correspondent's sketches is essentially the same in principle as some that have heretofore appeared in our columns, and will be understood at a glance by the majority of our readers. It is interesting in this connection from the fact that it facilitates comparisons between it and the other plan shown.

Cistern Filter.

From C. P. H., *New York.*—For the satisfaction of "J. D. F.," of Granville, Ohio, I would suggest that he construct his cistern of any material so that it shall be watertight. Preferably, the shape should be oblong, although this is not absolutely necessary. It is considered the best, however, on account of the filtering surface presented to the water. However it be arranged, it is important that the cistern itself be first constructed and finished before the parts to be next described are attended to. When the cistern is done, build the filter through the center. It consists of a partition wall 8 inches thick, composed of ordinary building brick laid in water cement. Care must be taken to have the faces of the partition free from the cement. The cement employed should be of the best possible quality; the brick should be carefully laid, with joints broken and placed lengthwise across the line of the partition. An occasional layer of stretchers should be used simply to bind the wall. In laying the lines stretchers of the joints should be carefully broken. After the cistern and the filtering wall are completed, receive the water in one end and draw from the other. The result will be that the water will filter through the bricks in the partition promptly. It will, of course, stand level in the two compartments. A good plan is to have one side of the cistern—that from which the water is drawn—a foot deeper than the other side. This is not necessary, but has advantages. The first section retains all the impurities and foreign matter contained in the water when received. Accordingly, it is necessary occasionally to pump it out and cleanse it, paying special attention to the partition or filter. At such times the filter wall should be scrubbed with a stiff brush until all the slime is removed. The fact that the end of the cistern from which water is drawn is deeper than the one in which the water is

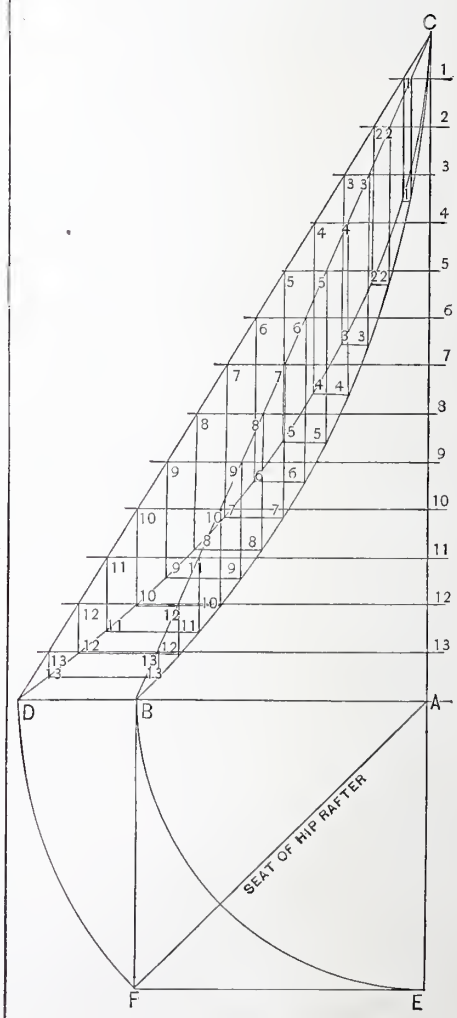


Fig. 3.—Geometrical Method.

first received facilitates such cleaning as is here referred to, and makes it possible to conduct this work without exhausting the entire supply of water. If the main walls of the cistern are built of brick, they should be laid with cement, and the entire inside surface, both of sides and bottom, should be coated with cement; otherwise the filtering process will go on in all directions, resulting in a heavy loss of valuable water. I have had occasion within the past few days to inquire the cost of building a cistern of the general kind here described. It is estimated at $1 per hogshead. I know of a cistern constructed upon this plan that has been in use for upward of 25 years, with entire success.

From H. B., *Paterson, N. J.*—In answer to a correspondent who inquired about the construction of a filter in a cistern, I would say that I have one that is very effective and satisfactory in its operation. It consists simply of a brick wall built through the center of the cistern and carried to the full hight. The brick are laid in cement. The water enters the cistern on one side and seeps through the wall into the other, thus filtering as it passes through the brick.

From C. H. B., *Faola, Kan.*—In the February number of *Carpentry and Building* a correspondent inquired the best method of constructing a filter in a cistern. I have had various kinds of filters to build, but I have never seen more than one that worked in a manner entirely satisfactory. The latter I built in this city, and it has been in use long enough to demonstrate its utility. The cistern in which it was placed was 12 feet 8 inches in diameter and 16 feet deep. A well, 3 feet in diameter, was built directly in the center of the cistern, and was carried within 2 feet of the top of the cistern. The walls of the cistern were cemented in the usual manner and were allowed to dry. After they had become dry the well in the center was built with soft brick, laid in cement. Care was taken to fill all the crevices with cement, so that the water would filter through the soft brick. The pressure of water, of course, was equal on all sides; the log of the pump was inserted in the well above referred to, and the inlet of the pipe from the house threw the water into the cistern proper. The water entered the well simply by filtering through the brick. Managed in this way the water was pure and pleasant to drink.

Old-Time Carpentry.

From A. S. *Thomaston, Me.*—In the April number of *Carpentry and Building*, in the article describing an old church, attention is directed to the increase in size of the posts toward the top. I think if the work in question is examined more closely, there will be found what we used to call a "cock tenon" extending into the tie-beam. The increase in size, accordingly, is not solely for ornamental purposes. The post has two tenons on the top end, one extending into the plate and one into the tie-beam. I have framed a number of barns in that way, and feel sure that I cannot be mistaken in this respect.

REFERRED TO OUR READERS.

"In Wind" or "Out of Wind."

From S. F. G., *Columbia, Pa.*—I have a question that I desire to refer to the practical readers of *Carpentry and Building*. I want to know the correct form of expression to indicate that a door is not in proper shape. For example, after a door has been hung on a true jamb, suppose that it strikes either at the top corner or at the bottom, as the case may be, when it is shut. Is this condition of things properly decribed by the term "in wind" or "out of wind?" I find that both expressions are in use, and it seems fair to suppose that one is correct and the other incorrect. If some of the practical readers of the paper will give me information on this subject I shall be greatly obliged.

TRADE PUBLICATIONS.

Stephen's Patent Vises.

A very neat pamphlet, including illustrations and price lists of the Stephen's patent toggle joint vises, manufactured by Natban Stephen, No. 41 Dey street, New York, is at hand. A general view of one of the vises is given on the first page of the cover, while the second page is devoted to a plan view, with parts broken away so as to show the working elements. The mechanism of this vise is such that by turning the handle to a certain point the sliding bar becomes disengaged, so that it may be moved in or out, as may be desired. When it has been brought very nearly to the point where it is desired to remain, by moving the handle in the opposite direction, the jaws are tightened upon the work. The parts of this vise are made interchangeable, which insures careful fitting and cheap repairs in case of any being necessary. Illustrations of a number of different forms of vises adapted for different purposes from the heaviest to the lightest work are shown, and each is accompanied by a price list. A number of special attachments useful in connection with this vise are also shown, following which are vises adapted to jewelers' work, together with other special tools used by jewelers. Illustrations and price lists of pipe tongs, pipe cutters, machinists' drills, cold chisels, hammers and patent cutting-off tools are also presented.

Band-Saw Blades.

We have received from A. Hammacher & Co., Nos. 209 Bowery and 3 and 5 Rivington street, New York, a price list of French band-saw blades, which in its scope and arrangement has features about it that make it of unusual interest to the trade and all who have occasion to employ band-saws. Heretofore, as catalogues have been commonly arranged, the matter of indicating exactly what kind of band-saw blades were wanted, in placing an order, has been one of considerable perplexity, and expensive mistakes have accordingly grown out of misunderstandings. When it is considered that a well-assorted stock of band-saw blades includes from some 300 sizes and kinds, the difficulty of indicating from a catalogue that is not thoroughly classified just what is required will be at once appreciated. Messrs. Hammacher & Co. have adopted the plan of numbering each description of saw which their catalogue describes, so that in ordering, instead of saying that there is wanted, for example, a "French band-saw blade 19¾ feet long, No. 20 gauge, ½ inch wide, with seven points to the inch," all that is necessary is to say, "Send me No. 40." The catalogue is very carefully arranged throughout, and opposite each number are prices of blades made by Peugeot, Perin and Mongin. No less than 234 regular sizes and kinds are enumerated, while three pages in addition are devoted to memoranda of irregular sizes. The latter are designated by quarter and half numbers. We understand that these irregular blades are enumerated simply for the purpose of disposing of the present stock on hand, and that hereafter the stock carried will be limited to the regular sizes and kinds. Such a catalogue as this is cannot fail to be of advantage to all who have occasion to use band-saw machines.

The Victor Heater.

The Victor Heating Company, of Norwich, Conn., have issued a pamphlet descriptive of the Victor heater, which has a boiler for low-pressure steam heating especially adapted for warming dwelling-houses. Several illustrations of the apparatus appear in this pamphlet, being elevations and sections both vertical and horizontal. The frontispiece is a vertical section through the boiler and the surrounding brickwork, and is done in colors, showing in a very satisfactory manner the special features involved in this apparatus. The first chapter in the pamphlet is an article on steam heating, by Prof. W. P. Trowbridge, being one of two articles which appeared in a recent issue of the *North American Review* entitled "Rival Systems of Heating." Following this is an article from *The Builder* entitled "Steam Heating and Ventilating," and then is presented a description of the Victor, with statements of its advantages and directions for its management. We notice the statement that it has been only a year since the patent of this apparatus was allowed, and yet in this time nearly 200 heaters have been introduced and are now in successful operation through the States of Massachusetts, Rhode Island, Vermont, New York, New Jersey, Pennsylvania, Connecticut, Ohio, Indiana, Illinois and even Minnesota. In the latter State, with the temperature of last winter, of 36 degrees below zero in some cases, this form of heating apparatus, it is said, was entirely satisfactory. A price list, with dimensions in inches, of Victor heaters, together with testimonials from those who have employed them, occupy the latter part of the pamphlet

Slate Mantels.

We have received from Charles B. Kline, No. 420 North Third street, Philadelphia, his revised book of new designs of artistic slate mantels, low-down grates, open fireplaces, &c. There seems to be a growing demand for slate mantels throughout the country at large, and in Philadelphia in particular. The statement is made in the preface to this catalogue that in Philadelphia during 1883 more slate mantels were used than during any previous year, a fact which is relied upon to indicate the worth of these goods and the appreciation of them by the public. In addition to designs of mantels, grates and other goods which this pamphlet contains, a number of testimonials from those who have used the goods with satisfaction are presented. Some designs for tiling are also given.

Cabinet-Makers' Hardware and Tools.

Messrs. A. Hammacher & Co., of No. 209 Bowery and Nos. 3 and 5 Rivington street, New York, have sent us a copy of their new illustrated catalogue and price list of cabinet-makers' hardware and tools. The book is a handsome octavo of no less than 296 pages, handsomely bound in cloth. There are several hundred engravings in it representing locks, casters, wire brads and nails, finishing nails, patent brass upholsterers' tacks, blind butts, double hinges, screen hinges, screw eyes and hooks, wardrobe hooks, door catches, sash locks, sash lifts, bolts, drawer-pulls and brackets, door stops and the various fittings used about tables, bedsteads and other articles of furniture. The latter part of the book is devoted to tools, and contains illustrations and price lists of almost everything that a cabinet-maker or a carpenter would employ, from a bench to the smallest tool that would be packed away in his chest. The catalogue has been specially prepared in the interest of cabinet-makers and upholsterers, and yet on almost every page goods are described which are used by carpenters and builders, especially in country towns, where the lines dividing the mechanical trades are not so sharply drawn as in the large cities. As a work of reference the book is very valuable to all who have occasion to buy any of the numerous articles we have named above. We learn from Messrs. Hammacher & Co. that they have a separate catalogue devoted to tools, and that they are prepared to send any of their books to proposing purchasers on receipt of application. We have also received from the same firm a new edition of their illustrated price list of gold and nickel plated drawer pulls, toilet screws, hat pins, escutcheons, candle holders and other similar goods. It is a pamphlet of some 32 pages, handsomely illustrated and well printed. The goods shown are such as are very generally required in the fitting up of houses of the better class, both in the furniture and in the stationary cabinet work.

Iron and Slate Mantels.

We have received from Fischer, Leaf & Co., Louisville, Ky., a copy of their new catalogue of marbleized iron and slate mantels, grates, ranges, &c. The catalogue is a handsome quarto, and contains a large number of designs of parlor, sitting-room and

chamber mantels, Eastlake grates, Eastlake settings, &c. The statement is made in the catalogue that all of the mantels are constructed for the Brecher patent folding and dumping grate. An illustration of this grate appears on pages 22 and 23 of the catalogue. In the latter case it is shown turned up to receive the summer front. One peculiarity of this grate is the arrangement of the bars which admits air on two sides, thus making it very desirable for burning soft coal; another is the construction whereby it is turned up and fastened preparatory to receiving a summer front, thus saving the necessity of lifting it out and putting it away when not in use. A page is devoted to directions for setting mantels and grates, and this cannot fail to be of interest to all who have work of this kind to do. A number of new designs have been added since the last edition of the catalogue was published. Among these may be mentioned a slate mantel having three shelves instead of the conventional shingle shelf. The shelf may be described as divided in three sections, the middle one of which is raised considerably above the other two, and all three of which are supported on plain brackets. The mantel is shown with Eastlake grate and settings and brass fender.

Terra-Cotta.

One of the recent industries which have been established at Indianapolis, Ind., are the terra-cotta works known as the Indianapolis Terra Cotta Company. They have been in operation scarcely a half year, yet their product is going into buildings in Pittsburgh, St. Louis, Cincinnati and some of the other cities, and is being used throughout many of the smaller towns. The works have been very carefully planned, and are among the largest in the country. The company were organized by the architects of Indianapolis, and were started for the important purpose of supplying a line of goods in accordance with their needs. Their success, so far as volume of business is concerned, was assured from the outset. Great care has been taken in securing help, and the men employed are by no means novices in the business. The superintendent, Mr. Joseph Joiner, had achieved a high reputation in Great Britain as an architect and sculptor before coming to America, and now undertakes work in which he has had long and successful experience. Modelers of established reputation are also employed, and accordingly the work which has been produced has been of a high grade from the outset. Among the prominent buildings upon which it is being employed at the present time may be mentioned the St. Louis Music Hall and Exposition Building. We have received photographs of different parts of this work, all of which has been specially designed, and we also have seen some portions of it in place. It is in every way creditable to a young establishment. We have received from the company their first catalogue, which is unique in its way. It consists of six sheets and the promise of others to follow as often as they are issued. Some very handsome designs and patterns are presented of a character to be found very useful by architects and builders generally. They include crestings, finials, chimney caps, belt courses and diaper tile, all done to a scale of 1 inch to the foot. The catalogue is printed on a paper which at first glance would be called a terra-cotta in color. The ink in which the designs are printed is also of what may be called a terra-cotta color, but somewhat darker than the paper. The effect is pleasing, and serves to indicate the character of the work in a very satisfactory manner.

A bit for drilling square holes has been patented by E. H. Bieber, of New York City. The bit consists of a triangular rod, one end of which may be clamped to a chuck or brace. At the other end it has three radial cutting edges. Upon the plate to be drilled is placed a guide block having a square hole cut out equal to the hole to be drilled into the plate The bit is then passed through the hole, and the cutting edges act on the plate. Each edge of the bit is made to revolve in a corner of the guide hole, while the other two edges slide along its sides. The bit will thereby receive an irregular eccentric motion, and is guided in such a manner as to drill an approximately square hole. The claim of the patentee covers the combination of a three-angular bit with a guide plate having a square hole.

TRADE NOTES.

F. W. Devoe & Co., Fulton and William streets, this city, who are largely concerned in house improvements and decorations, assert that their business seems to have been very little affected by the recent Wall street troubles, except in respect to local patronage. In this city, customers seem to have been crippled in their resources, and are doing much less than usual at this season of the year.

J. C. Henderson, Troy, N. Y., manufacturer of surface-burning furnaces and heaters, notifies the trade that he has removed from his old stand to No. 195 River street. The removal is from one building into the next, and has been made for the purpose of obtaining larger quarters. Mr. Henderson has recently added a schoolhouse heater to his line of goods. This article stands in the room to be heated, not unlike a large stove, but has the advantage of furnishing a current of fresh air continually from the outside, and is well adapted for use in small buildings.

We are indebted to Mr. J. F Baumann, Knoxville, Tenn., for a very handsome pamphlet, entitled "Knoxville, Past, Present and Future." Mr. Baumann has been identified with a number of the more important buildings which have been erected in Knoxville during the past 10 years. He is also well known by his works, scattered through a considerable portion of the States of Tennessee, Georgia and Virginia.

The Eppinger & Russel Creosoting Works, No. 160 Water street, New York, have issued a very neat circular directing the attention of consumers of timber to the indestructibility of creosote timber and calling attention to the company's facilities for doing work of this kind. They have also issued a supplementary statement of a portion of timber and tiles treated at these works for each year from 1879 to 1883, together with testimonials from parties using creosoted timber.

S. Bowan, 150 North Sixth street, Philadelphia, is advertising what he calls "None Such" mortar black, which has the merit of intense blackness, uniformity and fineness, absence of grease and general characteristics which makes it mix readily under all conditions. We understand that this black has been in use for several years among prominent builders and coutractors. Mr. Bowan makes the liberal offer of sending first invoices on approval. In addition to black he furnishes brown and other shades to order.

Bakewell & Mullins, of Salem, Ohio, have just issued new catalogues of galvanized-iron cornices and other house trimmings, and also of pressed zinc ornaments. The hooks are finely gotten up, and are desirable acquisitions to the libraries of builders aud architects generally.

Howell & Clendenning, Covington, Ky., are manufacturing one of the best known rain-water cut-offs now in the market Articles of this kind which are of late coming into very general use were formerly almost unknown, except in rare cases. The advantages attending their use are manifest to all intelligent builders and architects.

J. B. Shannon & Sons, No. 1020 Market street, Philadelphia, have published a condensed price list of building hardware which they are sending free to all applicants.

The Smith & Anthony Stove Company, Nos. 52 and 54 Union street, Boston, are advertising a 52-page book entitled "Our Homes; How to Heat and Ventilate Them." This little work, which has already been reviewed in our columns, contains illustrations of some of the finest residences in the country, with particulars about the system of heating and ventilation which has been employed in them. It is sent free to all applicants.

The American Well Works, Aurora, Ill., offer the "American Advance" wrought-iron mounted windmills, under a guarantee to do more work than others, give perfect satisfaction and stand any wind. They have a very complete catalogue which they send to any address on receipt of 10 cents in stamps for postage.

Mr. John W. Harman, of Boston, Mass., has recently made some important improvements in the telescopic plumbs and levels manufactured by him, and has issued a circular in which is set forth the advantages claimed for these instruments.

STRAY CHIPS.

A brick block, 25 x 67 feet in plan and three stories in hight, is being erected at Elyria, Ohio, for Mr. William Snearer. The cost is placed at $10,000. Mr. A. M. Smith is the architect. Plans have also been prepared by the same gentleman for a frame dwelling for Mr. W. F. Hurlbut that is estimated to cost $6000. The building will be 38 x 60 feet in size and two stories in hight.

A hotel building covering an area of 96 x 125 feet, and three stories in hight, is in progress of erection for the Albuquerque Hotel and Opera House Company, at Alberquerque, New Mex. The materials used are brick, stone and iron. The roof is of metal and the cornice of galvanized iron. The contract price is $75,000. Mr. J. B. Randell, of Albuquerque, is the architect in charge.

The St. Louis Custom House and Post Office is substantially completed and furnished, and is already partly occupied. This building was begun 14 years ago. The first estimate of cost was $1,750,000. The actual cost has been over $6,000,000. The building occupies an entire square, bounded by Olive and Locust streets, between Eighth and Ninth streets. It has a frontage of 248 feet by a depth of 198 feet. The hight from the basement floor to the floor of the dome is 183 feet, and the total hight to the top of the dome is 240 feet.

We understand that the patent sawdust plastering controlled by John A. McConnell, of 119 Water street, Pittsburgh, a notice of which appeared in our columns some time since, has been specified for use in the finish of the new court house now being erected at New Philadelphia, Ohio. The special reason for employing this material in the building referred to seems to have been its elastic properties. It is believed by the inventor, and also by architects who have investigated it, that its elasticity will successfully overcome the tendency to echo in public halls, court rooms and other similar places.

A warehouse building, 38 x 100 feet in size and two stories in hight, is being put up at Santa Fé, New Mex., for Messrs. Z. Staib & Co. The structure is of brick and stone, and will cost $6000. Mr. J. B. Randell, of Albuquerque, is the superintending architect.

A new infirmary is about to be erected adjoining the site of the present structure in Hamilton, Ohio. The building will have a frontage of 146 feet, will be two stories and basement in hight, constructed of brick, with stone trimming The estimate cost is $75,000. D. W. Gibbs & Co., of Toledo, furnished the plans.

The plans have been prepared by Messrs. Ellis & McClure, of Jacksonville, Fla., for a block of stores for the Holmes estate. The structure will be 66 x 80 feet in plan, three stories in hight, built of brick, with artificial stone and iron trimmings. The cost is placed at $10,000.

A frame residence 32 x 52 feet in plan is being erected at Council Bluffs, Iowa, by Mr. E. Ward. The structure will have a slate roof, and will cost $6000. Mr. T. D. Gayle, of Council Bluffs, is the supervising architect.

At Tucson, A. T., a brick county court house and jail is being erected from plans prepared by Mr. A. W. Pattianna, of Oakland, Cal. Mr. J. Hanlen, of Tombstone, is the builder. The cost is estimated at $75,000. An engine house 40 x 60 feet in plan and two stories in hight has just been completed at this place; also, a hose tower 10 x 10 feet in size and 81 feet in hight. The cost of these improvements was $5000.

The Delaware and Hudson Canal Company are erecting a handsome depot on the site of the old American House, in Utica, N. Y. The material used is brick, with Connecticut brown-stone trimmings. The structure is of the Romanesque style of architecture, and will cost about $150,000.

A new fire-proof building is in progress of erection on Nicollet avenue, Minneapolis. Minn., for the Minnesota Loan and Trust Company. The structure is 46 x 120 feet in plan and will be seven stories in hight The distance from the pavement to the apex of the central tower will be 150 feet. The material used in the construction is stone, brick, terra-cotta, colored marble and iron. The front is of fine buff sandstone and Knoxville marble. Iron is used throughout the building and fire-proofed with brick and terra-cotta arches. The partitions are of brick and terra-cotta hollow tile. All sustaining columns of iron are incased in porous terra-cotta and finished with Keen's cement. The stairs are of cast and wrought iron, with nickel-plated rails and trimmings. The building is designed in a style of architecture which combines the Venetian, French and English styles of the Gothic school. The plans were furnished by Messrs. Hodgson & Son, of Minneapolis.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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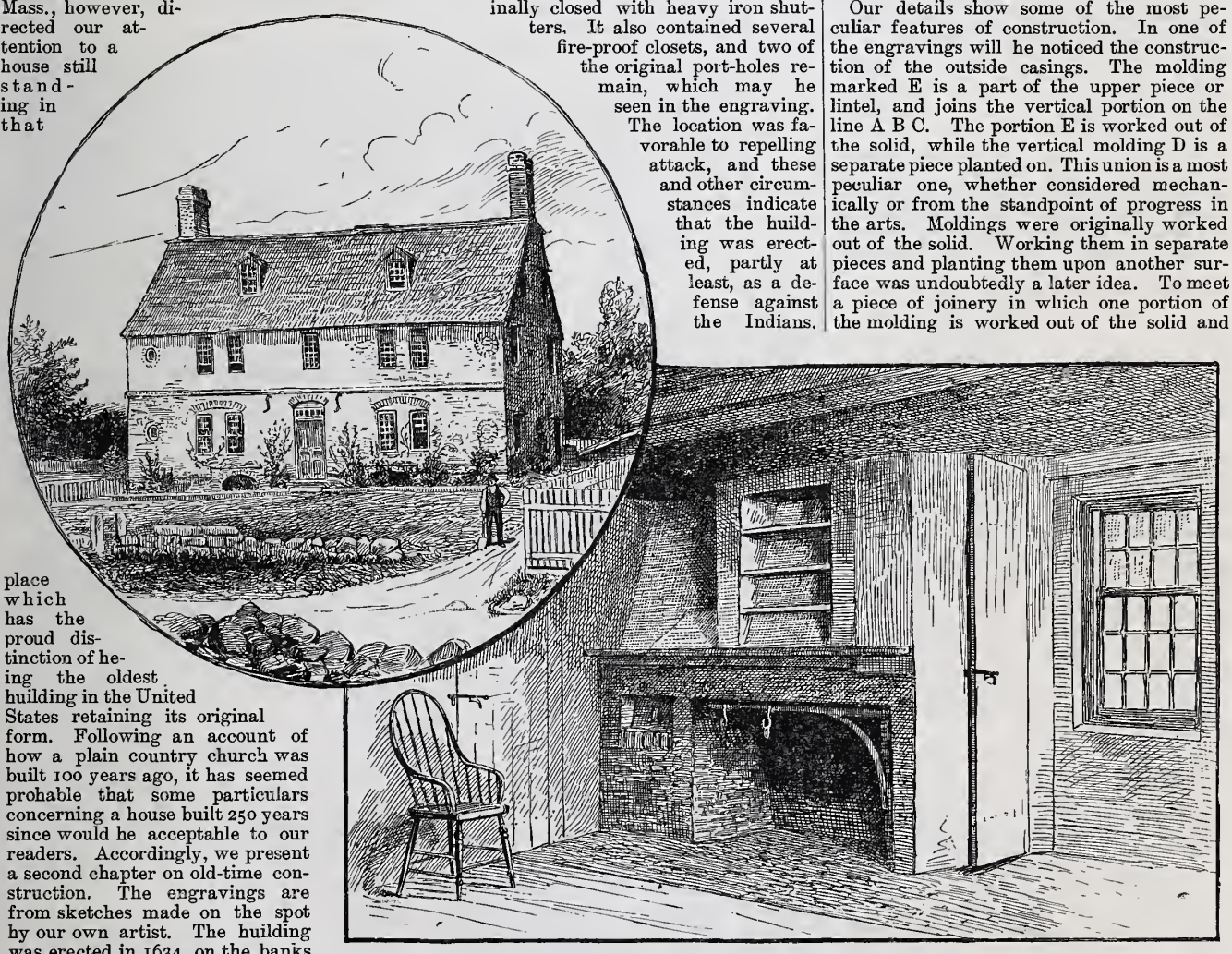
The Oldest House in America.

The description of the old church which appeared in our issue for April last called out a number of letters from our readers, several of which mentioned other old buildings that in the estimation of the writers were equally worthy of attention. Manifestly it would be inexpedient to give space to all that could be offered in this way, however valuable their publication might be, and therefore we have found it necessary to decline, with thanks, the suggestions of several subscribers. A correspondent, writing from Medford, Mass., however, directed our attention to a house still standing in that place which has the proud distinction of being the oldest building in the United States retaining its original form. Following an account of how a plain country church was built 100 years ago, it has seemed probable that some particulars concerning a house built 250 years since would be acceptable to our readers. Accordingly, we present a second chapter on old-time construction. The engravings are from sketches made on the spot by our own artist. The building was erected in 1634, on the banks of the Mystic River, near what is now called Medford. Governor Cradock's colony—otherwise known as the colony of Massachusetts Bay—left England in the latter part of 1629, and landed at different places on the coast between Salem and Boston early in 1630, their vessels having been separated during the latter part of their voyage by storms. Cradock, who had been appointed Governor, was a wealthy London merchant, and did not accompany the colony, but proposed coming later, and the house was built according to his orders, and in a style befitting a person of his means, under the immediate supervision of his agent, Nicholas Davidson. Cradock's death occurred in England shortly after the completion of the house, and the building, which bears the Governor's name, although never occupied by him, was disposed of, in connection with a large tract of land, to other parties.



THE OLDEST HOUSE IN AMERICA.—THE CRADOCK MANSION, MEDFORD, MASS., BUILT IN 1634.

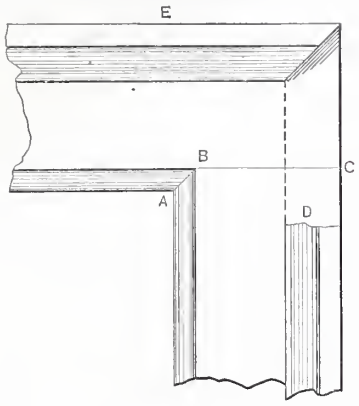
The bricks employed in its construction were burned in the immediate neighborhood, and vary in size—some of them are 8 inches long, while others are 8½; the thickness varies from 2¼ to 2¾ inches, and the width from 4 to 4½ inches. Modern bricklayers would, no doubt, object to bricks varying in size as these do, but the old-time bricklayers, notwithstanding these disadvantages, put up a building which for stability rivals the best modern structures. The walls of the building are very thick, being from 15 to 18 inches, and the windows and doors were originally closed with heavy iron shutters. It also contained several fire-proof closets, and two of the original port-holes remain, which may be seen in the engraving. The location was favorable to repelling attack, and these and other circumstances indicate that the building was erected, partly at least, as a defense against the Indians. Hence it has been called the "Fort" and the "Garrison House."

Were we so disposed we might describe some of the historical events which have occurred in the immediate neighborhood of this building. We will only mention that it was within hearing of the shots fired at Lexington and Concord, and that it might have been seen by Paul Revere in his famous ride, made immortal by Longfellow. It stands in a locality noted for the stirring scenes enacted there during the Revolution, and is a historical monument of the utmost interest to the citizens of America. While in general terms the house is in a fair state of preservation considering its great age, it is out of repair in several important particulars, and long neglect has served to obliterate many features which would be of the utmost interest to builders could they be reproduced and examined at the present day. The building measures 44 x 30 feet. Appearances indicate that some of the original sash and glass still remain in the windows, although successive repairs in this and other particulars make some such points doubtful. The hand of time has manifested itself in the sash as much as in any other place, some portions literally falling to pieces, the corners being entirely gone.

Our details show some of the most peculiar features of construction. In one of the engravings will be noticed the construction of the outside casings. The molding marked E is a part of the upper piece or lintel, and joins the vertical portion on the line A B C. The portion E is worked out of the solid, while the vertical molding D is a separate piece planted on. This union is a most peculiar one, whether considered mechanically or from the standpoint of progress in the arts. Moldings were originally worked out of the solid. Working them in separate pieces and planting them upon another surface was undoubtedly a later idea. To meet a piece of joinery in which one portion of the molding is worked out of the solid and the other is made by planting on is something of a curiosity. Parts of the casings are so weather-beaten that the molding is entirely gone except in the upper corners, where it is more protected than in other places.

The floor between the first and second stories is laid on what would be considered, from the modern builder's point of view, very heavy beams. Their lower surfaces, forming part of the ceiling of the lower story, are finished, and the corners are chamfered and molded, as shown in one of the engravings. Equal care upon the part of the builder is manifested in

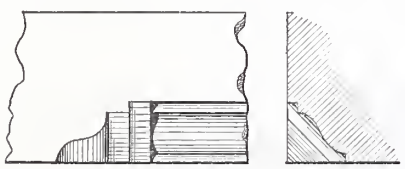
the finish of the under side of the roof timbers seen at A in the sectional view. Whatever may have been the intentions of the builders, this portion of the house shows signs of never having been finished. The main rafters are connected by horizontal timbers, C, which support intermediate



The Oldest House in America.—The Exterior Casings.

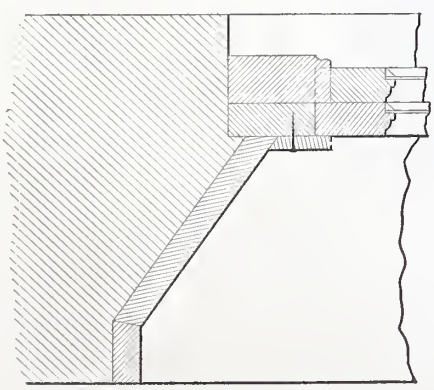
rafters, B. At the bottom of each rafter has been placed the wedge-shaped piece D, which gives the roof that curve so often noticed in buildings of olden times. The shingles are laid upon sheeting boards placed close together, and, although the shingles have been replaced, it is likely that the original sheeting boards remain.

The fireplace, with the old-time oven adjacent thereto, is a conspicuous feature of one of the rooms in the lower story. The quaint corner cupboard which is shown to one side of it in the engraving is suggestive. The cupboard above the fireplace, as well as



Finish of the Under Side of Floor Beams.

the corner cupboard just mentioned, have undergone modification at the hands of those who have occupied the building in modern times. Our sketch shows them in their original form as nearly as can be at present determined. As the size of old chimneys and fireplaces is often a source of remark, it may here be added that the fireplace shown in the interior sketch is just one-half of the entire chimney, this and its duplicate on the other side of the parti-



Horizontal Section of Second Story Window Casing.

tion where the door is shown being one and the same structure.

The introduction of molded brick in modern architecture has led some to believe that ornamental brick are a recent idea. That such is not the case becomes evident upon inspection of the belt course which extends across the front of this building and the base mold which runs entirely around it. Molded brick were employed in both of these positions, and are of the form indicated in the detail drawings. Still other features of design and construction may be noticed by an inspection of the accompanying sketches.

No effort is being made to preserve this historic landmark. At present it is used as a common tenement house. The ravages of time are fast stripping the building of its original features, and from present indications it will not endure many years more. For a century and a half the house stood in an open field and could be approached only by a private road through gates. Its surroundings, however, have undergone great modification in more recent years, caused by street grading and other improvements. Modern buildings have encroached upon its grounds. It stands an "old house," and, though frequently visited by those who feel an interest in it on account of its historical associations, it is greatly neglected, and by some is considered as little short of an eyesore. To the observing mechanic who enjoys studying examples of construction, it is, however, still well worth a visit.

Composition of Zylonite.

The following is a description of the composition and use of zylonite, given by the *Paper World:*

Paper, camphor and alcohol combined and chemically treated make zylonite, and from zylonite, in turn, are made almost numberless kinds of goods which have heretofore been produced from shell, horn, bone, &c. These goods include collars and cuffs, toilet brushes and combs, hair combs and pins, toilet boxes, eyeglass frames, harness rings, glove stretchers, buttons and scores of miscellaneous wares, at once useful and ornamental in both the higher and humbler walks of life.

Belt Course of Molded Brick.

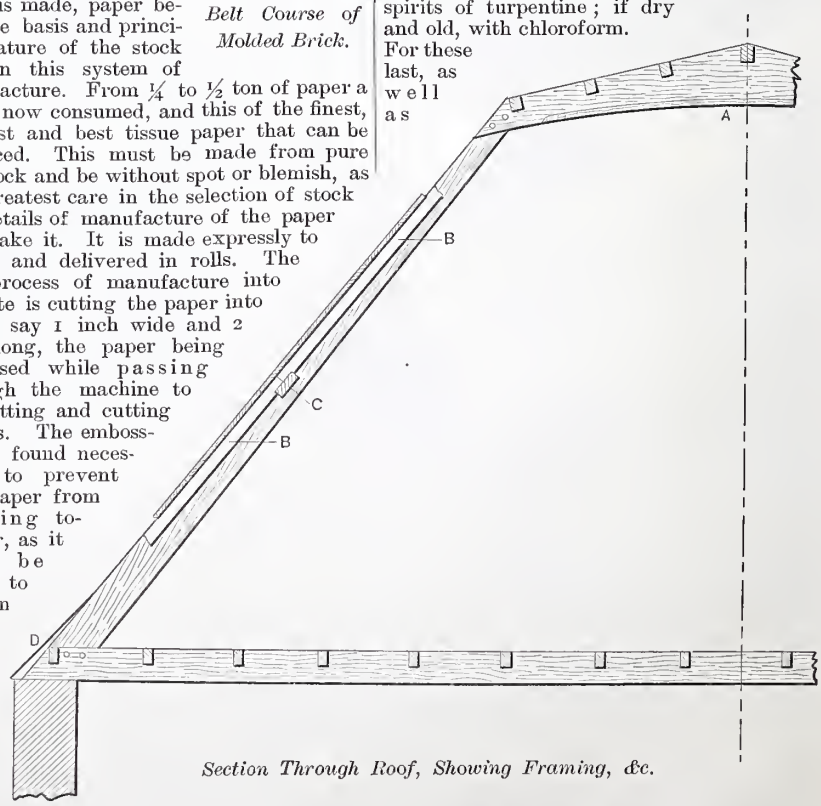
As we said, paper, camphor and alcohol are the materials from which zylonite is made, paper being the basis and principal feature of the stock used in this system of manufacture. From ¼ to ½ ton of paper a day is now consumed, and this of the finest, cleanest and best tissue paper that can be produced. This must be made from pure rag stock and be without spot or blemish, as the greatest care in the selection of stock and details of manufacture of the paper can make it. It is made expressly to order, and delivered in rolls. The first process of manufacture into zylonite is cutting the paper into strips, say 1 inch wide and 2 feet long, the paper being embossed while passing through the machine to the slitting and cutting knives. The embossing is found necessary to prevent the paper from matting together, as it would be liable to do if in sheets, in the process of manufacture. The paper strips are placed in iron vessels, strong acids are applied, and the paper again resolved into pulp. Then by processes peculiar to the company follow the introduction and combination of camphor and alcohol to the pulp, making the preparation insoluble. At this stage the mass partakes of the nature of cellulose, when coloring matter is introduced, and the combined preparation is passed between heavy and highly polished rollers. It is then molded into slabs of some 4 or 5 feet in length, about 2 feet in width and 3 or 4 inches in thickness.

After a certain length of time, and when in proper condition, the slabs are placed on the bed of a machine in which they are shaved to any desired thickness. At this stage of the manufacture the shaved slabs are as clear as crystal, presenting nothing to the eye in looking through them but the shade of color which may have been added at the proper time. These sheets are changed into rolls or rings and made ready for transforming into the various articles of manufacture.

Base Course or Water Table of Molded Brick.

The plans for the Mobile Cotton Exchange have been completed, and the structure promises to be something handsome. The plans show a three-story brick and tiled building of Flemish *Renaissance* architecture. The first story will have an elevation of 20 feet, and the second and third 14 feet each. The top of the building will be ornamented with gables and towers, and in the principal tower there will be placed a clock. Emblems of the cotton trade will be displayed over the main entrances. The arches over the windows will be ornamented with terra-cotta moldings in high relief. The frieze dividing the stories will be decorated with a tiling in relief, and will add greatly to the appearance of the building. The exchange will be erected on the northwest corner of Commerce and St. Francis streets

Stains of oil-paint may be removed with bisulphide of carbon; many by means of spirits of turpentine; if dry and old, with chloroform. For these last, as well as for tar spots, the best way is to cover them with olive oil or butter. When the paint is softened, the whole may be removed by treatment, first, with spirits of turpentine, then with benzine.



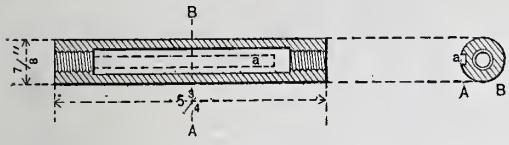
Section Through Roof, Showing Framing, &c.

Construction of a Cheap Lathe.—VI.

MANDREL DETAILS.

(Continued from page 97.)

For the poppet mandrel (Fig. 37) get a piece of thick ⅝-inch wrought-iron tubing, 6 inches long and not less than $1\frac{5}{16}$ diameter outside—what is known in the trade as "hydraulic pipe"—and instruct the smith to weld a short bit of ⅝-inch bar, about ¾ inch long, into each open end, in which to cut the necessary threads for the traversing screw and the dead center. In a small mandrel this is a readier method than drilling up a solid piece of metal and fitting in a nut for the back-screw. When welded, center-pop the ends, chuck in the dead centers with carrier, and turn to a sliding fit with the bore of the poppet-head. Remove the poppet center, replace with the cone-plate, and drill at one end a ⅜-inch tapping hole for the dead center; then, rechucking, drill at the end



Construction of a Cheap Lathe—Fig. 37.—The Poppet Mandrel.

opposite a ½-inch tapping hole for the traversing screw. Remove from lathe and cut the screws. Make a slot in the mandrel 4 inches long by ¼ inch wide by $\frac{1}{16}$ inch deep (Fig. 37, *a*, *a*) for the tightening screw. To cut the slot, get a cold chisel ¼ inch wide, keep it sharp, and chip as near to size as possible, just cleaning a little with the point of a file afterward; but the revolving cutter of a slotting machine, if at our service, would almost run it out while we were talking about it

For the traversing screw, get a piece of ½-inch rod 5¾ inches long; have a collar 1¼

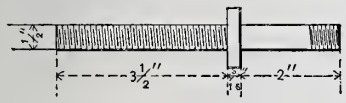


Fig. 38.—The Traversing Screw.

inches diameter by ¼ inch thick, welded on at a distance of 3½ inches from one end. Turn in lathe to dimensions (Fig. 38), trying the collar in the corresponding recess in the poppet to get an easy fit, and keeping it just a shade thinner than its recess is deep, so that it may not run tightly when the back-plate is screwed on. The screw may then be cut either in the lathe or with stock and dies. If the latter are used, care should be taken to keep the stock square with the axis of the traversing screw.

For the back-plate (Fig. 39) make a disk of wrought iron or brass, 1⅞ inches diameter by ¼ inch thick; drill a ½-inch hole through its center, and three holes in a diameter of 1¼ inches to take three small $\frac{3}{16}$-inch screws. Slip this over the end of the traversing screw, thrust the screw collar into

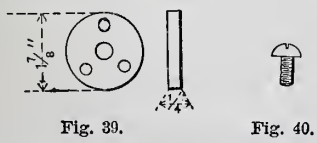


Fig. 39. Fig. 40.

Back-Plate and Screw.

its recess in the poppet, and mark three holes with a scriber point on the back of the poppet, corresponding with those just drilled in the plate. Center-pop, drill ½ inch deep, and tap these three poppet holes with any convenient tap about $\frac{3}{16}$ inch in diameter. If you have a screw-plate, one of the taper taps of the set will do for entering, and you can either make, or get a fitter friend to make for you, a stump tap cut with the same thread to finish with. Get some lock screws, mushroom-headed, such as carpenters use, cut them off ⅝ inch from the bottom of the head and screw with plate, so that they will fit the tapped holes (Fig. 40). Now, bore the hand-wheel to ½ inch, slip the disk over the end of the traversing screw, then the hand-wheel against the disk, followed by a tightening nut. Then drill a $\frac{3}{16}$-inch hole through boss of wheel and spindle, and drive in a bit of steel wire, or, neater still, tap a $\frac{3}{16}$-inch set-screw through one side of the boss into the spindle (Fig. 41). For the dead center get a piece of ¾-inch steel, and turn down to dimensions as shown (Fig. 42). The part A simply indicates a surplus length for the attachment of the carrier, and is cut off on removal from the lathe. Screw with ⅜-inch dies, chuck in a block of hardwood, and file the center to a nice point in the lathe, giving it afterward to the smith to harden. Make a set-screw to dimensions (Fig. 43) for tightening the mandrel. Put in the mandrel, make the traversing screw take into it, screw the back-plate in place, also the hand-wheel and tightening nut, and run the mandrel backward and forward with oil several times till it goes easily. The poppet now in section has the appearance of Fig. 44. Have a small forging made for the tightening screw of the rest (Fig. 45). Let the looped portion be forged solid, and drill a ¾-inch hole through it. Cut the ½-inch thread and drill and tap similarly the boss on the rest socket.

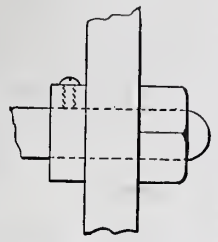


Fig. 41.—Adjusting the Hand-Wheel.

(To be continued.)

Slate-Making in Pennsylvania.

The Chapmansville Quarries, in Northampton County, were opened in 1850, the first one being worked on a small scale in 1864. Here are located, states the Easton correspondent of a daily paper, the Chapman and New York Slate Manufacturing Company, the Fischer Slate Company, and the Edelman Quarry. The quarry of the Chapman Company is a hole over 1000 feet long, 300 feet wide and 225 feet deep. It is called a flat rock quarry—the split of the slate inclining to the south at an angle of about 10°. The removal of the top is an

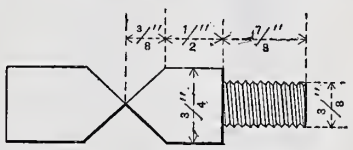


Fig. 42.—The Dead Center.

item of considerable expense, varying with the location. When the top has been taken away a natural joint in the slate is sought, and if not readily found a hole is drilled and a blast made. The slate rock is split into blocks which are hoisted by means of derricks to the surface, when they are landed on trucks and moved along a track to the shanties where they are split.

The splitter, with his mallet and broad steel chisels, sits on a block, and, taking a slab of slate between his legs, drives in his chisel a little way at one end. He moves it a little with a firm, gentle pressure, and one can see the split begin to start as straight as a die. He repeats the operation at the other end. Then he drives his chisel in the middle and easily pries the slab in halves. The split pieces are split and split again until they are of the required thickness. As fast as they are split a man who stands by the splitter takes the slates and runs them through the dressing machine. This is a cast-iron form set on five legs, with a steel extension piece or arm about 4 feet long. Suspended over this is a steel knife which is attached to a spiral steel spring and worked by the foot of the dresser. A gauge board guides his eye, and he puts his slato against it, presses his foot on the treadle, and down comes the knife, cutting the edge clean and straight. He makes the four edges straight, and lays the slate in piles according to size. Just as fast as his foot can work a good dresser keeps his machine going. The splitter and dresser work together, and are paid according to the quantity they turn out.

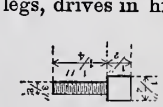


Fig. 43.—Set-Screw for Tightening the Mandrel.

Diamond saws having a reciprocating motion and making 140 strokes per minute are also used. They cut only one way, being lifted by a cam for the return stroke. A constant stream of water clears the teeth of slate dust. The planers are similar to those used for planing iron, the polishing-bed being of cast iron, 14 feet in diameter, and making 30 revolutions per minute. A curious feature about the place is that the factory, engine-house, smoke-stack, and many of the houses, are built of slate blocks. There is a great demand for all kinds of labor in the whole

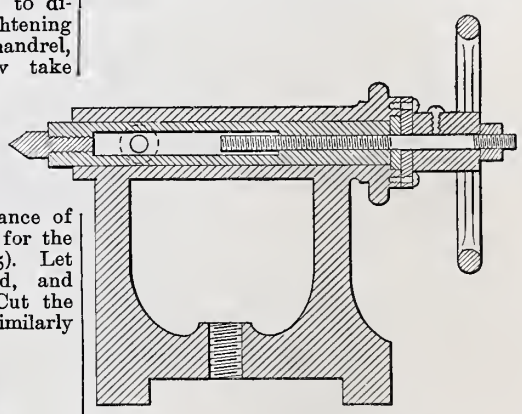


Fig. 44.—Appearance of Poppet as Now Completed.

region. Ordinary day laborers earn from $1 to $1.35 per day, and often more, according to the exigencies of the occasion. Carpenters earn $2.25 to $3.25. Bricklayers find work, but most new buildings are frame. Machinists are sought after daily, and make good terms, because practical men to work at the opening of new quarries and the erection of machinery are scarce. Slaters (splitters and dressers) earn from $2.50 to $4 and $4.50 per day by the piece. Quarrymen can always find employment.

How to Build Healthy Houses.

In all compactly built towns, says the *Real Estate Record*, but particularly in our larger Western and Southern cities, the air on the plane of the second or third stories of ordinary dwellings is more agreeable and healthy than that in the basement or ground floors. Where yellow fever prevails it is recommended by physicians to sleep and live as much as possible in elevated apartments. The air held within an area of crowded buildings, being obstructed as to its natural average motion by walls and fences, is prevented from a free ventilation, and is stagnated in streets, yards, alleys and courts to every degree of closeness. There is no chance for a free surface ventilation, and during close weather in such situations for many days at a time the air which is retained is but little changed.

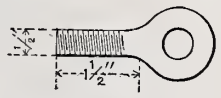


Fig. 45.—Forging for the Tightening Screw of the Rest.

It is to be regretted that our knowledge concerning the emanations of gases and air from the crust of the earth is not more certain. That the earth does perform a function somewhat analogous to human respiration is most probable—that is, the air penetrates the soil and water to a certain depth, is there changed, as in the animal

lungs, and is again exhaled or expired through the pores of the earth or water. How much the expired air is changed in different situations is always a subject for scientific inquiry. It is reasonable to suppose that such atmospheric changes may be excited into action by laws similar to those which govern the motions of the air at different temperatures. Whatever may be the causes which originate, or the laws which govern, terrene emanations, their existence cannot be questioned. In alluvial soils cellars are damper and more unpleasant than in primal formations, and obtain and retain an air which gives life to molds and various air plants.

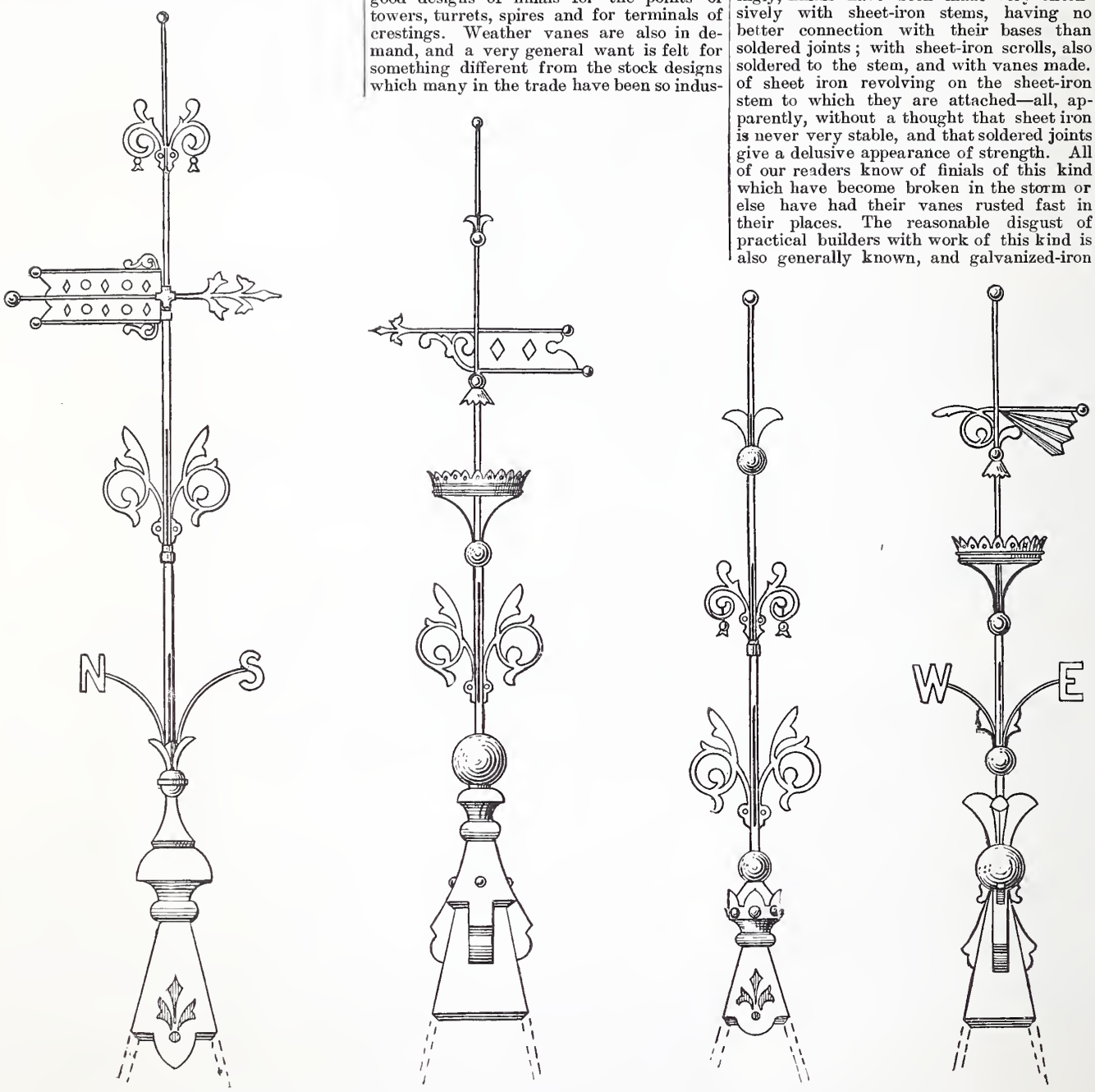
Now, instead of springing the houses out of the ground in such situations by digging cellars, and continuing the communications with the houses above by solid walls, it is suggested to build arches as the foundations for the houses, so that a stratum of air may be interposed between the interior of the dwellings and the earth. What advantages may be expected by such a change from the present style of building? As already said, surface ventilation of the air would be one prominent advantage. Cleanliness, surface drainage, convenience in city life, an abatement of certain nuisances, and consequent increased healthfulness, would be other advantages. It is not necessary to enumerate all the machinery which can now be so easily procured for carrying out the details of this desirable object. It is well known that such appliances are now at hand. Substitutes for cellars are being invented and put on the market; manufactories for asphalite and artificial stone are being established; convenient receptacles for holding the refuse and effete matters of a family are already made, so that such refuse can readily be transported to a distance without odor. Indeed, every detail for carrying out the conveniences for this principle of arch-building can now be obtained at moderate expense for even the large cities.

Finials and Vanes.

Almost every architect and builder at one time and another experiences the need of good designs of finials for the points of towers, turrets, spires and for terminals of crestings. Weather vanes are also in demand, and a very general want is felt for something different from the stock designs which many in the trade have been so industriously manufacturing and selling for years past. In a recent issue of *The Metal Worker* there was presented a number of new designs of finials and vanes manufactured by Shriver, Weatherly & Co., of Grand Rapids, Mich. We present a portion of them herewith. They are composed of wrought and cast parts, with sheet-metal trimmings. Commenting upon them, our contemporary says:

It is hardly necessary for us to say that the designs are happily chosen and well executed. Indeed, it has seldom been our opportunity to inspect as fine a set of designs for the purpose The engravings show their characteristic features so clearly that extended description is rendered unnecessary. It may be observed, however, in passing, that the elements of the designs are comparatively few, and that an interchangeability of parts runs through the lot to a considerable extent. As two finials are seldom placed near enough together on buildings to admit of close comparison, this is no objection, while, on the other hand, this feature cheapens manufacture and makes a large assortment possible with comparatively few parts to be carried in stock.

One great mistake which has been made by cornice-workers has been the flimsy character given to the finials which they have employed. Because their business is sheet-metal working it has seemed that they could use nothing but sheet metal, regardless of position or actual requirements. Accordingly, finials have been made very extensively with sheet-iron stems, having no better connection with their bases than soldered joints; with sheet-iron scrolls, also soldered to the stem, and with vanes made of sheet iron revolving on the sheet-iron stem to which they are attached—all, apparently, without a thought that sheet iron is never very stable, and that soldered joints give a delusive appearance of strength. All of our readers know of finials of this kind which have become broken in the storm or else have had their vanes rusted fast in their places. The reasonable disgust of practical builders with work of this kind is also generally known, and galvanized-iron work has been discriminated against in many cases solely on this account. Cut and soldered crestings have been extensively used, and have, likewise, brought reproach upon the industry. The finials and crestings which have been in the market in the hands of the weather-vane and emblematic-sign trade have never been entirely satisfactory for use with galvanized-iron work, because there was seldom any harmony between them and other parts of the finish, and also because they were so constructed as to make it somewhat difficult to unite sheet-metal work to them, as it is almost always necessary to do in making a finish. The need, therefore, has existed for the cornice trade to get up such finials as are perfectly adapted



Designs of Finials and Weather Vanes Manufactured by Shriver, Weatherly & Co., Grand Rapids, Mich.

to their requirements, and, at the same time, are not open to the objections to which we have alluded. The problem thus presented is being gradually solved, and the general average of work of this kind as now sent out is far superior to that which was formerly in vogue. The finials shown on this and the opposite page, as we have already stated, are among the best we have seen, when viewed from the standpoint of good design, combined with thorough construction and adaptability to use in connection with sheet-metal work.

Making Artificial Ivory.

A French paper gives the following description of a new process for making artificial ivory from the bones of sheep and goats and the waste of white skins, such as kid, deer, &c. The bones are macerated for 10 or 15 hours in a solution of chloride of lime, and after washed in clean water and allowed to dry. Then they are put with all the scraps of hide, &c., into a specially-constructed boiler and dissolved by steam, so as to form a fluid mass, to which is added 2½ per cent. of alum. The foam is skimmed off as it rises until the mass is clear and transparent. Any convenient coloring material is then added, and while the mass is still warm it is strained through cloth of appropriate coarseness and received in a cooler, and allowed to cool until it has acquired a certain consistence, so that it can be spread out on a canvas without passing through it. It is dried on frames in the air, and forms sheets of convenient thickness. It is then necessary to harden it, which is accomplished by keeping it for 8 or 10 hours in an alum bath that has not been used before. The quantity of alum necessary for this operation amounts to 50 per cent. by weight of the gelatine sheets. When they have acquired sufficient hardness they are washed in cold water and let dry on frames, as at first. This material works more easily and takes as fine a polish as real ivory.

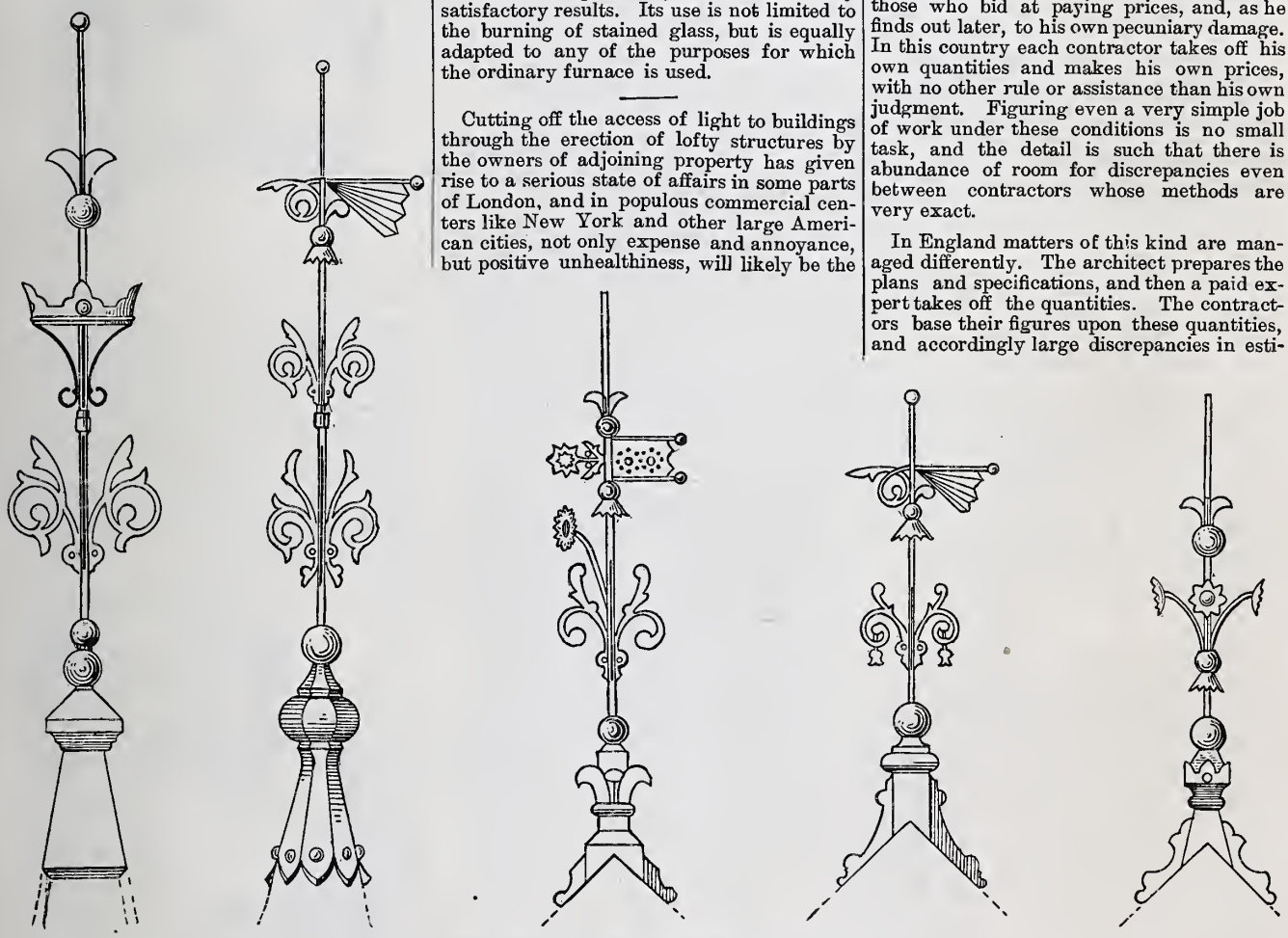
NOTES AND COMMENTS.

Ever since its origin the manufacturers of stained glass have experienced great annoyance and no small pecuniary loss by the breaking of the glass in the process of "firing." The delays caused by these breakages have been vexatious alike to the manufacturer and the purchaser, and consequently any decided improvement over the old method would have been regarded with the greatest satisfaction by those in interest. It was not until about three years ago, however, that the Thompson Brothers, of Leeds, England, perfected their patent gas kiln, which not only does the work in a better manner and in a shorter space of time than the common furnace, but, what is of more importance, insures a greater degree of safety to the glass from breakage. Although largely used in England, and by such prominent art establishments as Tiffany's, La Farge and J. R. Lamb & Co., in New York, this improved kiln was not introduced in this city until quite recently, when the George H. Gibson Stained Glass Works put one in as an experiment, and with eminently satisfactory results. Its use is not limited to the burning of stained glass, but is equally adapted to any of the purposes for which the ordinary furnace is used.

Cutting off the access of light to buildings through the erection of lofty structures by the owners of adjoining property has given rise to a serious state of affairs in some parts of London, and in populous commercial centers like New York and other large American cities, not only expense and annoyance, but positive unhealthiness, will likely be the result in course of time of making lofty structures shut out sunlight from residences and places of business. In order to obtain with some accuracy the proportion of light lost by a proposed obstruction, the *Building News* says: "The most scientific mode of arriving at the loss is by regarding the luminous sky as seen from the window as a quarter sphere, and dividing it horizontally and vertically by parallels of latitude and longitude, giving to each portion intercepted its relative power of lighting. Of course those portions of the sky surface to the extreme right and left are of less value than those immediately opposite to it. It is assumed rather wrongly that every unit of sky surface emits an equal amount of light. A table of the relative value of light so entering a window vertically placed is founded upon this assumption, and it is easy to find by angular measurements the portions of the sphere cut off or obscured by an addition to a building on the opposite side of the street." The general use of incandescent electric lighting in darkened rooms and greater attention to the drainage and cleanliness of houses and streets will do much to promote a good sanitary condition, notwithstanding diminished daylight.

The vast discrepancies in bids upon building work in this country are the subject of frequent remark. Very great differences occur not only in the figures of the principal contractors who estimate on entire jobs, but also among the sub-contractors who consider only such parts as pertain to the irrespective specialties. Various explanations of these discrepancies in bidding have been offered from time to time by those who have discussed the subject, but nothing has been accomplished that seems likely to insure more uniformity in matters of this kind. The fact that work generally is let to the lowest bidder causes a very considerable part of all of the building work in the country to be performed without profit. At almost every letting there is some one who, either through mistake or ignorance, puts in surprisingly low figures, and very frequently he receives the contract, to the disgust of those who bid at paying prices, and, as he finds out later, to his own pecuniary damage. In this country each contractor takes off his own quantities and makes his own prices, with no other rule or assistance than his own judgment. Figuring even a very simple job of work under these conditions is no small task, and the detail is such that there is abundance of room for discrepancies even between contractors whose methods are very exact.

In England matters of this kind are managed differently. The architect prepares the plans and specifications, and then a paid expert takes off the quantities. The contractors base their figures upon these quantities, and accordingly large discrepancies in estimates are less common there than with us. By this plan estimating is reduced to a definite system, and the work of different estimators can be intelligently compared—a condition of affairs that is always desirable. Various manuals calculated to assist in the work of estimating have also been compiled and are published in annual, semi-annual and quarterly editions. These books contain prices of materials and cost of labor for performing certain works, according to the state of the markets at the time they are issued, and to all who have not had long and varied experience they prove of great assistance. The publication of such volumes in this country, with the unsettled ideas which at present exist among our builders, would be an impossibility, but perhaps we shall reach a more desirable state in this respect in the future. As indicating the range of bids upon a typical job of work in England we append a list of the proposals, as published in one of the English architectural journals, for building what was called Conference Hall, at Strat-



Designs of Finials and Weather Vanes Manufactured by Shriver, Weatherly & Co., Grand Rapids, Mich.

ford. The figures given are pounds sterling. They can be converted into United States money for comparison by considering a pound equal to $5. It will be seen that the highest bid was something over $32,000, while the lowest was somewhat under $27,000. Between these extremes were 16 other proposals, the whole list showing remarkably small variations. We venture the assertion that few jobs of work let in this country on which 18 proposals are received ever show as small differences between bidders as in this case, which, from our own observation, we believe is in no respect exceptional. The list referred to is as follows:

L. H. & R. Roberts	£6,419
Williams & Son	6,269
Hobbs	6,230
Woodward	6,000
Shurmur	5,994
Arnaud & Son	5,985
Reason	5,954
Atherton & Latta	5,885
Wall Brothers	5,825
Reed	5,775
Conder	5,760
North Brothers	5,700
Morter	5,690
Holland	5,650
Greagar	5,600
Hearle & Son	5,585
Martin, Wells & Co	5,400
Holloway (accepted)	5,375

The article in our last issue entitled "An English Fireplace," and which illustrated a typical piece of English design and construction, has not passed without criticism from our readers. We anticipated this at the time we penned our brief introduction to the extract from the exchange to which we were indebted for the design. Among the letters which we have received relating to this design is one from Messrs. Edwin A. Jackson & Bro., of this city, which is printed in another column. It is the only one for which we can find space in this number. Messrs. Jackson & Bro. are well known to our readers as manufacturers of a successful heat-saving and ventilating grate. They have in the course of their business given close attention to all matters connected with heating and ventilation by means of grates, and this alone should entitle their remarks to more than passing attention. They refer to points which are of vital importance in grate-work, and direct the attention of architects to a subject that is very often dismissed without sufficient consideration. We have no doubt our readers will peruse their criticisms and suggestions with interest and profit.

The good quality of Roman mortar has been proverbial for centuries, and it is believed that the processes now followed in its preparation are identical with those in use by Italian masons 2000 years ago. The custom among Italian masons is, in beginning work on a new building, to dig first a pit large enough to contain all the mortar required for the work, into which is put lime enough to fill it within a foot or two of the top. Water is then poured in until the pit is filled, and the mixture is left to itself, care being taken only to add water as that first put in is evaporated or absorbed. As mortar is wanted, a portion of the lime is taken from the top of the mass, but the lower portion, which will be used to mix with the plastering mortar, remains undisturbed, and acquires a smooth, pasty quality much prized by the Italian architects. The mortar thus produced never swells nor cracks, nor gives out those disfiguring efflorescences so common in this country. With lime treated in this way work can be accomplished which would be impossible with such materials as we employ.

Various newspaper items have been in circulation of late to the effect that imitations of valuable lumber can now be made that so closely correspond with the genuine material that its true character often defies the scrutiny of experts. The following particulars with reference to manufacture of this kind are at hand: The process consists essentially of subjecting the cheaper woods to heat, inclosed in hermatically-sealed retorts, supplied with a regulator to admit air. The retort and contents are now subjected to heat, the extent and prolongation of which regulates the color of the woods. For example, if ebony is desired, the process is carried sufficiently far to char the surface, no air being allowed to enter. If waluut, not so much heat is required, but a longer time, with but little air. When rosewood or mahogany is desired, the lumber is mixed with refuse tan-bark and subjected to distillation; the volatile matter is condensed and used instead of the refuse tan-bark in this process in producing imitation of other woods by the same process. In this day and age of achievement it is not safe to dispute anything. While we have very little confidence in the efficiency of the method above described, we are not prepared to deny it. We shall be glad to watch this subject, and lay further particulars before our readers as we may have opportunity.

House Building.

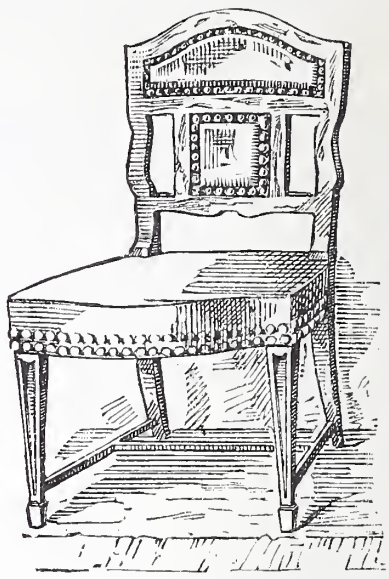
The following lines on the pleasures of house-building and the cost thereof are none the less a true picture because they are written in the Lancashire dialect. Their very quaintness makes them interesting. They are taken from one of a series of poetical sketches, entitled "Nathan Barlow; Sketches in the Retired Life of a Lancashire Butcher":

"If e'er aw spend a hawp'ny more o' brass
I' brick an' mortar stuff afore it's built,
Aw'll suffer like a fatted cawf't be kilt.
'An honest mon's the noblest work o' God'—
So th' poet says—but dostno think it's odd
He's med so few o' th' sort, and those he's med
By th' most o' folk are reckon'd soft i' th' yead?
Aw've seed sich wark, aw'm fain to think it's true,
As th' actor said, 'at 'honesty's a foo'.'
* * * * * *
They say there's good and bad i' every line;
There happen is; I know there is i' mine.
If God's med auy honest builders, though,
There seems a deal o' mystery wheer they go.
It seems to me they'n getten lost or strayed.
For aw've ne'er come across one yet i' th' trade.
They'n happen bin bowt up like th' China ware
'At's scrambled for becos it's owd an' rare.
Aw think it mun be so, for if aw see 'em,
It's likely t' be as mummies i' th' museum.
Sin 'aw jack'd th' contract up, an' paid mysel',
They'n been like devils letten loose fro' hell.
There's howdfasts, nails, and screws, if aw've bowt one,
Aw'll lay my life aw've welly bowt a ton;
That plasterer's had as mony bags o' hair
As met ha' plastered six i' stead o' th' pair.
It is no pounds they'n done me on, bu' scores;
That joiner bit me gradely wi' them doors;
They're hung on hinges med to tak three screws,
An' th' dirty wastrel's nobbut put in twos.
An' as for mowlding'—nay, theau needno smile—
If he's had inches, he's had mony a mile.
Some stales your timber, some your lead, or lime;
But th' plumber licks 'em at fudgin' time.
He'll put his pot on th' fire to melt his lead,
An' let it stop till th' handle's welly red;
An' then he'll snatch it off—too hot to howd—
An' let it stand to cool it—till it's cowd;
An' then he'll put it on again, an' when
He's look'd o'er th' papper, taks it off again;
An' then he'll potter wi' it on to th' roof,
Bu' what he does theer nob'dy has no proof,
An' th' gaffer doesno care how lung he stays,
As lung's he charges th' time an' someb'dy pays.
* * * * * *
What aw've bin done on i' my gizzard sticks,
An' th' weight of a' my trespass upo' th' law
Feels asier nor my losses i' my craw.
Now th' on'y grain o' comfort aw con land
Is t' think at th' start aw'd had a bit i' hand."

Some Library Chairs.

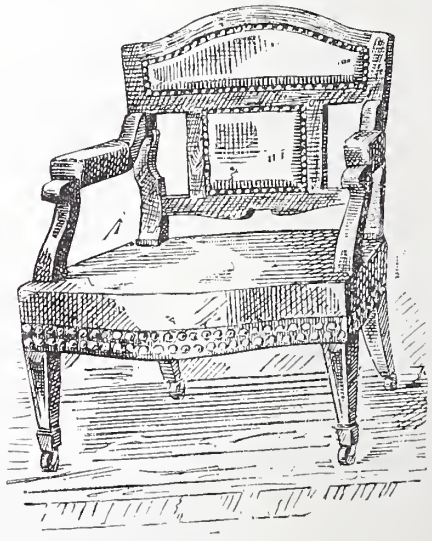
It is the fashion nowadays to have special designs for the chairs and other furniture of each apartment in a well-appointed house. Cabinet-makers, both professional and amateur, frequently have the opportunity of making work of this kind, and, therefore, the designs of two chairs and details of construction presented herewith will be very likely to be serviceable to many of our readers. The chairs shown are suitable for a library or study, and may be described as a small chair and a gent's study chair to match. These are intended to be upholstered in leather, and studded round with brass-headed nails, and the stuffing in the back is so divided into two pads that the top one fits the shoulders and the lower one supports the middle of the back. The arms of the easy chair are comfortably high, and recede some distance, so as to be out of the way of the sitter's legs, while the seat is sufficiently high for reading and writing purposes. Almost any wood will be suitable for these chairs. Dark mahogany or walnut should work out well, and the chairs, if covered in dark green leather and bright studs, would make up effectively.

Referring to the small chair, the details of which is 1-inch scale, care should be taken not to give too much weight. The back feet will require 2-inch stuff. Front feet should finish 2 inches at framing. The top, also the top splat, must be sufficiently wide on the face to allow rebate, as also the balusters. The top part of bottom splat and the inside of the back feet in the top stuffing panel must be fitted with stuffing pieces, which should be show wood for polishing, and to give the necessary "hand lift" to the top. Underframing 1¼ x ⅝. Top



Some Library Chairs.—The Small Chair.

splats and balusters, edge thicknesses, 1⅛ inch. The front feet should be squared, gauged and mortised before tapering, to insure accuracy for the lower framing. The back may be flat, but will be all the better, both as regards appearance and comfort, for a little sweep. In making the back, frame the balusters in between the two splats. When the glue is properly set, this frame may be fitted, as also the back seat rail, and glued in all together to back feet. It will be better to glue the top on, not between, the



Gent's Study Chair.

back feet. The position of the joint will be determined by the total width of the top—*i. e.*, by the width of the show-wood face and rebate combined. The three pieces of underframing should all be glued up together with the cross-framing of the chair. The front feet of this chair, as of its companion, should not be quite square at the framing, but beveled a little on the outside with the seat line.

The material for the large chair, the details of which is also 1 inch to the foot, should match with what is chosen for the small one. The back feet will require 2½-inch stuff, front feet 2¼-inch at the framing, arms 2¼-inch, heads 2-inch; tops, splats, balusters, edge thickness, 1¼-inch.

For back and seat, the same as in the companion, small. The arms full 2-inch, for the stuffed pad will be reduced at the back end $\frac{1}{8}$ inch under the back feet, inside and ouside. To obtain ample hold for the head, which has so small a base, and at the same time not to impair the seat line, cut away the side rail to receive it to the depth of $\frac{3}{8}$ inch, as shown at B. A shows the face aspect of the head, which has a "lap" corresponding with the space in the side rail, which it should just fill. After glueing the head in its place it may be doweled from under the seat with two stout dowels, when the whole will be thoroughly solid and strong. The arms will take two good dowels, or, if, preferred, a tenon at the back end. In reducing the arm at the back end take it all from the outside, and in fixing the arm let it rather overhang the head on the outside. The head and arm must be glued in together. It will be evident that decoration in the shape of moldings or carving can be added to these chairs where price will allow.

TRADE PUBLICATIONS.

Wood-Working Machinery.

A very neat illustrated catalogue of improved patent wood-working machinery has been recently published by the manufacturer, Mr. Frank H. Clement, of Rochester, N. Y. The present edition makes the 13th annual catalogue, and though Mr. Clement has been practically engaged in designing and manufacturing machinery for 22 years, the past 13 have been devoted more exclusively to the specialities described in the catalogue. Among the specialities referred to, and the first machines which the catalogue notices, may be mentioned the band-sawing machines, which are made in five sizes, from 42-inch diameter of wheels to 24-inch diameter, with a corresponding total weight of machine of from 2100 to 500 pounds. Planers and shaping machines are next noticed, together with different styles of scroll-sawing machines. Considerable space is devoted to lathes of special construction, of which five different styles are noticed. Under the head of boring machines we find illustrated two varieties of the horizontal and two of the vertical pattern, together with a double horizontal boring and a combined boring and bit-mortising machine. With the exception of a sandpapering machine and a patent band-saw-setting machine the remaining few pages of the catalogue are filled with cuts of special parts and fittings for the machines, such as chucks, shaftings, hangers, &c. Mr. Clement will send this catalogue on application, and as its illustrations convey a very clear idea of the machines manufactured, purchasers will do well to consult its pages.

Stairbuilders' Goods.

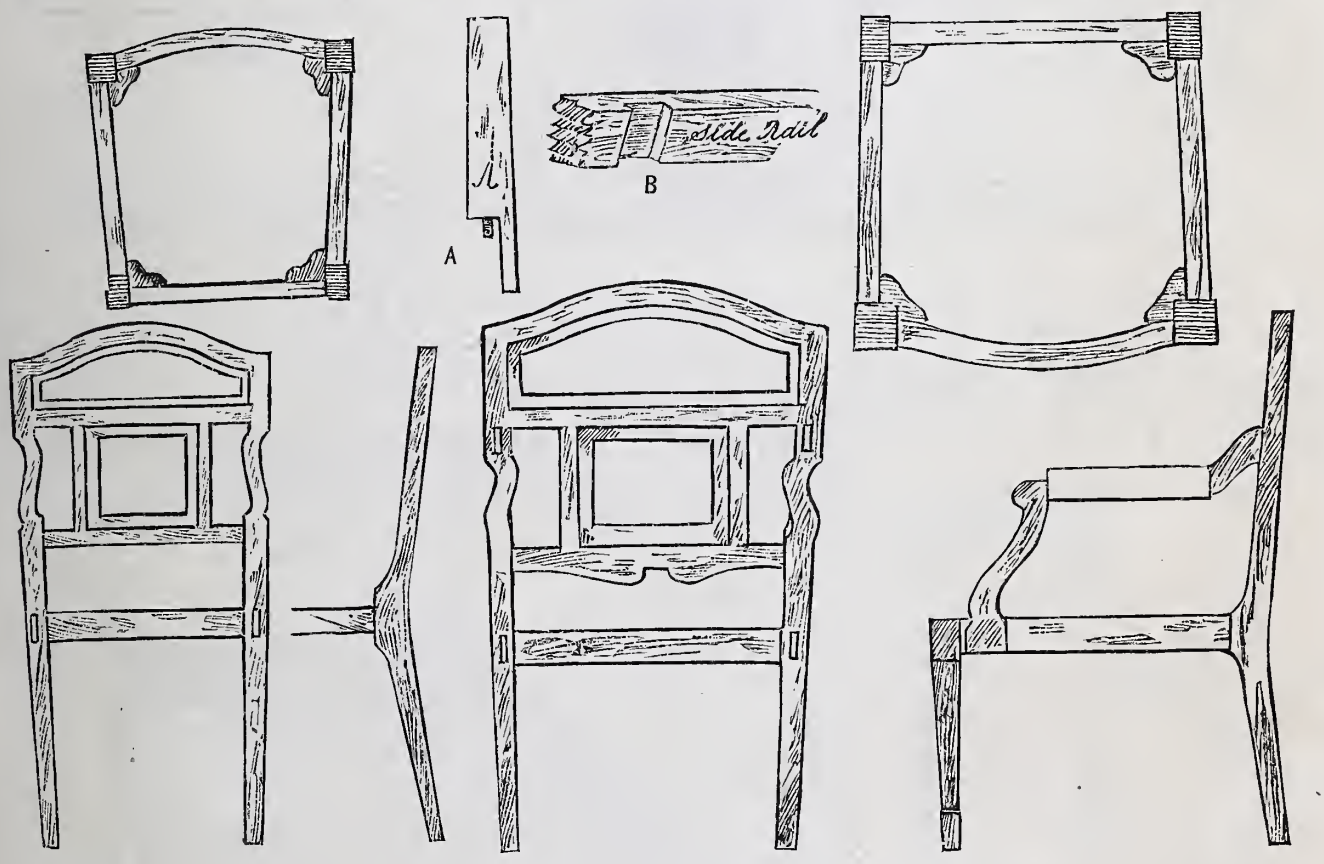
We are in receipt of a pamphlet of 50 pages, issued by S. E. Smith & Bro., stairbuilders, of St. Paul, Minn. It is an illustrated catalogue of stairbuilders' goods. The articles shown comprise newel posts in quite an assortment of designs, many of them being in the latest style and well adapted to the wants of architects and builders. Following are designs of stairs and stair-railing, balusters, both plain and carved, also square, turned and fluted. A specialty with this firm is "square turned" work of which they are prepared to make various patterns. Sections of hand-rails are given in profile. The latter portion of the book is devoted to a chapter entitled "Hints on Stairbuilding," and contains very specific directions for selecting and ordering the parts that are necessary to complete a flight of stairs. The pamphlet cannot fail to be of value to all who have occasion to make use of work of the kind described.

Heating and Ventilating Apparatus for Greenhouses.

We have received a copy of the new edition of the catalogue issued by Hitchings & Co., No. 233 Mercer street, New York. We reviewed a former edition not many months since. The present book contains all essential matter that was in the former one, with additional particulars which are of interest to all who have anything to do with greenhouse work or with heating where a hot-water system is desirable to be employed. The pamphlet is handsomely illustrated throughout, and contains much information that is of value to architects and builders generally.

Pavements of the Day.

The Warren-Scharf Asphalt Paving Company, whose office is at 114 John street, New York, have issued a pamphlet bearing the above title, which describes the pavement variously known as "Grahamite," "Trinidad," "American" and "Barber." This pavement is the standard pavement in use in Washington, and is that which is fast becoming popular in the various large cities of the Union. There are now 58 miles of it in Washington city alone. The Warren-Scharf Asphalt Paving Company is a new organization in name, dating from about the first of the present year. Until recently the members of this company were associated with Barber & Co., in the American Asphalt Paving Company, which is no longer in active business. From members of the Asphalt Paving Company two distinct companies have been organized, neither of which have any essential rights or privileges not shared by the other. The two companies lay identically the same kind of pavement and by the same method. Among the gentlemen composing the Warren-Scharf Asphalt Paving Company is Mr. Samuel R. Scharf, who is one of the most experienced and successful asphalt pavers in the United States. He has had long experience in connection with the pavements laid in Washington, Buffalo, Boston, Brooklyn and St. Louis. Mr. C. M. Warren, the president and chemist of the Warren Chemical and Manufacturing Company, of New York, is also of this company, and the asphalt used by them will be refined under his immediate direction. The pamphlet before us contains a clear statement as to the actual position which Trinidad asphalt occupies as a paving material. It contains much information that is of interest and value to all who have anything to do with paving either in a private or official capacity.



Details of Some Library Chairs.—Scale, 1 Inch to the Foot.

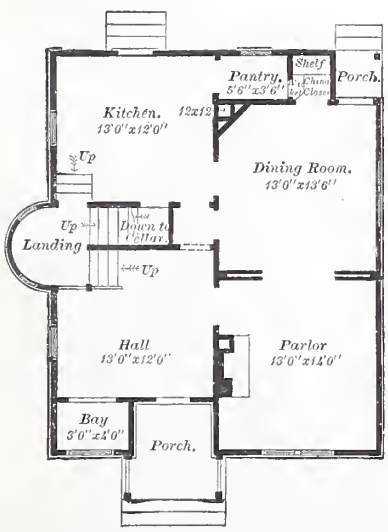
Mr. C. B. Johnson, of Medford, Mass., writing with reference to the Cradock mansion, which we illustrate in this issue, says that when an apprentice, some 35 years ago, he helped reshingle the north side. He states that those portions of the shingles which were exposed to the weather had become worn to about $\frac{1}{16}$ inch in thickness.

$1500 Frame House.

The result of our Fourteenth Competition, which had for its subject $1500 frame houses, was given on page 87 of the May issue. At that time we presented the perspective views

Fourteenth Competition.—$1500 Frame House.—Front Elevation of Prize Design, by Chas. J. Williams, Dayton, Ohio.—Scale, ⅛ Inch to the Foot.

of the three successful designs and also gave the elevations, floor plans, details and bills of materials of one of them. At the present



First Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

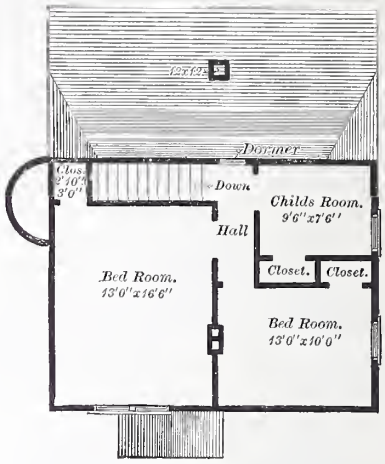
time we lay before our readers the elevations and details, with floor plans and outline of estimate, of another of the successful studies, being that submitted by Charles J. Williams, of Dayton, Ohio. The perspective view of this design will be found on page 86 of the current volume. Mr. Williams, in working up his design, has presented four elevations, a first-floor plan, second-floor plan, cellar plan, roof plan, and a liberal amount of details. The building shown is of the kind that is very commonly described as one-and-a-half story. A bay window, semicircular in form, on the left side elevation is a conspicuous feature and is made to serve a useful purpose as a landing in the stairway. By means of this landing there is communication from a single flight of stairs with both the kitchen in the rear and the hall or sitting-room at the front. There are a number of interesting features about this design that will bear study.

In commenting on the drawings submitted the author directed attention to the compact arrangement of rooms, economy of space and ample closet room provided. He also directed attention to the picturesque and economical arrangement of stairs, the cosey bay and porch in front, and the fact that direct access is had with all the rooms from what he has been pleased to call the hall. With reference to the inside finish the author suggests that the hall be done entirely in yellow pine, and that the remainder of the house be done in white pine or poplar.

The following is the bill of materials submitted with this design, together with the prices attached by the author:

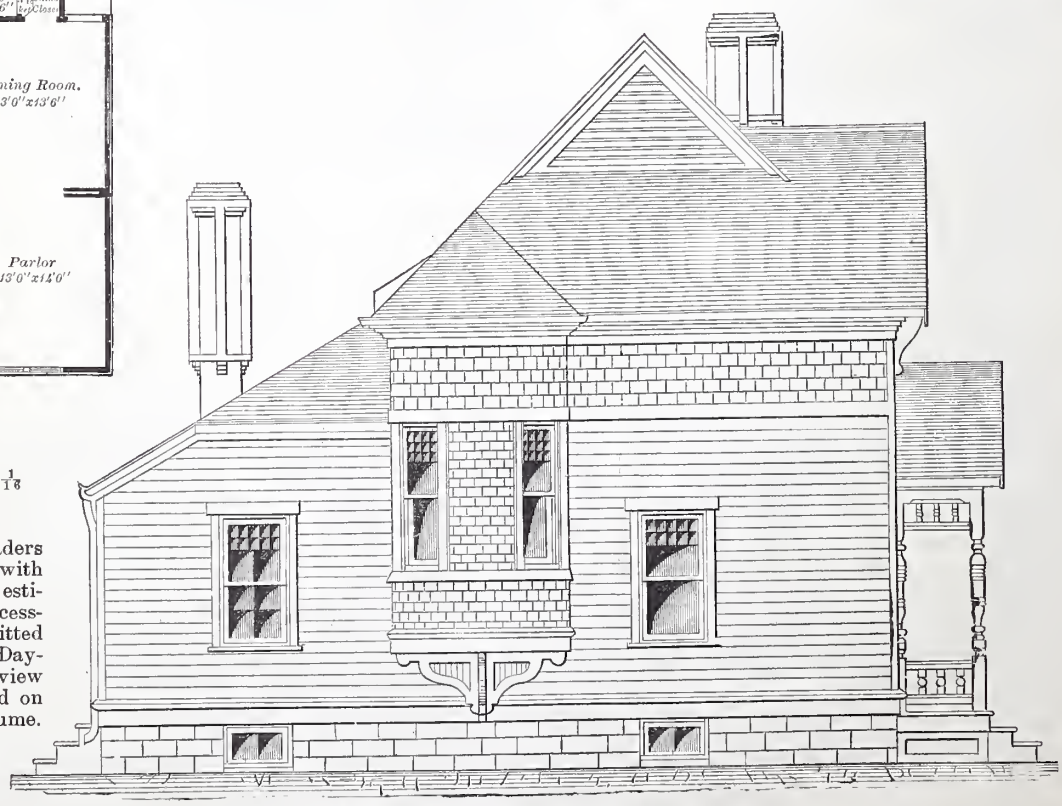
ARCHITECT'S ESTIMATE.

70 yards of excavation at 25¢	$17.50
850 feet of rubble masonry at 12¢	102.00
6000 brick at $8	48.00



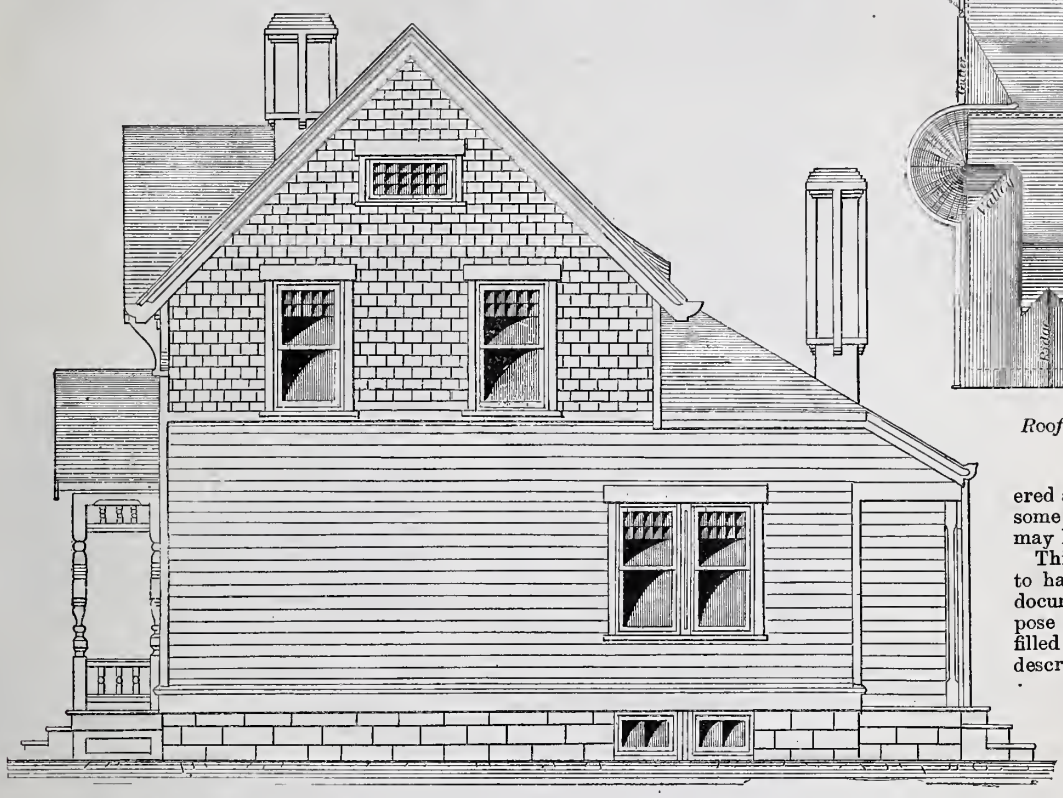
Second Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

140 lineal feet of gutters and conductors at 10¢	14.00
60 square feet of valleys and flashings at 15¢	9.00
17 pair japanned butts, 3½ x 3½ inch	4.50
16 locks	8.00
1 front door lock	2.50
1 sliding door lock	6.50
12 pair door bolts, 2 x 2 inch	3.00
13 sash locks	5.20
312 feet of cord for sash	3.12
416 pounds sash weights	8.33
3 stair-rail brackets	0.60
11 sash lifts	1.10
1 front door bell	1.50
Nails	32.00
3 coats of paints (exterior and interior)	115.00
360 yards of plastering at 25¢	90.00
14,000 shingles at $4 per M	56.00
1000 feet of sheathing at $15 per M	15.00
1500 feet of sheeting at $15 per M	22.50
1500 feet of patent siding at $30 per M	45.00
5200 feet of framing timber at $15 per M	78.00
560 feet of cornice and trimmings at $3 per 100	16.80



Left Side Elevation.—Scale, ⅛ Inch to the Foot.

1500 feet of flooring at $25 per M	37.50
19 doors, frames and finish at $6	114.00
15 window frames and finish at $6	90.00
7 cellar windows at $1.50	10.50
1 pantry and china closet	25.00
3 closets, 2 shelves each, at $3	9.00
1 front porch, complete	50.00
1 rear porch, complete	20.00
1 stairs to second story, complete	35.00

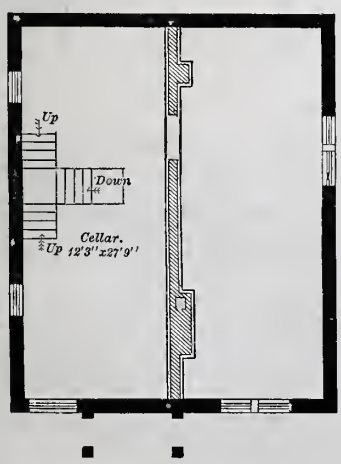


$1500 *Frame House.—Right Side Elevation.—Scale, ⅛ Inch to the Foot.*

1 stairs to cellar	4.00
1 mantle and grate	25.00
Labor	216.00
Profit and sundries	158.85
Total estimate	$1500.00

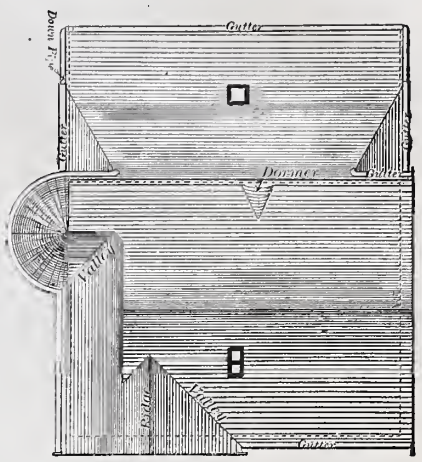
Stone-Cutting of the Ancient Greeks.

A rather interesting observation, says the *American Architect and Building News*, has recently been made upon the methods of stone-cutting employed by the ancient Greeks. Every one knows that the marble blocks of which the Grecian masonry was composed are put together without mortar, and so nicely fitted that in many instances



Cellar Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

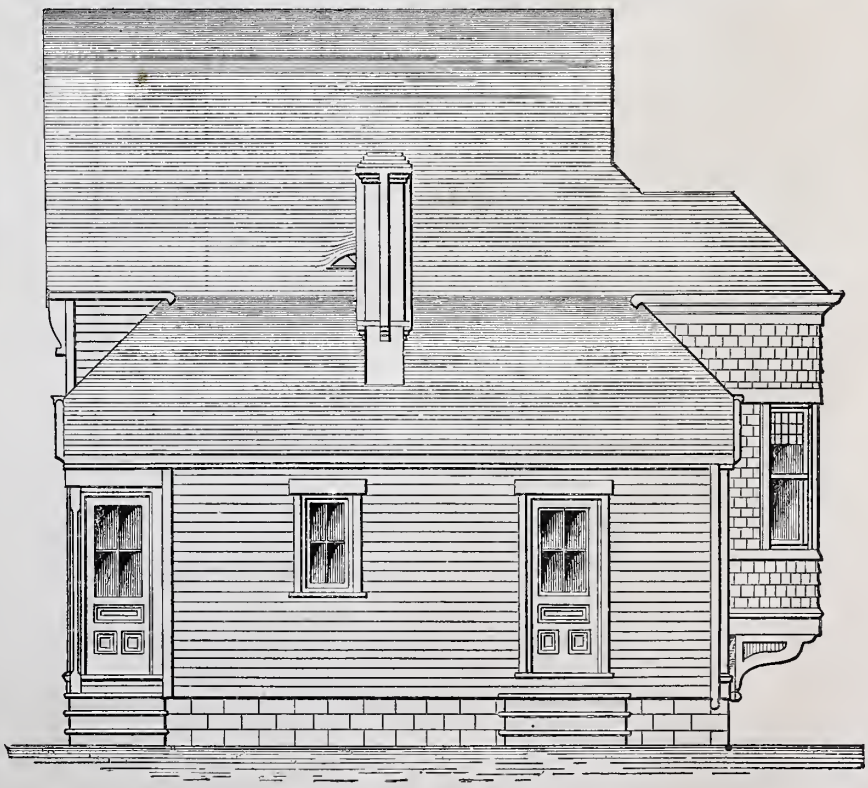
two adjacent stones have, as it were, grown together by the cohesion of their particles, brought into almost absolute contact, a fracture made by a blow upon one passing directly into the other, just as if the two formed a single block. With regard to the fitting of the drums of columns, Mr. Penrose, the most scientific and practical of all investigators of Greek architecture, believes that the desired effect of close fitting was obtained by inserting a wooden pin as a pivot in the drill-holes which are always found in the centers of the drums, and revolving each drum upon the one below it, first placing sand between the stones, until a perfect joint was obtained, in the same manner that glass stoppers are ground into bottles, and pieces of metal-work of certain kinds fitted to each other. This explanation, which is probably the true one, solves the problem completely so far as the drums of columns are concerned, but throws no light upon the fitting of the other stones of the Grecian buildings, such as the blocks of the entablature, which are found to have joints as close as those of the columns, the edges of each block for a certain distance back from the face being polished, while the rest of the joint is slightly sunk, in order to allow the polished portions to be brought into perfect contact. As no sign of a pivot can be discovered on the stones, even if it were possible to revolve them in contact with each other, it is plain that a different process must have been used for fitting them, and an inscription discov-



Roof Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

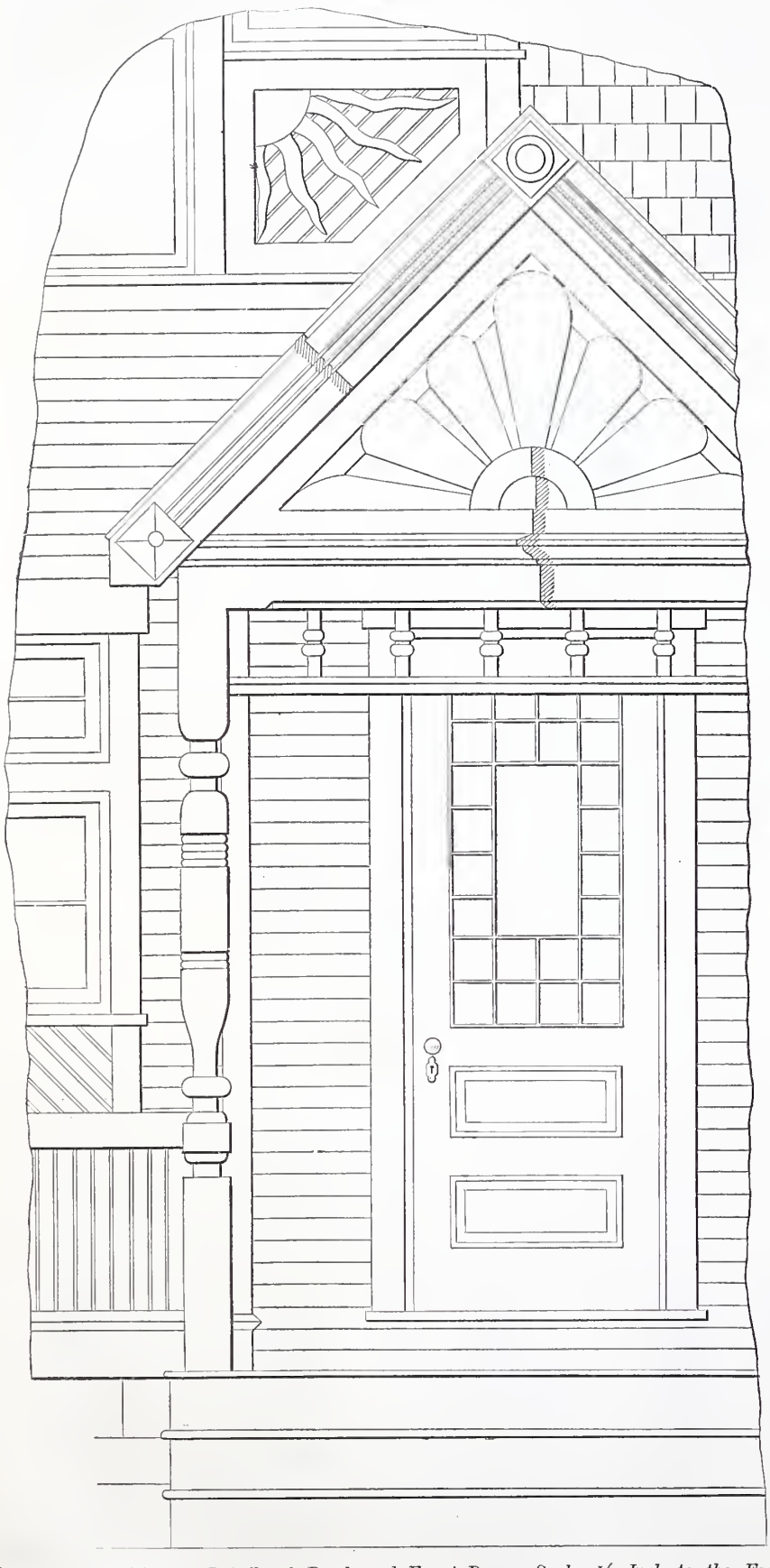
ered a few years ago gives us some idea of what the process may have been.

This inscription, which seems to have been a sort of official document, answering the purpose which would now be fulfilled by a printed specification, describes the construtions of a temple, and stipulates particularly that the joints of every block of marble must be polished with a mixture of oil and vermilion. As vermilion, if the word so translated really refers to the pigment now known under that name, has no polishing quality, it has been suggested that the color was used simply to spread over the joints before trying the stones together. If any inequality existed in the surface of either stone, it would be immediately shown, on separating the stones after a momentary contact, by the transfer of color from one to the other, and the protuberant portion thus detected could then be rubbed down by hand to a uniform plane with the rest of the surface. A powder of red chalk is often used by mar-



Rear Elevation.—Scale, ⅛ Inch to the Foot.

ble-cutters for a similar purpose, and it is quite possible that this may have been the only use of the vermilion paint, but there is some difficulty in accounting on this theory for the mixing of oil with the paint, which, if used dry, would be quite as useful for its supposed purpose, and would be much more easily cleaned off the stone. There is no serious improbability in the supposition that the authors of the inscription may have confounded the true vermilion with the red oxide of iron, or crocus, which is a very efficient polishing agent, and if mixed with oil, and applied to the surface of a piece of marble, would serve admirably both to show where that suface had been brought to coincide with a test plane and to reduce the inequalities which might, on trial, be found to exist.



$1500 *Frame House.— Details of Porch and Front Door.—Scale, ½ Inch to the Foot.*

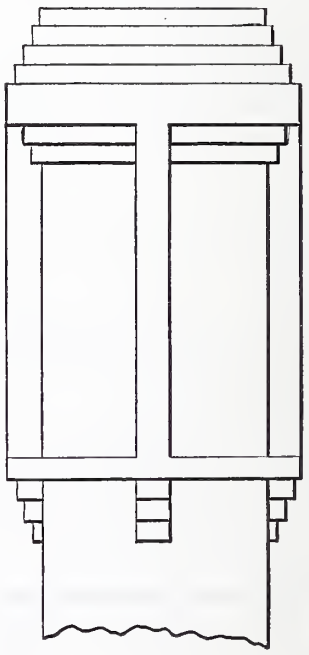
NEW PUBLICATIONS.

SHAVINGS AND SAWDUST. By "Observer." Comprising a series of articles, some of which have appeared in the *Lumber World* and are now revised, together with many others which have not been published—all treating of the design, construction, care and operation of wood-working machinery. Size, 6 x 9½ inches; 150 pages, bound in cloth, illustrated. Published by C. A. Wenborne.

The somewhat facetious title "Shavings and Sawdust" has been applied to a book treating on the designing, construction, care and operation of wood-working machinery. The *nom de plume* "Observer" stands for John Kane, a portrait of whom forms the frontispiece of the volume. The style in which the work has been written in some respects resembles "Chordal's Letters," although we would not do the author the injustice of insinuating that he had imitated any one. The letters are pleasant talks about every-day mechanical problems which arise in the management of wood-working establishments, and they will bear reading by all who are engaged in such work, whether they agree with the conclusions reached by the author or not. Some of the illustrations are of the nature of tail-pieces to the chapters. Some of them have a mechanical application; others are humorous. It is to be regretted that the volume has not been more thoroughly illustrated from a mechanical standpoint. The first chapter is entitled "A Plan for the Economical Dressing of Lumber," and in the way of illustrations presents the arrangement of machinery in a model wood-working establishment. There is also given a cross-section, showing the location of line shafts under ground below the main floor, and the framing of the roof of the same building.

EVERYBODY'S PAINT BOOK. A Complete Guide to the Art of Outdoor and Indoor Painting. By F. B. Gardner. Size 5 x 7½ inches, bound in cloth, 180 pages, illustrated. Published by M. T. Richardson, Price, $1.

This book, by a practical painter and one of the best known writers on the subject of painting, is designed for the special use of those who wish to do their own work. It consists of practical lessons in plain painting, varnishing, polishing and staining, with directions for paper-hanging and kalsomining. Instructions are also given for renovating furniture, and a few hints on artistic work for home decoration are presented. It contains a description of the tools and materials used in painting, with directions for mixing paints. A glossary of terms used in painting and a very complete index complete the book.

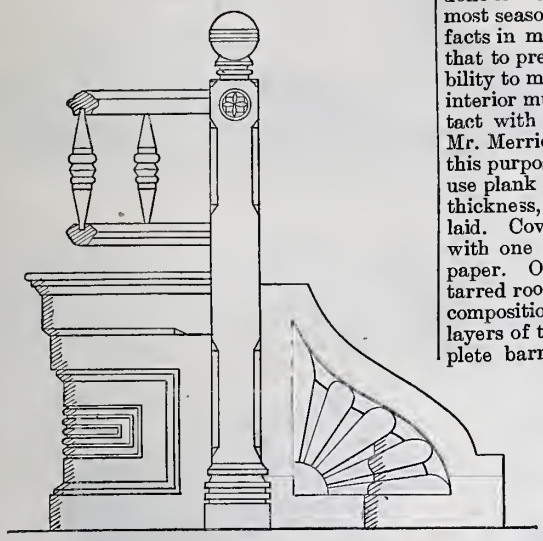


Chimney.—Scale, ½ Inch to the Foot.

COTTAGES, OR HINTS ON ECONOMICAL BUILDING; containing 24 plates of medium and low cost houses, contributed by different New York architects, together with descriptive letter-press, giving practical suggestions for cottage building. Compiled and edited by A. W. Brunner, architect; to which is added a chapter on the water supply, drainage, sewerage, heating, ventilation and other sanitary questions relating to country houses, by William Paul Gerhard. Size, 6 x 9 inches. 70 pages, 24 plates, bound in cloth. Published by William T. Comstock. Price $1.

According to the preface, the aim has been simply to offer hints and suggestions to those about to build, and to present a series of designs of low-cost cottages. This has been very happily done. This work, which contains modern designs, will fill a well-defined want, and should have a very large sale. The designs as set forth in the title are by a number of New York architects, and very satisfactorily represent styles which are current in the best work that is now being done, whether cheap or expensive. An important feature is the chapter on sani-

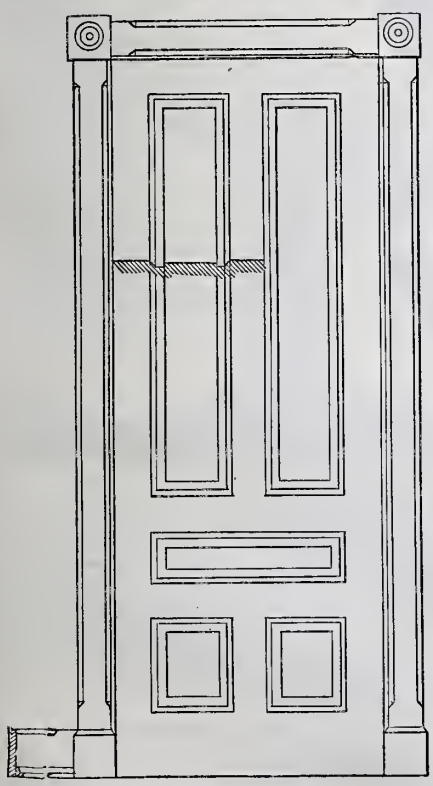
tary matters by Mr. Gerhard. In it various questions likely to arise in the selection of a site and the location of a building are carefully discussed, and principles are presented in such a way as to be readily understood and applied by those who have had the smallest experience. The first chapter in the work, entitled "Hints on Economical Building," by Mr. Brunner, is equally valuable, and the few comments that are offered upon the plates are made with specific application.



$1500 *Frame House.—Detail of Stairs.—Scale, ½ Inch to the Foot.*

Duck Roofing.

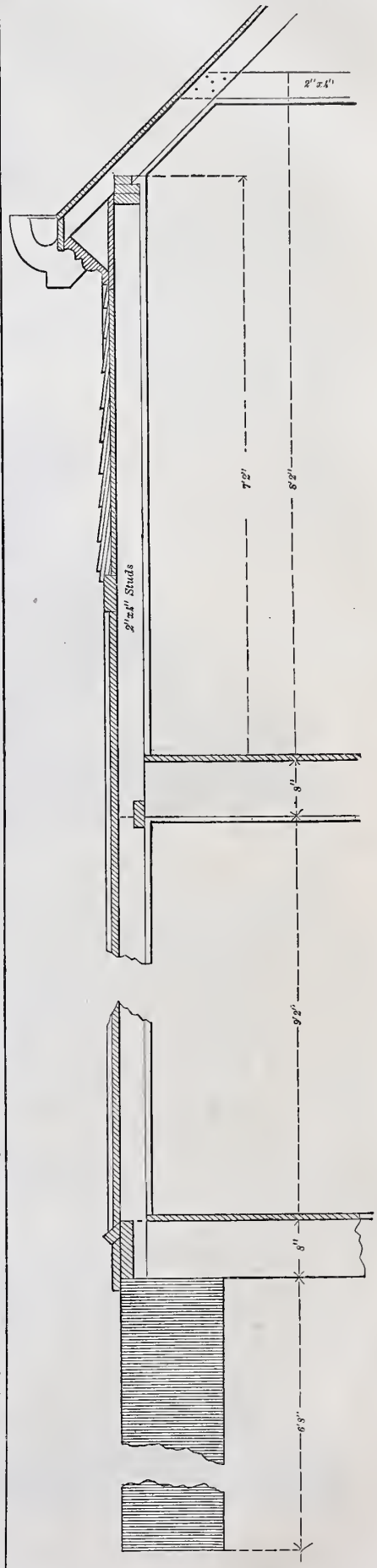
The following particulars with reference to the use of duck roofing have been furnished us by Mr Timothy Merrick, treasurer of the Merrick Thread Company, Holyoke, Mass. Mr. Merrick has given careful attention to the use of roof coverings of the kind described during the past four years. The result has been so satisfactory that he informs us that he should use no other material for a flat roof. The great danger to the life of the duck covering for roofing purposes is not from the surface exposure, but rather from the destructive influences at work against the under side. The chief destructive agent to be contended with is mildew. This attacks the cloth from the under side, and in a short time the ruin is complete. To prevent this is the objective point to be considered. It is a well-known fact that warm air will hold more moisture in suspension than cold. It is also well known that the temperature of rooms where work is being done is much warmer than the outer air at most seasons of the year. By keeping these facts in mind it becomes at once apparent that to preserve duck roofing from the liability to mildew, the humid, warm air of the interior must be effectually cut off from contact with the canvas. The method which Mr. Merrick has found advisable for use for this purpose is as follows: For the roofing, use plank well seasoned, planed to an even thickness, tongued and grooved and closely laid. Cover the roof surface thus prepared with one thickness of a heavy, rosin-sized paper. Over this lay a two-ply thickness of tarred roofing paper, with a coat of roofing composition applied hot between the two layers of tarred paper. This forms a complete barrier against moisture from within the building. In making this foundation care must be taken to fasten it sufficiently to keep it in place. This in turn is covered with another layer of paper of the same kind as the first. The roof is then ready for the duck. Any weight may be used. Mr. Merrick has employed upon the buildings of his company material 72 inches wide, equivalent in weight to 13 ounces, 22 inches wide. The canvas was laid lengthwise of the roof. The lengths of the pieces were the full length of the building, with a little to spare. Each breadth was securely nailed on its edge with ⅞-inch copper nails, the breadths lapping each other about 1 inch. Around chimneys and all other places requiring flashings lead or zinc was employed. After the canvas had thus been prepared it was filled with a preparation made up of 4 parts North Carolina pine tar and 1 part linseed oil, applied warm. This fills the film of the cloth, and acts as a preservative against damp of any kind. After completing the roof a coat of paint was applied to the outside, and this is to be repeated as often as circumstances seem to indicate is necessary. Seven cents per square foot, or, in other words, $7 per square, is Mr. Merrick's estimate of the cost of a roof laid in the manner above described.



Detail of Door, &c.—Scale, ½ Inch to the Foot.

Self-Acting Time-Check.

In all manufacturing establishments the question of accurately registering the time at which the employees of the concern enter for work is of considerable importance. According to an English exchange, an ingenious, self-acting apparatus for checking the exact time of arrival or departure of workmen has lately been invented by Mr. Luther Hansom, of the Bowling Dyke Dye House. The invention is worked by clockwork, and is of a character to be applied to any clock having sufficient strength. The only attachment necessary for the purpose is a cam-plate fixed upon the center spindle of the works. As the plate rotates by the movement of the clockwork, the cam comes into contact with one end of a lever, which is thus raised and suddenly dropped at such intervals as the cams allow. To this lever is attached a peg, which, by the above movements, is lifted and dropped into notches in a circular table below. The table, when thus liberated by the lever drawing out the peg, revolves on a center shaft by means of a weighted cord or a spring. This motion of the table removes a box or cell fixed upon it, from under a hopper, and brings round another cell into its place, which stays there until the table is again allowed to carry it away by the lever action. These cells have marked upon them the period of time they are under the hopper, which period is arranged by the construction of the cam-plate attached to the clockwork. In this manner an accurate account is kept, without any personal attention, of the exact time workmen enter or leave their work, by each putting their representative check through the hopper into the cell. The whole is inclosed in a wooden case, with the clock above, only apertures for the reception of the checks being exposed. The apparatus is such as can be made to meet the requirements of any trade employing any number of hands or checking any number of times day or night.

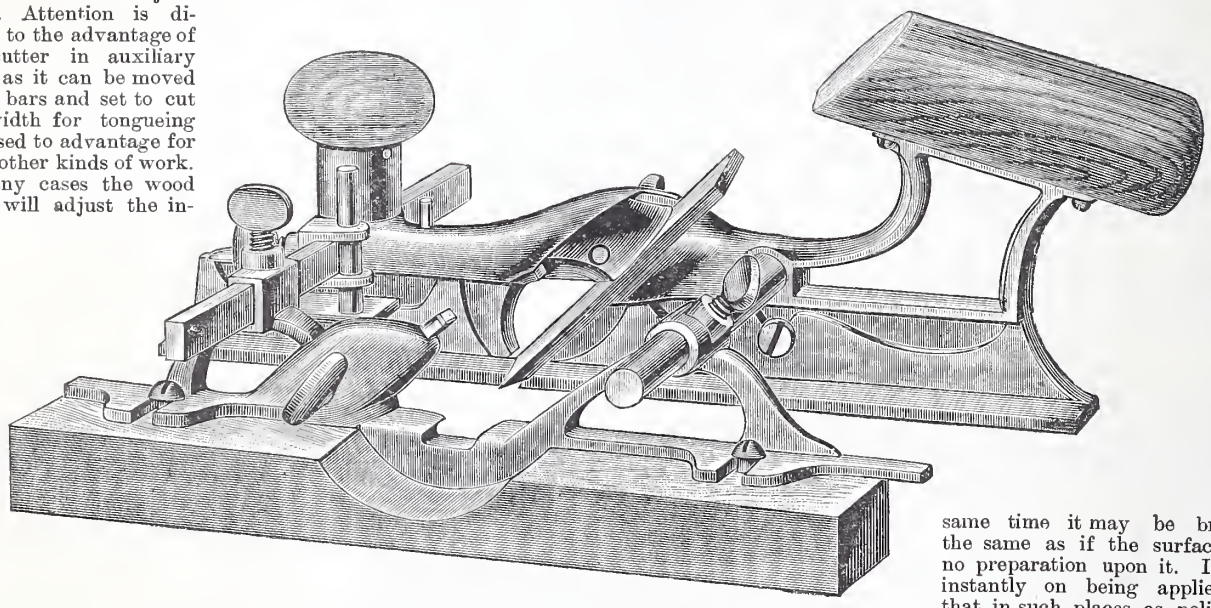


Section Through Walls.—Scale, ½ Inch to the Foot.

NOVELTIES

Fale's Patent Variable Bench Plane.

The accompanying illustrations, Figs. 1 to 6, represent a new tool which has recently been put on the market by Otis A. Smith, Rockfall, Conn. It is, as will readily be perceived, a combination tool, and is described as constituting carpenter's plow, front and back filletster, matching planes of all sizes, sash planes of various kinds, dadoes from 3-16 to ⅞ and upward, hollows and rounds from No. 2 to No. 18 (nine pairs), beads from ⅛ to ⅝ and upward, side rabbet, snipe-bill, &c. It is a tool which is evidently the result of a great deal of thought and practical knowledge, and gives an exceptionally complete combination plane, the manufacturer claiming that it covers a wider range of combinations than any other plane on the market. Fig. 1 gives a general view of the tool, with the auxiliary stock at tached to the main stock and in readiness for the various adjustments. Attention is directed to the advantage of the cutter in auxiliary stock, as it can be moved on the bars and set to cut any width for tongueing and used to advantage for many other kinds of work. In many cases the wood fence will adjust the instrument without having to slide auxiliary stock on cross-bars. In some operations it will be necessary to reverse or turn end for end the wood fence of this auxiliary stock in order to bring it close to or under the cutter in the main stock, and this can be done without difficulty. It will also be observed that on the front bar there is a gauge to regulate the depth of cut, and in the plane, though not represented in the illustration, there is an adjustable spur in front of the cutter. Fig. 2 represents filletster and grooving attachment, with the reversible and adjustable wood fence, and constituting a grooving plane of all sizes for tongueing and grooving. By reversing the wood fence a front filletster can be made. Fig. 3 shows a detached round form and cutter. These are made nine in set, from $\frac{3}{16}$ to 1¼ inches. Fig. 4 represents a detached hollow form and cutter, made in sets of nine, from $\frac{3}{16}$ to 1¼ inches. Fig. 5 represents a detached bead form and cutter. These are made from ⅛ to ⅝ inch and upward. Fig. 6 represents an adjustable plow and dado spur. The following are the parts which constitute a standard set, but, if a complete set is not wanted, any part can be had separate, and others added as desired. All the parts are accurately made to gauge and are therefore interchangeable: Main stock, front bar and gauge stop, dado forms, including cutters, $\frac{3}{16}$, ¼, ⅜, ½, ⅝, ¾, ⅞; auxiliary stock, including back bar and one cutter, grooving and filletster attachment, filletster cutter, bead forms, including cutters, ⅛, $\frac{3}{16}$, ¼, ⅜, ½, ⅝; center bead forms, including cutters, ⅛, $\frac{3}{16}$, ¼, ⅜; hollow and round forms, including cutters, from No. 1 to No. 18. Attention is called by the manufacturer to the fact that the different forms are of metal, and are not liable to get out of order either by friction, warping, swelling or shrinking, as they would be liable to if made of wood. The inventor claims for this plane that it is one of the best carpenter's plows ever invented, for the following reasons: First, every dado acts as a plow; consequently, has spurs in advance of the cutter, and will cut as well across as with the grain; second, the dado form, being the width of the cutter, allows the instrument to run steadily without allowing the corners of the cutter to tear out pieces in working curly, cross-grained or knotty wood. One strong recommendation is that the variable plane takes but a comparatively small space when the number of tools it contains is considered.



Novelties.—Fig. 1.—General View of Fale's Variable Plane.

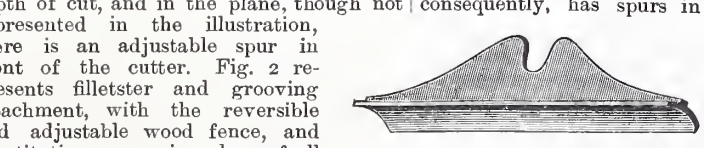


Fig. 2.—Filletster and Grooving Attachment, Having Reversible and Adjustable Wood Planer.

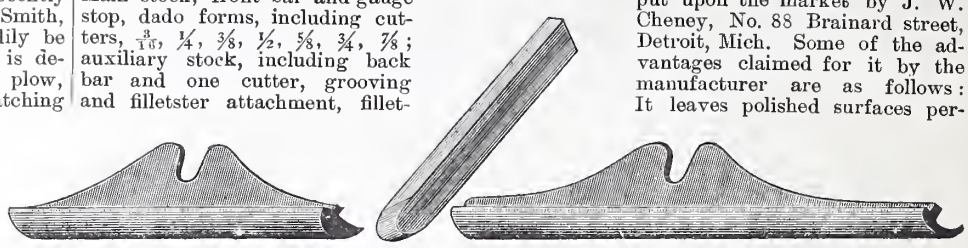


Fig. 3.—Detached Round Form and Cutter.

Fig. 4.—Detached Hollow Form and Cutter.

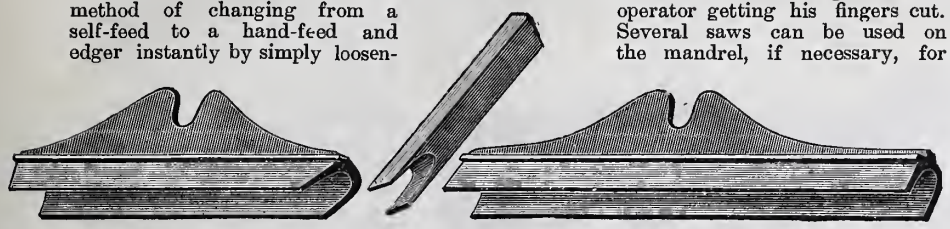
Rust Preventive.

The liability of polished goods to rust, even when finished in nickel, has induced many to investigate the subject of rust preventives. A new article of this kind is being put upon the market by J. W. Cheney, No. 88 Brainard street, Detroit, Mich. Some of the advantages claimed for it by the manufacturer are as follows: It leaves polished surfaces perfectly natural, so that it is difficult to detect that an article has been covered with any preparation, save only on very close examination. The substance is impervious to air and moisture, yet when dry is so hard that dust does not stick to it. At the same time it may be brushed the same as if the surface had no preparation upon it. It dries instantly on being applied, so that in such places as polishing-rooms or stove establishments it has great advantages over all slow-drying preparations. Its usefulness includes a wide range of applications. It may be applied to mechanics' tools, to farming implements, to stoves and stove-pipe, to prevent rust when not in use, and it is said to be especially desirable for manufacturers and exporters for protecting their goods against moisture incident to shipment to foreign countries It can be rubbed off if desired by using a cloth saturated with turpentine or coal oil. A circular which Mr. Cheney has issued contains a number of flattering testimonials, among which we notice the names of Henry Disston & Sons, Philadelphia, and the Detroit Stove Works, Detroit, Mich.

New Self-Feeding Rip Saw.

One of the newest machines turned out by the Egan Company, Nos. 221 to 241 West Front street, Cincinnati, is shown in Fig. 7 of the engravings. It is described as a self-feeding or hand-feeding rip saw, and has been designed for use in factories where a large amount of ripping is to be done in either hard or soft wood. The manufacturers confidently offer this machine as the best of its class now before the public. A considerable number have already been put out, and some very flattering testimonials have been received from well-known experts in the wood-working line. We con-

dense the following description from the company's circular: A reliable and powerful feed, much simplified and with much less machinery than usual, is embodied in its construction. There is also a method of changing from a self-feed to a hand-feed and edger instantly by simply loosening one thumb-screw. A method is provided of getting at the saw without disturbing the feed works, simply by swinging the feed-arm out of the way. A method is also provided of feeding the piece so that it is always given a slight lead against the fence, and of tracking the feed-saw in such a manner that the cutting blade always takes out the kerf made by the feeder. The frame of the machine is cast cored style, and, as may be judged by the engraving, is strong and well braced up and stands very substantially on the floor. The feed consists of four speeds, namely, 60, 80, 100 and 120 feet per minute. The arrangement of parts is such that the feed can be quickly changed from one speed to another. The table is hinged at the back end, and when the feed-arm is swung back can be raised by a screw or clamp and can be lifted clear up, giving free access to the mandrel and feed works. The manufacturers offer this machine as being capable of doing the work of from three to six men and at the same time doing it cleaner, with no jerks or resting marks on the cut. From the fact that the boards are held firmly on each side of the cutting saw by a spring, there is no danger of the board flying back, neither is there danger of the operator getting his fingers cut. Several saws can be used on the mandrel, if necessary, for sawing blind slats and other work of similar class.



Novelties.—Fale's Variable Plane.—Fig. 5.—Detached Bead Form and Cutter.

Fig. 6.—Plow and Dado Spur.

The Shumard Sash Balance.

Those of our readers who have inquired for spring sash balances in the past will no doubt be interested in the device illustrated in Fig. 8 of the engravings. This article is of general interest to the trade, and wherever a fixture is wanted to take the place of the ordinary weights used in box frames it is worthy of careful investigation. It is known as the Shumard sash balance, and is manufactured by the Shumard Sash Balance Company, No. 114 North East street, Richmond, Ind. The manufacturers offer this device as a perfect and practical balance for all kinds of sash. Among the advantages which they enumerate for it are the following: It does away with the use of box frames, weights and ropes. It is simple in construction and easy of attachment in both old and new houses. It is noiseless in operation and can be placed behind the sash and at one side if desired, so as to do away with the openings which are required in the old rope system. The construction of the balance is such that the same pair of balances can be arranged to several different lengths and weights of sash. Still another advantage which will be appreciated by housewives who are in the habit of removing sashes from the windows in house-cleaning time is that the sashes can be readily detached, since they are fastened to the balance simply by the hook shown in the engraving. Several different sizes are manufactured, adapted to sash weighing from 8 to 22 pounds, and having a length from 32 to 40 inches. Special sizes are made to order. The capacity of these sash balances is capable of being increased or diminished within certain limits. This is done by passing the ribbon once more around the drum to increase its power, or letting it off a round or more to diminish its power. Small adjustments are made by means of the spring brake which is shown above the drum in the engraving. By increasing the tension of this brake, which is readily done by means of a screw, and which can be accomplished after the balance is in place in the window frame, variations of 1 pound or more are readily made.

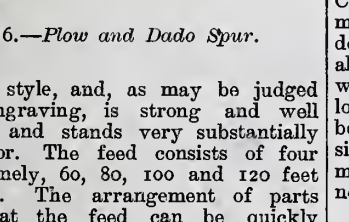


Fig. 8.—The Shumard Sash Balance.

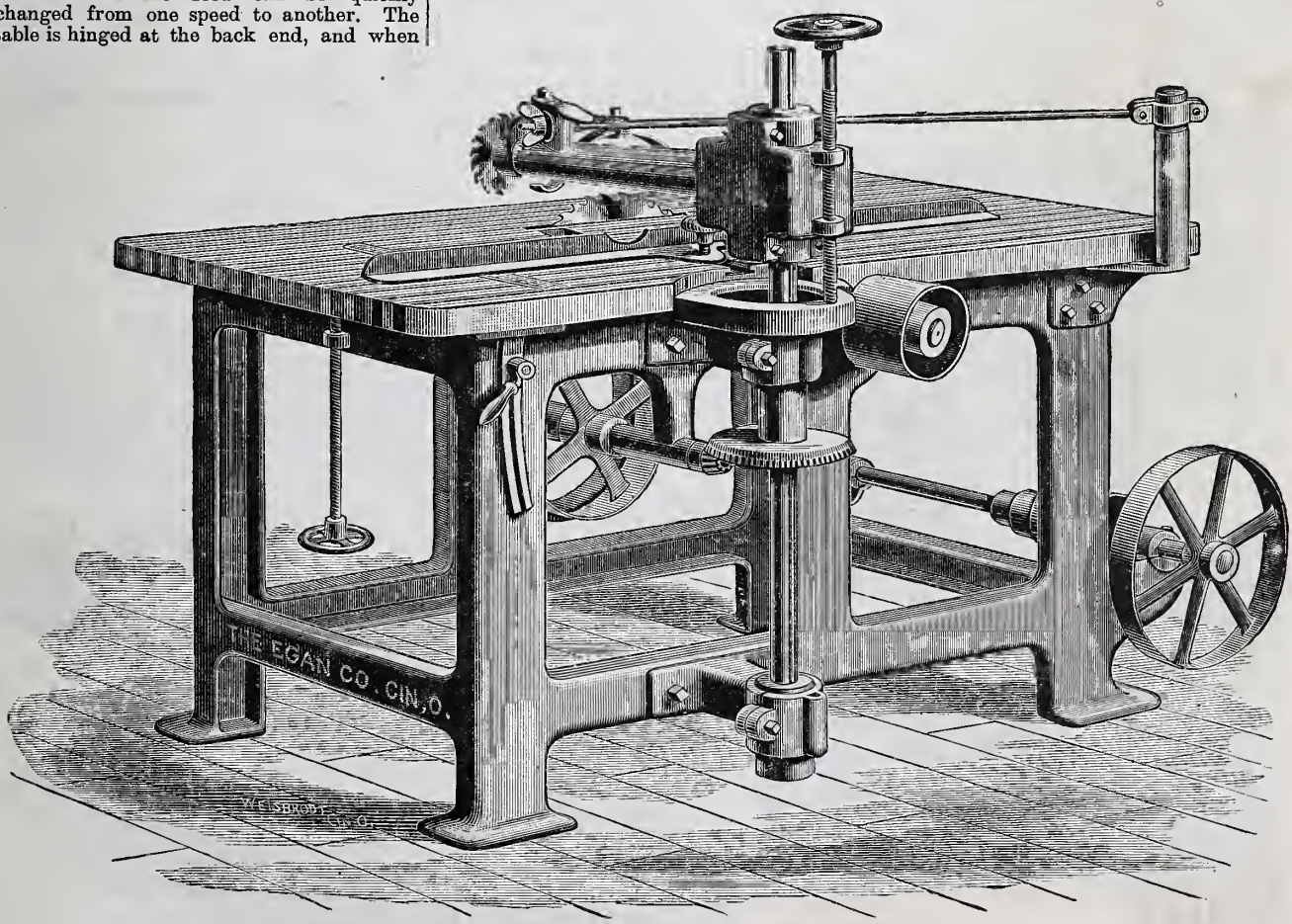
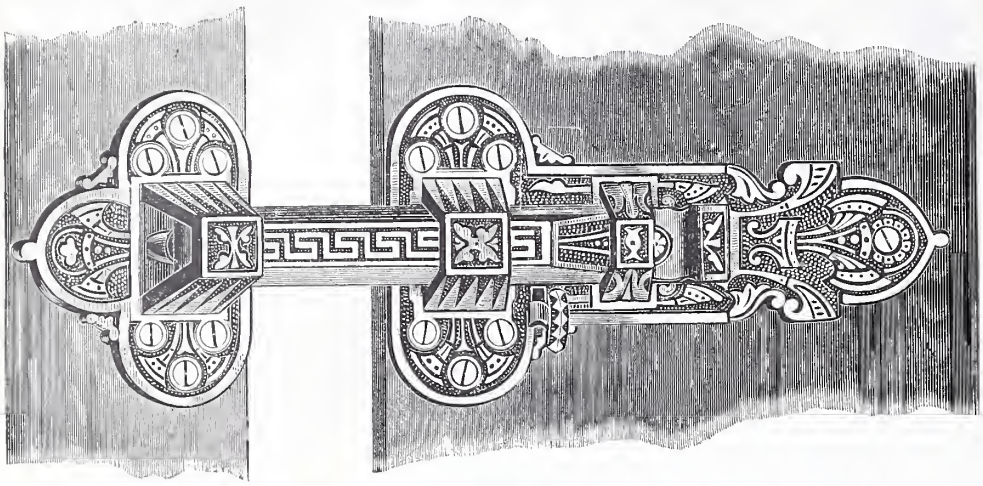


Fig 7.—New Self-Feed Rip Saw, Built by the Egan Company, Cincinnati, Ohio.

The Vulcan Shutter Bolt.

Brooke & Co., Royersford, Pa., have put on the market the shutter bolt represented in Fig. 9 This article is a bolt and bower combined, and is claimed by the manufacturers to be the only positive bower on the market. In the illustration which we give it is represented as attached to shutters which are bowed, a term which will be understood by some of our readers as denoting their position when fastened partly open. It will easily be seen that this article will serve as a simple bolt and fasten the shutters securely when closed. It has, it will be observed, a catch which is self-acting and fastens the bolt when it is in use, so that it cannot be moved without operating this catch. The bolt is so constructed that when used as a bower it is fastened securely, so that it cannot be opened or shut from the outside. This is accomplished by giving the end of the bolt a slight projection or spur on its under side, which serves as a catch and fits into the bower plate, which is so constructed as to hold it securely until the bolt is drawn back. Of this article three sizes are made, 8, 10 and 12 inch, which are finished in Mexican and Brazilian bronze. The points which are made by the manufacturers in favor of this article are its attractive pattern; that the weight of material and the position of the screws by which it is attached give strength where it is needed—at the points of pressure; that its construction is such as makes the bowing positive, so that it is almost as secure with the shutter bowed as when shut and locked; that the self-acting or gravity catch fastens it securely against wind and sneak thieves, and that it is exceedingly simple in operation and not liable to get out of order.



Novelties.—Fig. 9.—The Vulcan Shutter Bolt, Bowed.

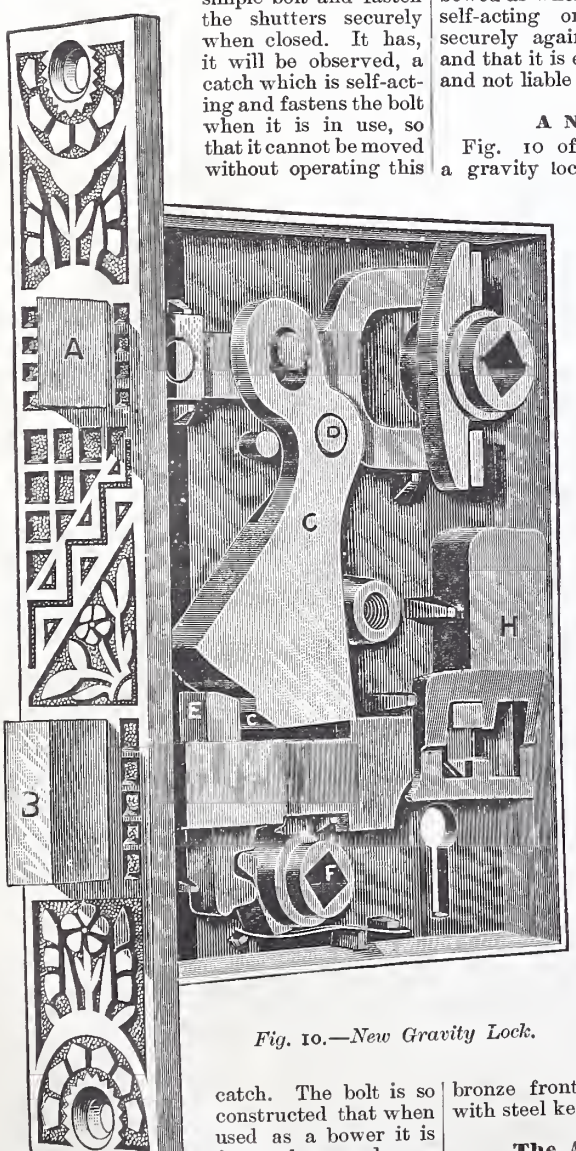


Fig. 10.—New Gravity Lock.

A New Gravity Lock.

Fig. 10 of the illustrations represents a gravity lock which has very recently been put on the market by the Union Door Knob Company, of Detroit, Mich. The main features of this article on which the manufacturers lay emphasis are its simplicity of construction, its perfect working without the use of a spring, and the contrivance by which the latch is locked on the inside. The construction of this lock may easily be apprehended by reference to the illustration. The reversible latch A is thrown by the weight C, working on an eccentric, the force of the weight being assisted by a loose spring around the pin D, affording, it is claimed, sufficient power to throw any knob. A small bolt, E, is worked by thumb-piece F on the inside of the door, and when turned up in notch *c* in weight C effectually locks A and takes the place of an extra bolt which cannot be worked from the outside. The tumbler H to lock the bolt B is a weight assisted by a coil spring inserted in the same. The manufacturers mention that the springs in this lock are not essential to the working of any part, and, being loose at the ends, cannot break or get out of place. The lock is made with an ornamental bronze front and strike, and is furnished with steel keys.

The Amidon Corner Brace.

Figs. 11 and 12, represent a brace which has recently been put on the market by Amidon & White of Buffalo, N. Y., for whom W. H. Goldey is agent in this city, at 103 Chambers street. The general form of this brace is shown in Fig. 11. The feature of special interest in this implement is the contrivance, which has been admired as ingenious and efficient, by which the power and motion are communicated to the bit. This is done by means of a universal joint, the form of which is represented in Fig. 12. In this cut P is a portion of the arm by which the brace is held in position and on which the pressure is applied. C is connected with the sweep, by the motion of which in the operation of boring it is made to revolve, and through the joint as represented it gives motion to A, a shaft, which, extended, carries the chuck which holds the bit, E being a bush and A revolving inside of it. The jaws are those of the Barker improved brace, which is already known by the trade. This brace is a handsome tool, in full nickel-plate, with black-walnut head and handle. It is made with 6, 8 and 10 inch sweep. It will be apparent to our readers that this brace possesses many advantages, and among others the manufacturers enumerate the following: That it bores six or eight times as fast as the ratchet brace, as the movement is round and round; that it bores more easily, as it is easier to turn round and round in continuous motion than back and forth, and as the pressure comes on the arm of the brace, instead of on the sweep itself, moro power is gained; that for heavy work or boring into hardwood, and especially for boring overhead, either in the corner or in the

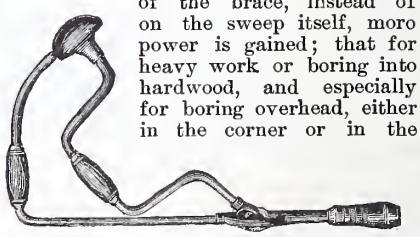


Fig. 11.—Amidon Corner Brace.

clear, the superiority of the corner brace is apparent in the advantage gained by the pressure on the arm; that it will bore close into a corner, the ratchet brace, owing to its head, not boring a straight hole within 1½ inches of the corner, and that it is not confined in its utility to work in the corner or against a wall, but that it will do just as good work in the clear as an ordinary brace. The manufacturers speak of the favor with which it has been received by mechanics who have used it, and regard it as an important addition to the workman's outfit. It will be seen that it is adapted not only to the carpenter,

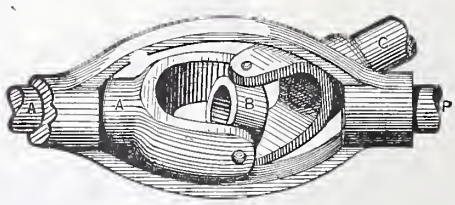


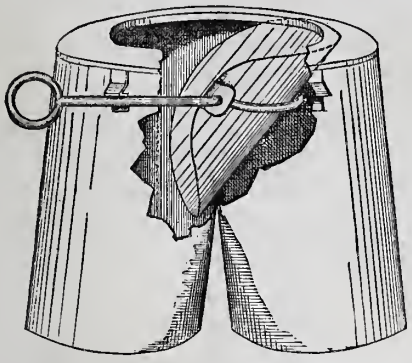
Fig. 12.—Joint in Amidon Corner Brace.

but especially to the plumber, gas-fitter, bell-hanger and other mechanics whose work calls for boring which is difficult or impossible with ordinary tools.

New Rain-Water Cut-Off.

A new form of rain-water cut-off that is claimed not only to be simple, strong and durable, but also the cheapest cut-off on the market, is being introduced by Frank Van Uxem & Co., of Richmond, Ind. The general appearance of the article may be gained from an examination of Fig. 13. Portions of the outside shell are broken away, thus affording a view of the interior construction. The special points of excellence claimed for this device are that the body is formed of but two pieces, which obviates the presence of elbows, with seams to become unsoldered.

The top part of the cut-off is a raised breast with edge turned inward, into which the end of the conductor-pipe is projected. The valve is of one piece of tin, looscly hung, not soldered to the rod which operates it. This rod passes on its under side and is extended outward to the front, forming the lever for operating, as may be seen by the engraving. The rod and by it the valve are held in position by catches on



Novelties.—Fig. 13.—*Richmond Rain-Water Cut-Off.*

either side. The extreme simplicity of the cut-off secure ease of action, great strength and durability.

New Molder.

Messrs. Jos. O. Colladay & Bro., No. 626 Race street, Philadelphia, have recently brought out a molder built from entirely new patterns, a general view of which is afforded by Fig. 14. The manufacturers describe this machine as designed for general work in sash, door, car, cabinet and agricultural shops. It is very heavy, and is intended for working all kinds of moldings up to 6 and 7 inches wide. It is also adapted for various kinds of door and sash work. The arbors used in this machine are of steel, and carry four slotted cast-steel heads. The side spindles are adjusted vertically and laterally. The outer one may be inclined to any angle desired, and may be moved to or from the work without disturbing the angle. The upper cylinder can be adjusted laterally, and the bottom one has both vertical and lateral adjustment. The bed is provided with a friction roll and is operated by a single screw. It drops 16 inches. The machine is provided with two feed rolls. The larger one is weighted, while the smaller one is held firmly by a spring. By having one roll smaller than the other the two can be placed nearer the weighted pressure shoe than otherwise. By this means a very powerful feed is obtained, and the lumber in being worked is held firmly near the cutter head. The machine is furnished with adjustable chip breakers, pressure bars, springs and guides. Two sizes are built, known as 6 and 7 inch machines.

A New Shelf Support.

The Quincy Floor Plate and Staple Manufacturing Company, Quincy, Ill., are now introducing McMaster's shelf support, a

Fig. 15.—*Shelf Support.*

simple article, the use of which is indicated in the name, while its form and construction are represented in Fig. 15. Each of these shelf supports is made of sheet iron, so cut as to give four staples, ⅜ inch long, which are bent over as represented in the cut, and are intended to be driven into the wood forming the side of the cupboard or other closet in which the shelves are to be placed.

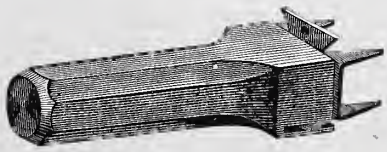


Fig. 16.—*Set for Driving Shelf Support.*

Holes are also punched in the bottom of the support, and in the staple plate, in order to secure stronger fastening where the shelf is a little too short. In favor of the utility of this article, in addition to its trifling cost, its convenience and strength are mentioned. A shelf held up with four of these supports is capable, the manufacturers inform us, of sustaining with security a quarter of a ton. Fig. 16 represents a set which is made to hold the shelf support while it is driven in place —an article which facilitates the putting up of the supports, though in the judgment of the manufacturers the operation can readily be performed without it. Fig. 17 represents a very simple box strap and corner iron, which is made by the same firme, and is on the same principle as the shelf support. It is cut from sheet iron in such a manner as to give four staples, which are to be driven into the wood of the box. It is also perforated as represented, so as to give holes through which nails or screws may be driven to hold it more securely, if necessary.

Permanent Paste.—Dissolve a teaspoonful of alum in a quart of water; when cold, stir in flour to give it the consistency of thick cream, being particular to beat up all the lumps; stir in as much powdered rosin as will lie on a ten-cent piece, and throw in half a dozen cloves, to give it a pleasant odor. Have on the fire a teacup of boiling water; pour the flour mixture into it, stirring well all the time. In a few minutes it will be of the consistency of treacle. Pour it into an

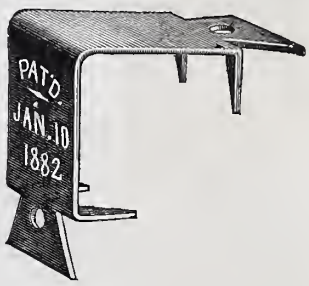


Fig. 17.—*Box Strap and Corner Iron.*

earthen or china vessel; let it cool; lay a cover on and put in a cool place. When needed for use take out a portion and soften with warm water.

An iron paint of a recent German invention is composed of pulverized iron and linseed varnish, and is intended for covering damp walls, outer walls, and, in short, any place or vessel exposed to the action of the open air and to the weather. Should the article to be painted be exposed to frequent changes of temperature, linseed oil varnish and amber varnish are mixed with the paint intended for the first two coats, without the addition of any artificial drying medium. The first coat is applied rather thin, the second a little thicker, and the last in rather a fluid state. The paint is said to be equally adapted as weather-proof coating for wood, stone and iron; nor is it necessary to previously free the latter from rust, grease, &c., a superficial cleaning being sufficient. This paint will prove a valuable auxiliary to manufacturers.

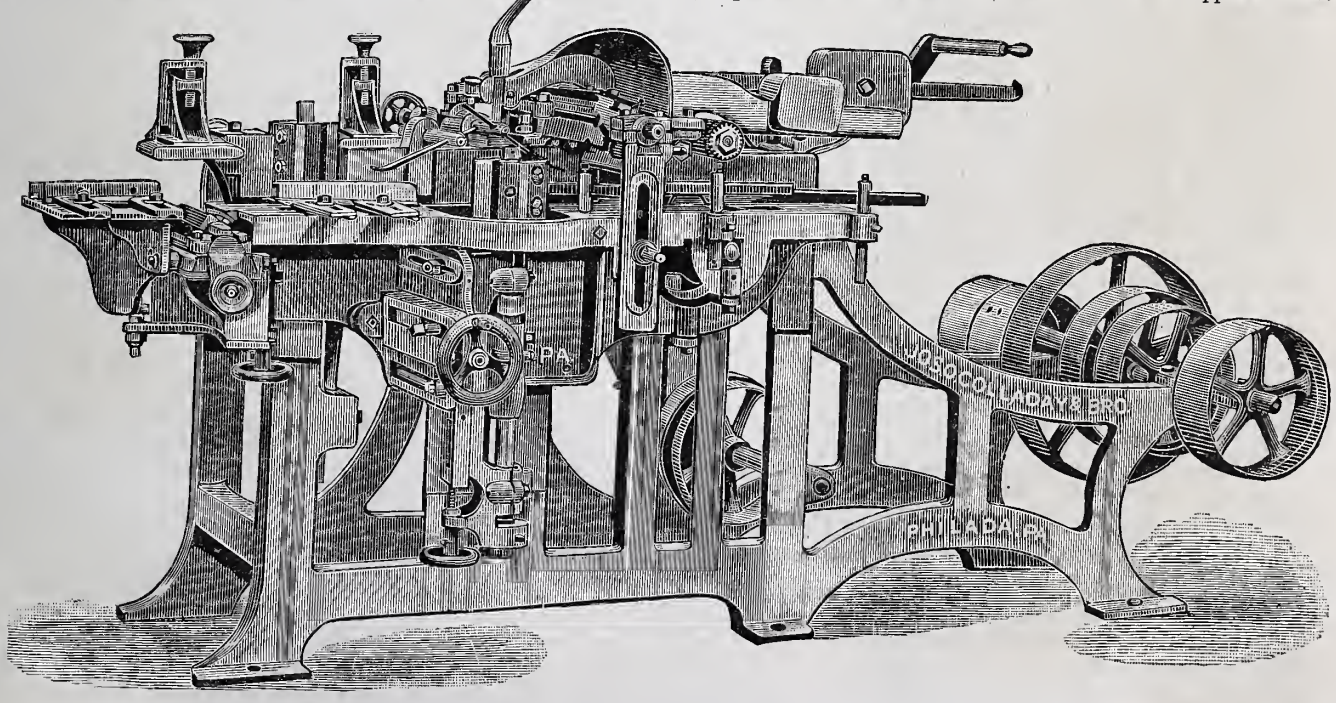


Fig. 14.—*New Molder, Built by Jos. O. Colladay & Bro., Philadelphia.*

CORRESPONDENCE.

Stairbuilding Articles.

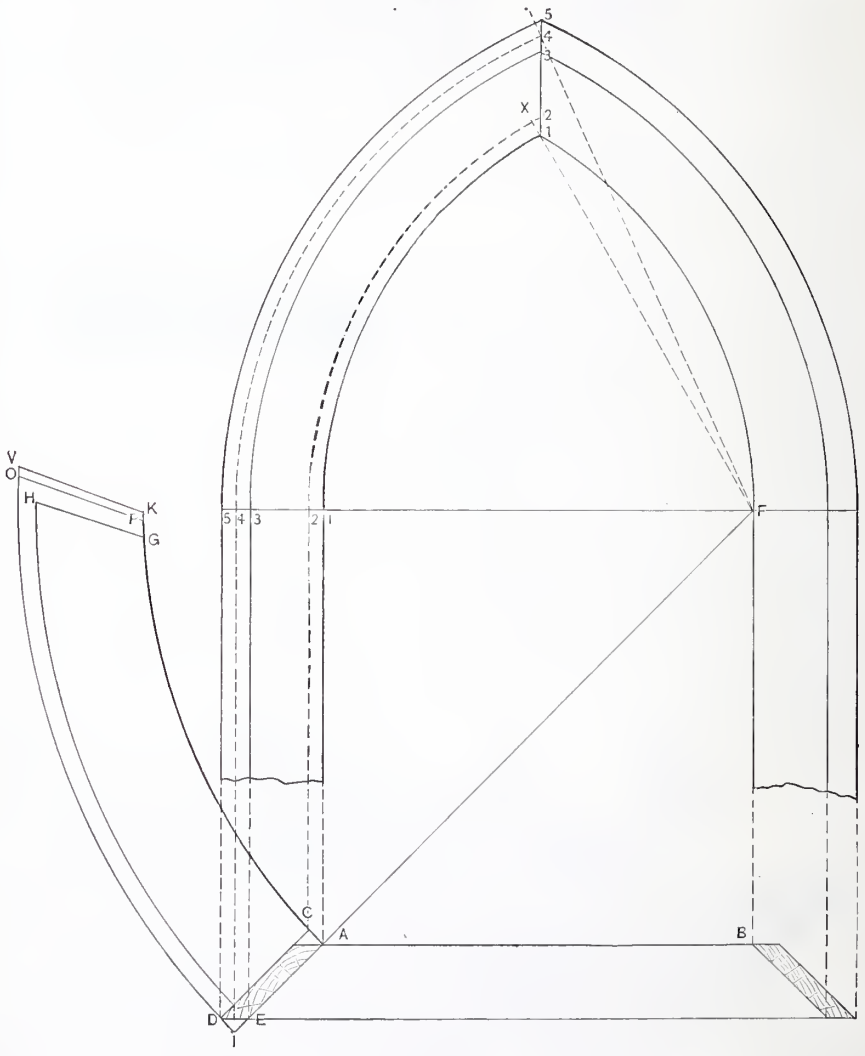
From W. R L., *Remington, Ind.*—In the March number of *Carpentry and Building* there appears an article from "W. G. P.," of Toronto, Ontario, in which he promises to treat the subject there considered very fully at a future time. The subjects of stairs and hand-railing have been written upon and discussed to a very large extent, and by many men entirely competent to deal with the subjects in a scientific manner, yet it seems to me that they have failed to accomplish all the good that is possible. I think the science of the art might be put in a more simple form than has yet been done. I think it might be made so plain and simple that amateurs would be able to catch the important points more easily than at present, when it is treated in so technical a manner as is common in most of the articles that have been published. There are many joiners in the West who are frequently called upon to build stairs, there being no professional stairbuilder within reach. Personally, I have been doing such work, or trying to do it, in a modest way for about 20 years, and no doubt you will think me very green when I tell you that I never saw an experienced stairbuilder at work in my life. All that I know I have caught up from what I have seen in print; accordingly, I have been very much interested in the different articles that have been published in *Carpentry and Building*. The communication referred to at the outset in this letter impresses me very favorably. It struck me at first sight as being more nearly of a character I have been wishing to see than anything else that I have examined. Accordingly, I think if "W G. P." will kindly illustrate his tangent box and describe the mode of using it he will do a great kindness to many young men, especially those in the West, where the conditions are such that a few common-sense hints are worth far more than volumes of technicalities.

Radius Line for Splayed Work.

From G. W. P., *Carthage, Ill.*—I inclose you herewith a drawing showing one method of obtaining the radius line required by "R. D. N.," in the April number of *Carpenter and Building*. A B is the distance between inner edges of splayed or flaring jambs. I use it also in this case as the radius of the Gothic arch. E A is the face of splayed jamb, having a flare of 45°. Continue line E A until it intersects with a vertical line from opposite center of arch, which I have arranged to be at F the center itself. Then F A and F E are the radii required. Strike arcs A G and E H, and make them equal in length to 1 1 and 3 3; join H G, and we have the exact shape and size of the face of the splayed arch. This is all and more than than asked for by "R. D. N.," and would be qute sufficient if he were only going to get out a veneer for the arch; but I understand from his sketch that he wants to kerf and spring the arch of thick stuff. This makes a more difficult problem, for while 1 1 and 3 3 will give the exact length of the two angles or edges of the face of the finished work, and could be used to measure stuff having no thickness—as veneering—it is evident some additional length will be required to measure stuff, which must be kerfed in order to bend it, as the saw cutting across the face certainly removes a portion of the length as well as thickness. In kerfing, it is usual to regulate the depth of the saw cut so as to leave about $\frac{3}{16}$ inch of the thickness of the stuff at the back. Now, in the center of this $\frac{3}{16}$ inch we find what is called the "neutral axis," or that part in the thickness of the piece bent where the fibers of the wood are affected by neither the compression nor tension consequent to bending. So a guage line $\frac{3}{32}$ inch from the back of the piece to be bent would be of exactly the same length after bending as before. Let A C D I give a section of the jamb (before it is beveled), which we will assume to be 1 inch thick; the dotted line near and parallel to C D represents the neutral axis.

We will suppose the pattern for bending is already laid out and cut except as to length, (no explanation will be needed as to why F 1 becomes the radius for the outer edge of pattern instead of F E). We will run a gauge line along each edge to represent the neutral axis. Then, if in the diagram we draw a vertical line from the intersection of the dotted line with C A to the spring of the arch at 2, and with F 2 draw 2 2, we have a curved line showing the position of the neutral axis of the inner edge of pattern after being bent. Now, as this part of the thickness of the pattern does not change in length, we have but to measure 2 2 with a pair of dividers (not too great an opening) and apply it along the gauge line, marking the neutral axis, which will bring us to K instead of G.

To obtain the length of outer edge of pattern, draw vertical line from intersection of dotted line with D 1 to 5; with F 5 draw 5 5, which is the length of neutral axis of outer edge; obtain this and apply it along gauge line on that edge, which brings us to L. Now, A K L I is the exact shape the pattern should be along the plan of the neutral axis. To obtain the bevel of top joint, draw a radial line through 1 to X; take the distance X 2 and set back from K on gauge line and square to face of board at P; join P K, which gives the bevel on inner edge. With radial line through 4, locate V; with distance V 5 set back from L on gauge line and square to face, as at O, join O L for the bevel on that edge, join O P for face cut, and we are done.



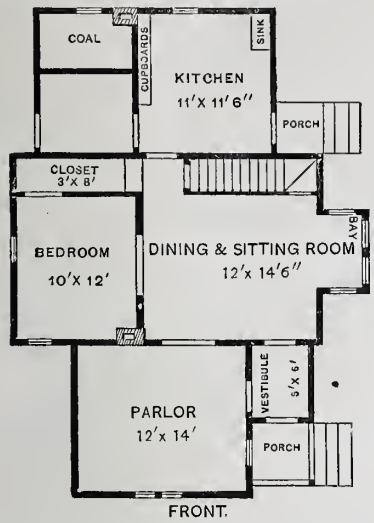
Radius Line for Splayed Work, as Explained by G. W. P.

A Floor Plan.

From A CARPENTER'S WIFE, *New York.*—After reading the first of "Notes and Comments" in the March number of *Carpentry and Building*, I could not resist the temptation to send my plan of a dwelling. If it is deemed worthy of place I should be glad to have it published, and also to have "C. N. C.," of Alpena, Mich., or some other of your many contributors, furnish an elevation or perspective view. We wish to build a house 1¾ stories in hight, the kitchen and coal-house to be one story.

Note.—We take pleasure in presenting the floor plan contributed by "Carpenter's Wife" herewith, and, although she has not suggested that it was open for criticism, we feel disposed to call attention to some points in house-building which may be of benefit in this case and in others where the owners or prospective occupants of the house are giving attention to features of plan and design. The floor plan submitted is not without its merits in point of arrangement, appointment and convenience. At the same time it is open to several objections which apply not only to it, but to many other houses that are being built in the country every year. If what we say in this case shall induce any one to avoid some of the mistakes which are made in house-building, and enable them to add to the convenience and comfort of their home, our space will have been well employed. An objection that many housekeepers would make to the floor plan referred to, notwithstanding the fact that it is intended only for a modest story and three-quarter house, is that there is but a single stairway, and that it opens directly into the sitting and dining room. This necessitates a passage through this room whenever the upper rooms are to be communicated with, and in many cases, especially in the event of sickness in the house, the necessity of so doing becomes quite embarrassing. It is hardly to be thought of in a case like this of introducing another stairway, but there are methods of making a single stairway less objectionable than as here drawn. One method that suggests itself in this connection is that of closing in the rear porch, making it a vestibule not unlike the one in front, and opening a door through the wall that separates it from the stairway, so as to give another means of access to the chambers. It is true that the present staircase is planned with a step so placed as to make this impossible without modification; but we think that enough space could be obtained at the other end to accomplish this, while the convenience added by this little change would

be an important consideration. As now drawn the cellar stairs, which are presumably under the chamber stairs, go down out of the dining-room and sitting-room. By moving a single door they could be made to go out of the kitchen, which would be an advantage, not only in saving steps, but also in the shape of the dining and sitting room. Instead of moving the door, a second door,



Scale, 1-16 Inch to 1 Foot.

Floor Plan Submitted by "Carpenter's Wife."

with glass perhaps, for the sake of the light in the lobby, might be added, which would be an advantage, inasmuch as there would then be two doors between kitchen and dining-room, thus to a certain extent protecting the former from the smells of the latter. The bedroom closet, 3 by 8 feet in size, is of unfortunate shape. The small space partitioned off at the right, we understand from our correspondent's letter, is intended for a china closet. This is too small, while the other is too large, as well as inconvenient in shape, for use. A modification in this respect would, in our estimation, be an advantage. The space between the closet just referred to and the room marked "coal" is not named upon our correspondent's plan. We are in doubt whether it is a porch and hall or is intended as a general storeroom. Evidently it is the intention to carry coal from the coal-room, as marked, through the door leading to the kitchen to the place where the stove would naturally stand on account of the location of the chimney. A little ingenuity would suggest a plan by which coal might be conveyed directly in front of the stove by means of a low opening between kitchen and coal-bin, so that no coal would need to be carried at all. The space in front of the coal-room could be utilized as a pantry or for additional room, of which at present there is a lack. The back chimney is not well located, inasmuch as it goes against the outside wall, thus wasting some of the heat which might otherwise be utilized in warming the house. This, however, seems unavoidable under the circumstances, and, as the back part is only one story high, the loss cannot be a very large item. The front chimney is awkwardly placed in the corner of two rooms, and not in the center of the side of the third.

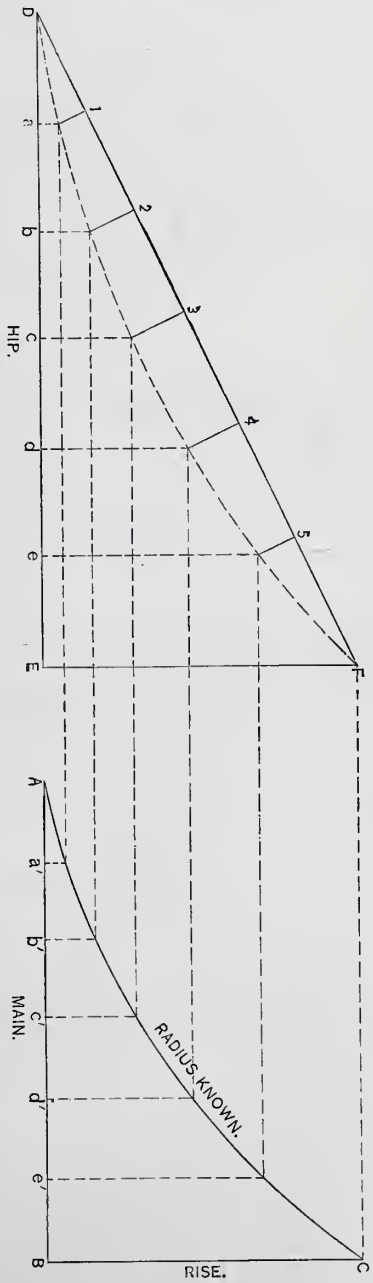
We trust that our correspondent will not consider that we have been unnecessarily critical in this case, for our suggestions have been offered for the benefit of all whom they may concern. Much might be added if space permitted. If any of our readers have further suggestions to make as to the modification and betterment of this plan, we shall be pleased to hear from them.

Proportions of Fireplaces.

From EDWIN A. JACKSON & BRO., *New York.*—In the July number of *Carpentry and Building* you illustrate "An English Fireplace," as designed by Walter Crane. It represents a fireplace perhaps 24 inches wide by 42 inches high; at least, such are the relative proportions of width and hight. Now, every person familiar with the subject well knows that no fire would burn in such a fireplace without smoking. A fireplace is intended for a definite purpose; at least it should be, for it may be made the most important feature of the house, in its double office of heater and ventilator of the room in which it is situated. Therefore, when an architect so far forgets his calling as to sacrifice the comfort and the healthfulness of a house, in order that he may exhibit his ability to produce a fancy fireplace therein, we think he should turn his attention to the production of pictures only, and not to the planning of fireplaces, whose limitations he does not understand. We write this because we see in almost every architectural journal that we take up, and, worse than that, find in the plans made by architects for houses in which we are desired to place our grates, fireplaces low and wide, or fireplaces high and narrow, in which it would be impossible to make a fire that would burn without smoking. There cannot be a great disproportion between the width and hight of a fireplace, if it is expected to do perfect work.

Problem in Hip Rafters.

From J. N. H., *Chattanooga, Tenn.*—I have just had to deal with a problem in hip rafters, which gave me a little trouble at



Problem in Hip Rafters, by J. N. H.

at first, and I would like to get the ideas of some of your readers on the subject. The problem is to establish the curve of the hip rafter on a building, the rise of roof and radius of main rafter being given. The following diagram will give an idea of the method I employed. The size of building and center post, distance rafter extends over plate and radius of main rafter being given, you, of course, have base A B, rise B C and arc A C for your main rafter. For the hip rafter you have same rise E F as for main, with a base, D E, equal to distance from center of building to corner, which can easily be calculated, allowance, of course, being made for center post and extension of of rafter over plate. By dividing base of main into any number of equal divisions and extending right-angle lines from the points on base until they cut arc of circle A C, and then dividing base of hip into the same number of equal parts and drawing lines parallel with base line from the points on curve of main until they intersect the corresponding lines drawn from points on base of hip, points are thus established on the curve of hip rafter. By dividing base of rafters into the number of parts you intend employing jack rafters, you derive the following advantage: Every point established is a point against which a jack rafter will strike, and from point A to the corresponding point on main is the length of said jack rafter. Thus, point *a* curve of hip is the point of contact for first jack rafter, and A *a* is length of first jack rafter; *b* on curve of hip is point where second jack rafter will rest, and A to point on main curve cut by *b* is length of second jack rafter, and thus throughout. By making your drawing to a scale of 2 or 3 inches to the foot you can give the ordinates to the curve on hip by offsets, thus: Give distance D to 1 with its offset; then D to 2 with corresponding offset, &c. I would be glad to have this method criticised by persons who have had more experience than I, and also to learn any other plan of obtaining the desired result.

Windmill.

From C. T. H., *Waltham, Mass.*—Will some of the readers of *Carpentry and Building* kindly give plans and description for the construction of a windmill for farm use? All other information relative to this apparatus has been published in the paper except the construction of the mill itself. I think it would be of service to the readers generally if this were now taken up and discussed practically.

Note.—We have no objections in referring the suggestion of this correspondent to our readers, and leaving it with them to do as seems best under the circumstances. We would remark, however, that windmill construction is much like many other things at the present time—something in which specially equipped establishments with large experience have great advantages over amateurs, however intelligent they may be, and however apt and ingenious. With windmills, as with most kinds of machinery, we think no one can afford at the present time to build for himself. We think it is cheaper and in every way more satisfactory to buy, thus securing the advantage of the experience which comes from long and successful conduct of business. Pending such discussion as our readers may see fit to give this subject we would suggest to our correspondent the propriety of writing to some of the following addresses: Andrew J. Corcoran, 76 John street, New York City; United States Wind Engine Company, Batavia, Ill.; Lake City Tool Company, Madison, Wis.

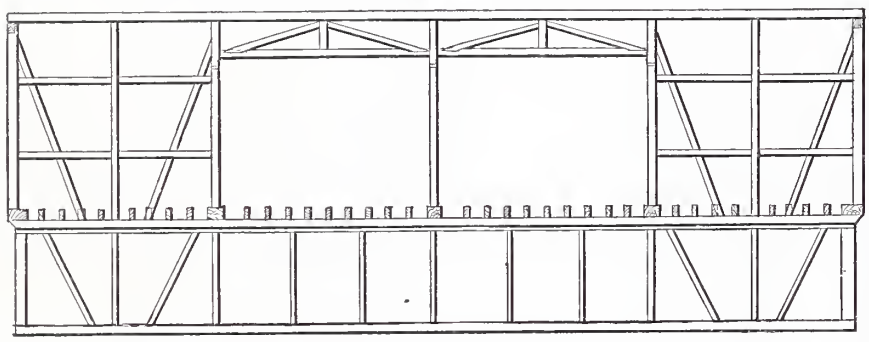
Railroad Buildings.

From F. A. H., *Peterborough, Canada.*—I desire to suggest to both the architectural and practical readers of the paper the desirability of discussing the subject of railway buildings. Personally, if I had more practice in this line of architecture, I would gladly contribute some designs. It seems to me that all must agree that this subject has become very important in various directions. Yet careful investigation seems to indicate that no architect of real ability has ever given the subject careful consideration, nor have architectural works treated upon it as they have dealt with other topics. I am surprised that the numerous railway journals have failed to give this subject such attention as its importance merits. There is al-

together too much conventionality in designs of this sort as commonly erected, notwithstanding the constant outcry from the public and the continual inconvenience to the poor railway officials who are obliged to occupy them. I think great improvements may be made in this line of building if the subject is carefully discussed. Among the railway buildings that I have specially in mind in making this suggestion may be mentioned passenger stations, freight sheds, engine houses, workshops, signal houses and tank houses. The construction of buildings of this class cannot be said to lie entirely in the domain of the engineer; he may contribute his proper quota in the matter of construction, but the design certainly is the province of the architect. I shall be glad to have the suggestion receive attention in *Carpentry and Building.*

Barn Framing.

From J. E. M., *Cookport, Pa.*—According to a promise made some time since, I send you part of the drawings of the framing of a barn which, if deemed suitable, I should be glad to see published in *Carpentry and Building.* The barn is 56 x 64 feet in extent. I would like to have the opinion of my brother framers on this work. I would like to know where I could have improved on it, especially in the matter of the truss from the floor in the middle bent. The barn in question was built where timber is plenty. I would like to hear from some one who has work where timber is not as plenty as in this section, and learn from him how it could be built with less material. I do not think any explanation is necessary, as the drawings will probably be understood by all practical men. Before closing, I wish to say that if *Carpentry and Building* keeps on improving for the future as it has in the past, its equal will be impossible to produce.



Barn Framing.—Fig. 1.—*Front Elevation of Frame.—Scale,* $\frac{1}{16}$ *Inch to the Foot.*

Styles of Architecture.

From G. L. M., *Kingston, Pa.*—While competitions in architectural subjects are popular, would it not be profitable to conduct a series based upon a carefully-selected floor plan, the general scheme of which should be elevations in various distinctive styles of architecture. In other words, let there be selected a set of floor plans of some well-arranged residence as a basis. Then let there be required elevations in the principal styles of architecture, both ancient and modern, each different style forming a separate competition. The object to be gained would be to show the distinctive features of architecture.

Answer.—If our correspondent had considered the scope of his question before he presented it we doubt if it would have reached us, at least in its present form. In order to show the absurdity of such an enterprise as he suggests, let us assume for the moment that the floor plans selected should be that of the eight-room house which has been a conspicuous feature of past competitions in this journal. Given the floor plans in question as a basis, let our readers imagine for a moment what would be produced if we should advertise for elevations of houses constructed to this plan in Babylonian, Persepolitan, Persian, Phœnician, Indian, Egyptian, Chinese, Mexican, Arabian, Grecian, Roman, Byzantine and Gothic styles. Perhaps this is taking our correspondent too literally and carrying his suggestion further than he originally intended; but, restricting the suggestion to the smallest scope consistent with the terms of his proposition, it would be still absurd. The planning of a house in some respects is insuperably connected with the style of architecture in which it is to be erected, or, conversely, the style of architecture would in some respects determine the planning of the house. Hence the impossibility of a house of the kind we have referred to being erected in any of the classic styles or in some of those styles common in modern times which by their nature should be restricted to special uses. We have no doubt that our correspondent meant this suggestion in good faith, and hoped in case it were carried out to obtain much useful information about the different styles of architecture by means of practical illustration. We would remind him and all others similiarly situated that architecture is not to be studied alone, but should always be considered in connection with the history of the people who employ it and the climate in which it is employed. The architecture of ancient Greece and Rome, however elevated in conception and perfect in construction it may have been, is scarcely any better adapted to the conditions of our own times and country than our construction would be to the times and the conditions of the peoples who built the ancient temples. However poor our own architecture may be in itself, it has had its suggestion and its growth out of conditions peculiar to our own country; and whatever may be the architecture of the future, it will be the direct outgrowth from what has heretofore existed and is at present in existence in this way. Those who desire a comprehensive view of the subject of architecture from the earliest records down to the present time cannot do better than to purchase Gwilt's "Encyclopædia of Architecture." This work, which we have had frequent occasion to refer to in the past, contains a historical account of architecture, a description of the various styles, together with considerations of the mechanical and mathematical principles entering into building construction.

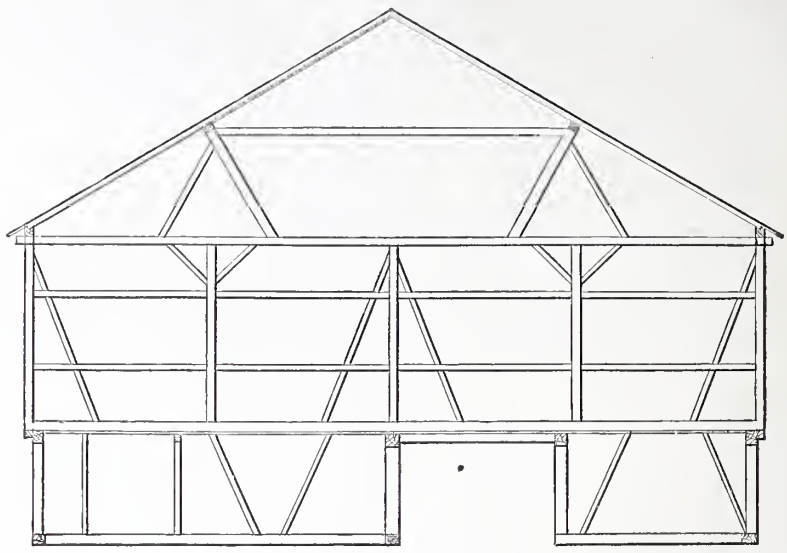


Fig. 2.—*End Elevation of Barn Frame.*

While we are on the subject of absurdities in architecture we may be excused for referring to a suggestion of the same kind recently made by a Southern architect to the architectural fraternity of the country. The American Institute of Architects have for some time past been considering the expediency of erecting a building which shall be the the permanent home of the society. An architect, ambitious alike to hand down his own

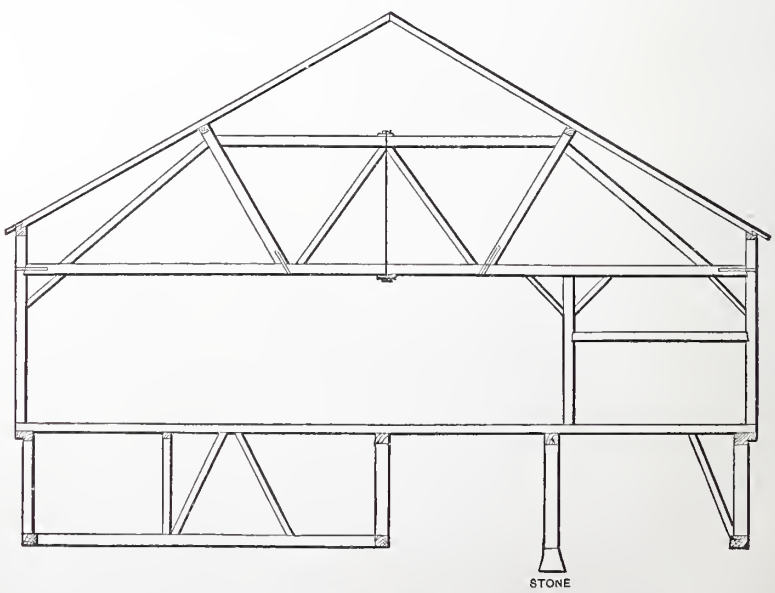


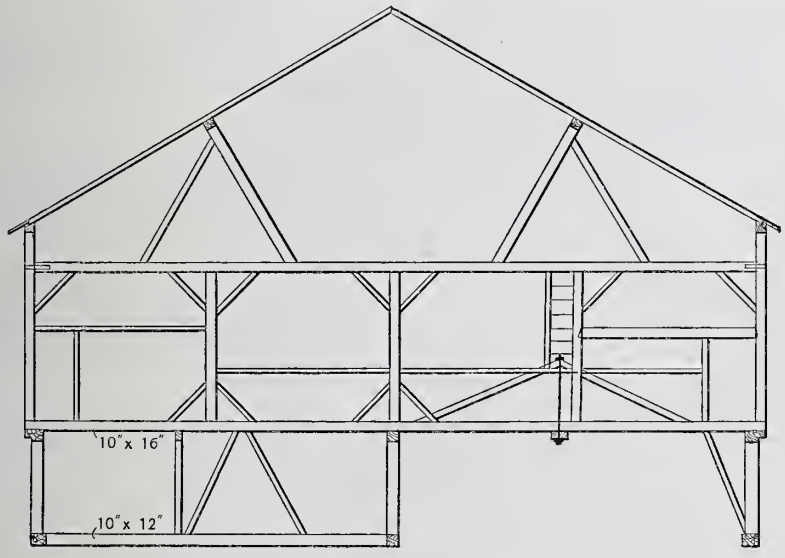
Fig. 3.—*Middle Bent, Showing Plan of Truss Over Floor.*

name to fame and posterity, and to build a monument to the architecture of the past, presents a design for the proposed building to one of our contemporaries, which in its composition contains a little something of almost every style of architecture which the world has known from the beginning of history to the present time. We must say that he has handled the subject in a commendable manner, and that the building, as shown in his drawings, taken as a whole, is not nearly so displeasing to the eye as one would expect under the circumstances. Yet it is an absurdity from the very nature of the case, and its elements remind one of the grotesque constructions frequently indulged in by cartoonists in the comic papers. Those of our readers who have any desire to view the architecture of the past in the light of such an effort as we have described will find a very curious study, and perhaps an acceptable addition to their scrap book, in the American *Architect and Building News*, dated January 19 of the present year.

Building Terms.

From M., *Fort Louis, Col.*—I inclose a short list of terms commonly used within the building trades, the definitions of which I shall be very glad to see published in *Carpentry and Building.*

Answer.—Without occupying space to repeat the terms which our correspondent incloses we will define them in the order in which he gives them:



Barn Framing.—Fig. 4.—Left Side Floor Bent.

WINDOW-SILL.—The term sill means a horizontal piece of timber or stone at the bottom of a framed case; hence the piece forming the bottom of the case of the window is called a window-sill.

WINDOW STOOL is defined by Webster as the flat piece upon which the window shuts down and which corresponds to the sill of a door. The term stool conveys the meaning of a seat, and a window stool, therefore, as the term is commonly employed, means the projecting portion at the bottom of a frame which under certain circumstances might serve as a seat. It is placed above the sill, the latter being the projecting member at the bottom of the frame on the outside of the building. We believe this is the sense in which the term is commonly employed. It is ommitted in the architectural dictionaries to which we have referred.

JAMB may be defined as the side of a window, door or chimney or the vertical side of any aperture.

A RAMP, as defined by Brande, is a concave bend or slope in the cap or upper member of any piece of ascending or descending workmanship. The term is commonly employed in connection with hand-railing work in stairs. In its literal signification it is a spring or bound; hence any sudden rise interrupting the continuity of a slope line. It is sometimes used in the sense of a flight of steps or a line tangential to the steps.

A KNEE is a piece of timber somewhat in the form of a man's knee when bent. This term is also used in stairbuilding, and indicates the reverse of ramp. It means the back of the hand-rail, which is of a convex form.

SOFFIT.—This term means the under side of the lintel or ceiling of an opening, the lower surface of a vault or arch. It also denotes the under horizontal surface of an architrave between columns and the under surface of the corona of a cornice. A term which in some degree is synonymous with soffit is *planceer*, also occasionally written *plancher*, which means the ceiling or the soffit of a cornice.

The term GIRT is used with two distinct meanings among builders and mechanics. In one sense it means the measurement around something, as the girt of a building or the girt of a molding, the latter term occurring frequently where moldings are formed out of sheet metal; it is also used in the sense of a small horizontal beam or girder. The latter is a term peculiar to the United States. The term is spelled both girt and girth.

The term APRON as used among mechanics conveys several different ideas. As commonly defined in the dictionary it means a platform or flooring of plank at the entrance of a canal lock on which the gates are shut. It is also used by metal workers as indicating a peculiar form of flashing—thus a tinner will speak of the flashing and counter-flashing or apron. An apron in the latter sense has the same general meaning as when used in ordinary conversation, and means a garment or cloth hanging suspended at its upper edge. Apron is occasionally used among carpenters in about the same sense, indicating a board hanging over something.

The term CAP indicates an assembly of moldings or other parts which forms the head of a pier or pilaster. In joinery it is the uppermost of any assemblage of parts. Thus, we have the cap of a wainscoting, for example. Cap is occasionally used in the sense of capital. A broad definition of this term is anything resembling a cap in form, position or use.

Hanging Blinds.

From E. C. N., *St. Catherines, Ontario.*—In reply to "C. D. H.," of Hamilton, I submit a description of the manner in which I hang the blinds referred to in a former communication. I first get the hight and the width of the frames with the pattern of segment. I then dress the blinds to size, allowing for three joints. I lay each pair on the floor opposite the frame. I mark the places for the hinges and fasten them on. I then step out upon the scaffold with the rod and fasten on the casing hinges. I next take in my scaffold and then slip the blinds into place and look out for any deficiency. The next step is to fasten the catches on the sills. This being done, I proceed to the next window. Inasmuch as two persons work together at the blinds, one goes ahead at the outside, the other following on the inside. If your correspondent will observe the sketch accompanying my former communication, he will notice that the vertical pieces are notched out below the stone sill, so as to enable one to tip the scaffold on its edge in order to draw it into the houses. I trust this will meet all requirements.

Cellar Cistern.

From W. H. C., *Thomaston, Conn.*—Answering the inquiry of "L. L.," of Richmond, Wis., who desired to know about the construction of a cistern in his cellar, I would advise him to build a wooden frame the size of the inside of the cistern wanted. Place it, say, 6 or 8 inches from the cellar wall, having first dug down into the cellar bottom for firm ground upon which to rest the bottom of the cistern. Place a second frame outside of the first, allowing 1 foot of space between the two, according to the hight of the cistern to be built. Fill the interior space with cobble stone, and then pour in cement made to the proper consistency to fill in between the stones. After the sides have been formed in this way the inside woodwork may be removed and the bottom treated in like manner. The outside woodwork may be removed or left in place, as the location of the cistern may require. If removed the exterior surface of the cistern can be plastered, thus making a smooth surface.

Lime for Preserving Shingles.

From A. F. H., *International Railway, Me.*—It may be of interest to the readers of *Carpentry and Building* to be informed that lime is a good preservative for shingles. The shingles, before being laid, should be given a good soaking in strong lime whitewash well salted. Shingles so treated will make a good, hard, smooth roof for years, and one, too, that moss will not grow upon. It is also partially fire-proof. Sparks are not liable to set it on fire. This whitewash I have applied to good advantage to the inside of wooden bridges, workshops and the like. It makes them look much cleaner and lighter. Where it is used I think there is less danger from fire.

Shrinks from Stove Patterns.

From F. E. O., *Rochester, N. Y.*—Please inform me, through *Carpentry and Building*, where I can get a book that treats of shrinks for stove patterns.

Answer.—We do not know of anything that treats upon this subject save only the brief remarks which apply upon pattern-making in general that may be found in the various mechanical hand-books and in such works as the "Pattern Maker's Assistant." A list of books of this subject will be sent to our correspondent if he will furnish us his name and address.

Tower of Pisa.

From F. W. W., *Des Moines, Iowa.*—I am a young draftsman, and would like to know if the Tower of Pisa was built in its present condition, or became so since. An architect in this city says it was built so. Will some of the old heads please let me know?

Answer.—We find in Gwilt's "Encyclopædia of Architecture" the following: "There can be no doubt whatever that the defect has arisen from bad foundation, and that the failure exhibited itself long before the building was completed, because on one side, at a certain hight, the columns are higher than on the other, thus showing an endeavor on the part of the builders to bring back the upper part of the tower to as vertical a direction as was practicable, and recover the situation of the center of gravity."

Attic Plans.

From D. G. E., *St. Louis, Mo.*—I think it would be a benefit if the attic plan to the design published in the January number, and also to the design in the number for June of last year, were prepared and published.

Answer.—This correspondent, and all others who desire more particulars with

reference to the designs published in *Carpentry and Building* than we give, will probably best serve their own interest by direct correspondence with the authors of the designs, whose addresses we are always careful to print. On as large subjects as the houses here referred to, it is impossible to present every feature of detail and plan that may be desired by those who propose to use the designs. The same applies to estimates of cost, which we have not undertaken to publish, and which are frequently inquired for. Those who address us on these subjects are always referred to the authors of the designs, from whom they can obtain whatever is necessary. Since in some respects contributions to a periodical like *Carpentry and Building* upon the part of competent architects is like casting one's bread upon the waters, we suggest that all who correspond with the authors of the designs for the purpose of obtaining such additional information as they may be in need of, should do so with a willingness to pay for the actual benefit to be derived.

Planning Risers.

From F. S. W., *Cleveland, Ohio.*—I desire to say to "I. F.," of Central Valley, N. H., that he should plan his stairs a little differently, so as not to have the riser lines crowd so much at the angles. As the plan is given there is no choice as to setting the angle posts. They must be set to receive the rail coming from each way. I should make all the flights of the same width and should plan the stairs so as to use the same pitch board for all the treads and risers. The stairs can be built just as he has drawn them, but it will leave a jog underneath at each turn or landing of the stairs. The post at the top should be placed so as to include the end of the raking stringer on the last flight.

Twist in Outside Blinds.

From C. M. R., *Wheeling, W. Va.*—The article in the April issue of *Carpentry and Building* on twist in outside blinds needs a slight correction in order to make it convey my meaning. Beginning with the words "this may be done," it should read on "by mortising the slats in the stiles on a slight twist." It will be observed that the spring to the slats, when twisted, will spring the shutter more or less, as desired. I think the fraternity at large will be interested in this if correctly understood. I have found it a No. 1 kink.

Architects' Fees.

From J. L. M.—I desire to know upon what architects base their charges for the plans and elevations of buildings.

Answer.—Architects' charges are for the most part based upon the cost of the building to be erected, and are a definite percentage of the amount. Sometimes their charge is divided into two amounts—so much for plans and specifications and so much for superintendence. On small work the price is sometimes fixed in lump arbitrarily, and on very large work special terms are often negotiated.

A Question in Hand-Railing.

From R. D. M., *Grand Forks, D. T.*—I would like to ask some stairbuilder to explain the most practical way of laying out a winding hand-rail. Having no book at hand to which to refer, and having occasion to put up a winding rail recently, I found considerable difficulty in laying out the same.

Note.—Our correspondent does not present a specific problem by means of a diagram, but offers the question in a general way. As the subject of stairbuilding has been more or less considered in back volumes of *Carpentry and Building*, we feel disposed to refer him to them for the principles involved, or to some book on stairbuilding, either of which will afford him the information he desires in shorter time than he could possibly expect it through the medium of a monthly journal. We have no doubt that some of our readers would take pleasure in answering his question if it were presented in a way to show the actual conditions to which the rail is required.

REFERRED TO OUR READERS.

Drawers.

From C. W. F., *Cambridge, Ohio.*—I desire to learn from some practical reader of the paper how drawers are made to slide on rollers, what size the rollers should be, and whether they should be of wood or metal?

Center of Gravity.

From W. P. D., *Cleveland, Ohio.*—I would like to ask "H. L. C.," of Buffalo, who favored us some time since with a consideration of the subject of the center of gravity of plane surfaces, to rise up and explain why he takes the trouble to divide his irregular trapezoid into four parts to find the center of gravity, when it can be done much quicker by the same general method by dividing the figure into two triangles and finding their common center of gravity. This method, by the way, is simply that of Trautwine for finding the common center of gravity of two or more bodies. An explanation of it will be found in his "Engineers' Field Book," page 442.

From M., *California.*—It seems to me that our center of gravity friends do not stick to the subject first proposed, which was center of surface.

Joining a Wing to an Upright.

From H. B. Y., *Chagrin Falls, Ohio.*—I desire to inquire of the readers of *Carpentry and Building* the best method of joining a wing to an upright in order that it may be water-proof. I have tried tin flashing, also a gutter, with very indifferent success in both cases.

Workbench.

From W. S. W., *Kalamazoo, Mich.*—Will some practical reader of *Carpentry and Building* contribute a plan for the construction of a workbench suitable for pattern-makers' use, or for a cabinet-maker? I want something that is adapted to that class of mechanics who recognize the value of a convenient bench, with all modern improvements. I think a plan with sufficient details for the construction of a good bench of this character would be appreciated by the readers of the paper generally.

Design For Pulpit.

From S., *Waveland, Ind.*—Will some contributor to *Carpentry and Building* furnish a design, with details, for a pulpit suitable for use in a frame church in the country. The cost of the building is about $2000, and the pulpit should be in keeping.

TRADE NOTES.

The Dunning patent boiler, of which over 1500 are said to be in use at the present time, has been recently illustrated upon a neat card with metal edges, arranged for hanging up. Three views are presented—a general view of the apparatus as it would be placed in a cellar or basement for heating a dwelling, a vertical section showing the arrangement of the self-feeding coal magazine and water-flues, and a general view of the base for the boiler, showing the anti-clinker rocking grate. This form of heating apparatus is manufactured by the New York Central Iron Works, Geneva, N. Y.

Messrs. Butler & Constant, with office at 18 Warren street, New York City, have lately taken the agency for Gorman's folding adjustable extension scaffold support, which was fully illustrated and described some time since in this journal. Building samples of the device can be seen at the company's rooms on Warren street.

The Kansas City Corrugated Iron and Ventilating Company, Kansas City, Mo., have sent us an oblong pamphlet illustrating their specialties. Corrugated iron as put up by this company is held in place by the use of Smith's patent adjustable fastener, which has the advantage of permitting the sheets to be removed for repainting or other purposes whenever required. Smith's patent ventilators and chimney-caps are also illustrated, and at the close of the pamphlet a number of designs of galvanized cornices and window-caps are presented.

The Scribner Roofing and Cornice Company, of St. Paul, Minn., have one of the most complete establishments in the Northwest, and probably in the country at large. In addition to galvanized-iron work, including Hayes's skylights under royalty, they also manufacture corrugated iron and an excellent article in the way of fire-proof shutters. The same company do an extensive business in slate, asphalt, and pitch and gravel roofing.

STRAY CHIPS.

A residence for the president of the university is in course of construction at Boulder, Col., from plans furnished by Mr. C. Stokes, of that city. The structure will cost, when completed, about $7000. Two buildings designed for the use of the students are also going up—one from plans furnished by J. G. Weller, of Denver, to cost $4600, and the other from plans by Sterner & Varian, also of Denver, to cost $3800. Mr. Stokes is the superintending architect for the improvements.

On the corner of Fifteenth and E streets, Washington, D. C., the Washington Light Infantry Corps has lately commenced the erection of a building combining an opera house and armory. The cost of the structure is estimated at $125,000. Messrs. Gray & Page are the architects, and Mr. D. J Macarty the builder.

Mr. G. L. Twichell, of Brookfield, Mass., is erecting a building 28 x 60 feet in plan and three stories in hight, which will be occupied as a manufactory for shoe heels. The structure will be first class in all respects, steam being used for power and heating. The work is in charge of Mr. A. D. Ward, of that place.

Work has lately been commenced on the Colby Block, situated at the corner of Milwaukee and Mason streets, Milwaukee, Wis. The building will have a frontage on Mason street of 120 feet, on Milwaukee street of 100 feet, and will be five stories in hight. The foundations will be of stone and the superstructure of brick with stone trimmings. The cost is estimated between $150,000 and $200,000.

The Johns Hopkins Hospital are putting up a warehouse on a triangular lot fronting 115 feet on Lombard street, 14 feet on Hanover street and 122 feet on Uhler's Alley, Baltimore, Md. The structure is to be of brick with stone finish, four stories and basement in hight. The plans were furnished by Mr. George Archer. The cost is estimated at from $25,000 to $30,000.

Mr. Charles L. Carson has furnished the plans for the hospital building in course of erection on Baltimore street, between Lloyd and Exeter streets, Baltimore. The structure is 57 x 63 feet in size, three stories and mansard in hight. Brick, stone and terra-cotta are the materials used. Messrs. Philip Walsh & Sons are the builders. The cost is placed at $15,000.

A hotel building, known as "The Commercial House," has recently been completed at Sioux Falls, Dak. The structure is 70 x 100 feet in plan, four stories in hight, and contains 100 sleeping apartments. The cost was $40,000. W. L. Daw was the architect, and E. L. Caster the builder.

At Stockton, Cal., Mr. C. Belding is erecting a two-story and basement frame structure, to cost $12,000. W. G. Copeland is the architect.

Abilene, Texas, is to have a court house that will cost $30,000. The structure will be of brick, three stories in hight.

The Catholic Society at Bellows Falls, Vt., have commenced the erection of a $25,000 church.

A hotel company has been organized at Savannah, Ga., under the name of the Forest City Hotel Company. A new building is to be erected, which is estimated to cost $300,000.

A schoolhouse is to be built on Shaw street, West Newton, Mass., to cost $15,000. J. F. Ober, of Boston, is the architect.

Prominent among the buildings in course of erection at Denison, Texas, we note the following: State National Bank, a two-story brick structure for banking purposes, to cost $16,000; Louis Lebrecht, a fine two-story brick building, 50 x 120 feet, to cost $17,000; E. V. Ransford, a two-story brick and stone building, 50 x 100 feet, to cost $10,000; A. Jacobs, D. A. Cook and W. M. Nagle, a block of two-story brick business houses having a total frontage of 100 feet and depth of 110 feet, to cost $30,000.

A building 300 feet long and costing $25,000 is to be erected at Batavia, N. Y., for the Post Sewing Machine Company.

One of the most important building projects in the city of Chicago is to be a 12-story office building, fronting 68 feet on Jackson street and 100 feet on both Fourth avenue and Dearborn street. The building is to be fire-poof in every respect, even to the window frames, which will be of iron. The basement and first two stories will have outer walls of Pennsylvania mica stone, that is said to be entirely impervious to heat or flame, and the upper stories will be faced with the best quality of Chicago pressed brick. There will be three commodious passenger elevators in the main hall, besides the staircases. The structure is estimated to cost $250,000.

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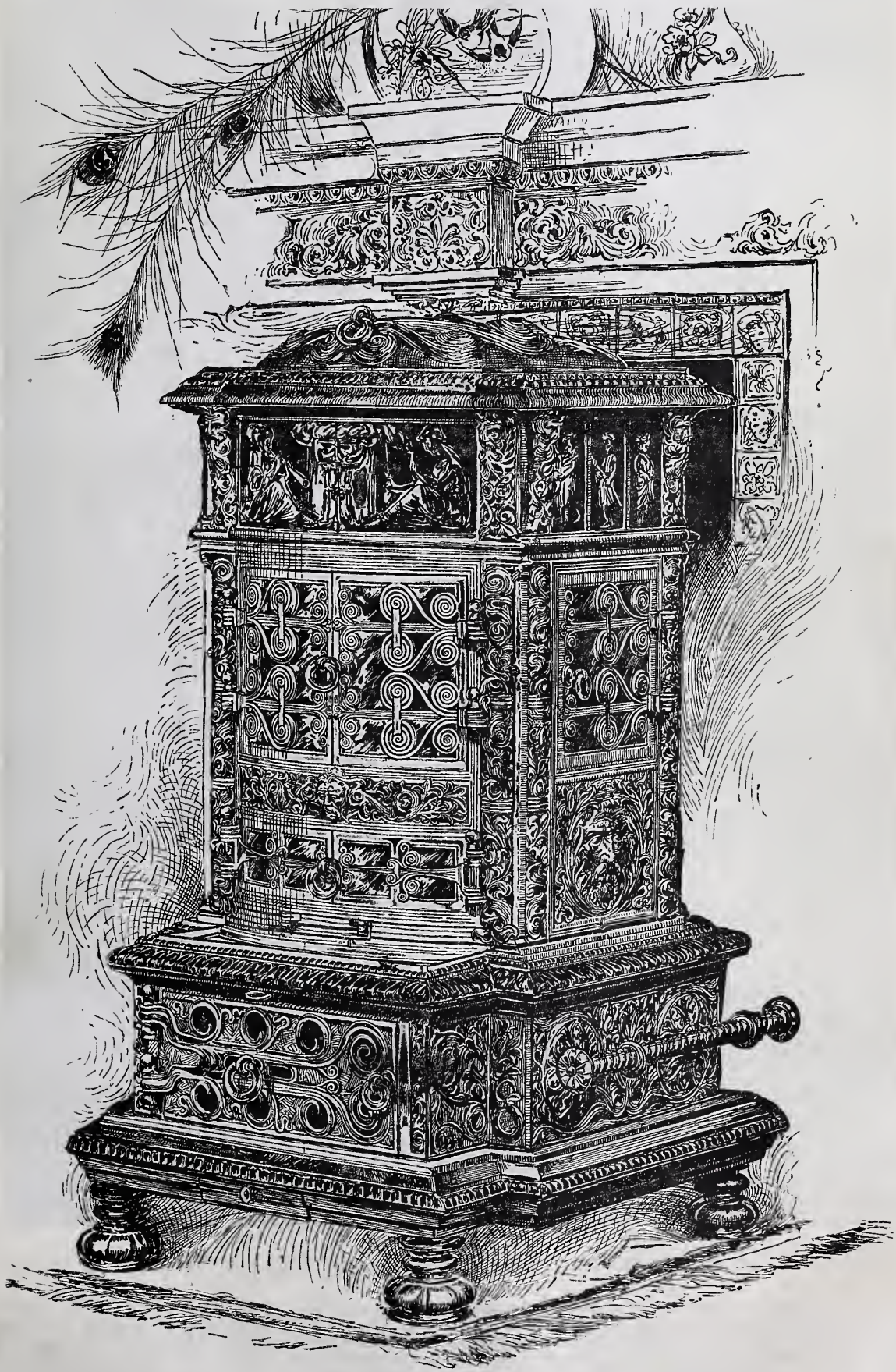
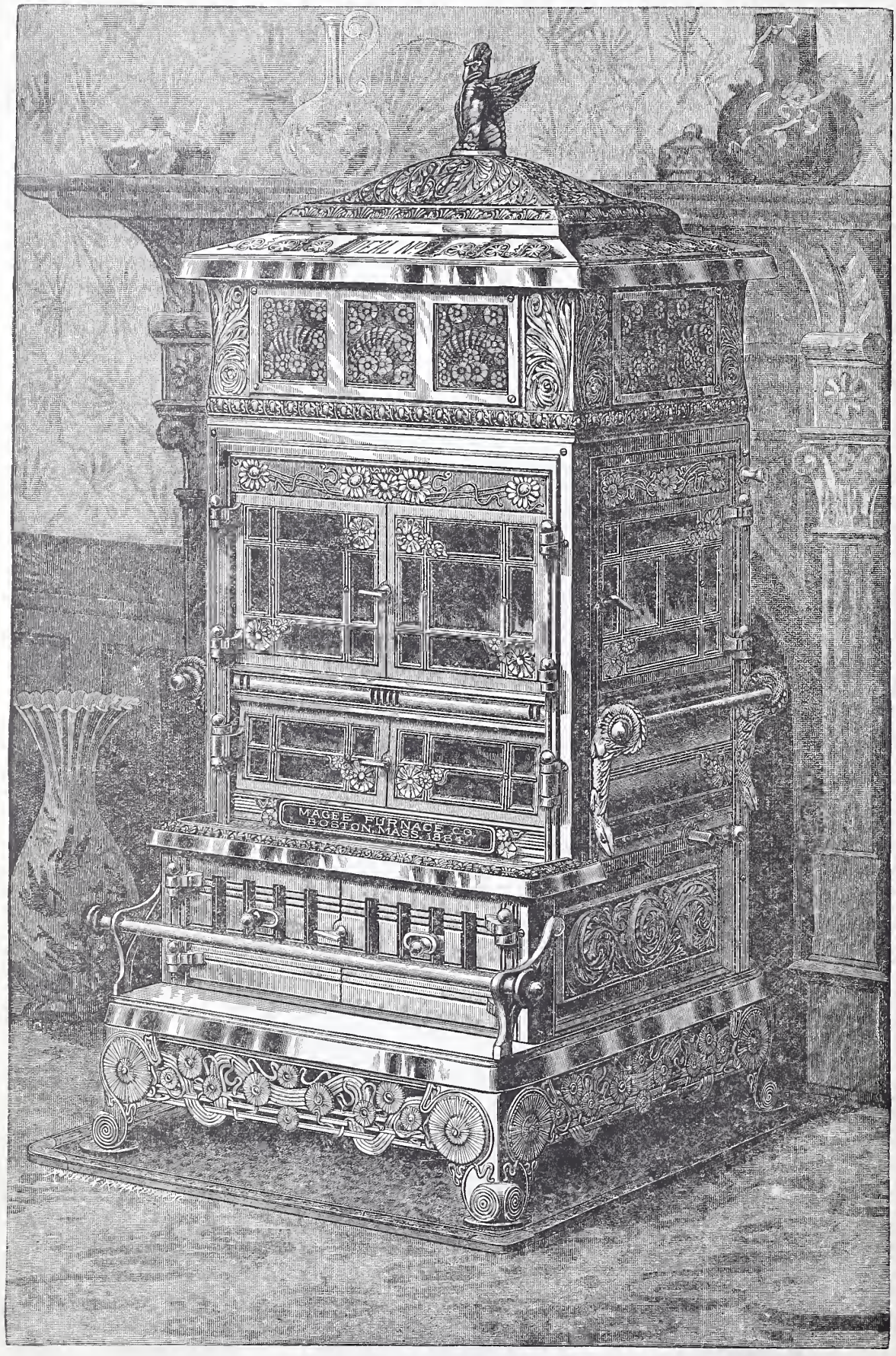


ARTISTIC HEATING STOVES.—THE "ART WESTMINSTER."—RATHBONE, SARD & CO., ALBANY, N. Y.

Artistic Heating Stoves.

While the furnishing and decorations of rooms in houses of moderate cost are seldom considered as belonging to the architect's work, he is frequently called upon for advice respecting these matters where a considerable sum is to be expended or where the very best effects are desired. In addition to this he often has the opportunity of making suggestions which are advantageous to his clients, although such services are not specifically included in his contract. It is hardly necessary, however, to bring forward arguments in support of the broad proposition that architects and builders should keep thoroughly informed upon all matters of furnishing, as well as upon those of design and construction. The advantages accruing from the pursuit of a liberal policy of this kind must be self-evident to all who give the subject a moment's reflection. Accordingly, in devoting space at this time to a consideration of some of the more desirable forms of heating stoves now before the public, although such a topic at first thought may seem somewhat outside of the nominal field of this journal, we shall be laying before our readers information which in many cases can be turned to practical account at once. Until recently it has been the reproach of the stove trade of the country that, no matter how meritorious our stoves have been as heaters, nothing has been available which, by reason of its artistic features, was desirable or



ARTISTIC HEATING STOVES.—THE "IDEAL."—THE MAGEE FURNACE CO., BOSTON, MASS.

even unobjectionable for use in a well-appointed parlor or library. The round or "pump-log" base-burner, loaded with nickel and meretricious ornament, is an example in point and illustrates at once both the best and the worst, and also about all that has been available. The production of some stoves which in their designs are not only unobjectionable from a critical point of view, but, in fact, are of real art excellence, and which at the same time are among the best of heaters, becomes a matter of wide interest and importance.

For a number of years past the open fireplace has not only been fashionable in the appointments of all rooms the furnishing of which have had any claim to being in good taste or artistic, but it has been the only form of heating apparatus which could be obtained of a style and character to harmonize with fine furniture, handsome walls and rich carpets and upholstery. The open fireplace, whatever may be urged in its favor from sanitary considerations, has seldom been an economical success as a heater. Housekeepers have always found it a dirty adjunct, damaging by its dust such articles as carpets, furniture and paintings to many times its value in a very short period of time. They have submitted to the infliction because an open fireplace was the proper thing to have, and because no other form of heating apparatus which in itself would constitute part of the furnishing of a room or harmonize with artistic furnishings was available. Steam heat and furnace heat cannot be nsed in all situations, and therefore in many cases it has been a choice between a grate and a stove. Artistic considerations have frequently decided in favor of the former, and where a grate was impossible a stove has been used, with the best apology for its presence among superior surroundings which it was possible to frame. The advent of artistic heating stoves relieves all embarrassments of this kind.

It is not our purpose to cry down the open fireplace or grate. It has its appropriate use, and every house, in whatever way heated, should have at least one of them, if for no other purpose than to furnish the convenience of a small fire in the cool evenings of summer and early fall, on damp days and in case of sickness, when other means of artificial heat are out of use. The open fireplace, however, has been overdone. It has of late reached a cost that is prohibitory in many cases. Of course our remarks are restricted to those designs that have any claim, just or otherwise, to superior art excellence. What with bright brass, elaborate hearths, painted tile and other accessories, the cost has reached a figure that makes an open fire one of the dearest luxuries of liberal living. Considered purely as a matter of art, and supplemented by steam heat or hot air, some of these costly settings might be passed; but a grate supplied with them fails of its ostensible purpose. To build a fire in it adequate to heat the apartment in which it is placed would ruin it. These facts are so generally known to all practical people that it is unnecessary to dwell upon them in this connection. We mention them only to contrast artistic grate settings with artistic heating stoves. The latter are scarcely more expensive than stoves that make no pretense to art excellence or those of similar heating capacity heretofore in use.

Panel on Top of the "Hub Franklin."

ARTISTIC HEATING STOVES.—THE "HUB FRANKLIN."—SMITH & ANTHONY STOVE CO., BOSTON, MASS.

Heating stoves in a majority of houses are a necessity. They may be the sole dependence for arificial heat, or they may be mere anxiliaries to some more elaborate system. In whatever way they may be employed it is desirable that they should be not only good heaters and economical in consumption of fuel, but that in all their features they should be in good taste. The art instincts of our people have made great progress in the last few years, and that at last we have good stoves as well as good carpets, good wall paper and good furniture is a matter for congratulation. The artistic heating stoves at present before the public are good heaters, being made to models which have already demonstrated their worth in this respect. They are as economical as the best round base-burners, with many of which the public has become familiar during the past 10 or 15 years, and they are of a character in point of exterior design to require no apology for their use in apartments, no matter how artistically furnished. The manufacture of art stoves in this country dates from about three years ago. At that time the round stove, in almost universal use, began to be superseded by the square stove, which has since becomo deservedly popular. The first square stove, which in a modified form is shown in our second illustration, marked the first successful attempt to introduce real art excellence into stove castings. That the problem was successfully and intelligently solved is evidenced by the large line of fine art castings which the Magee Furnace Company are producing, as well as by the stoves they are making. The success of the pioneer square art stove caused other manufacturers to compete in the same field, and several other square art stoves are in the market at the present time. We have space to illus-

trate only one of them, the "Art Westminster." The Smith & Anthony Stove Company, in addition to the Franklin stove we illustrate, make a square art stove of great merit called the "Modern Hub." While the success of the first square stove, on account of its art excellence, induced competition, as has already been mentioned, on this high plane, the popularity of the square stove with the general public has induced many manufacturers to make it without reference to art features. Accordingly, it becomes necessary to remind our readers that all square stoves are by no means art stoves, and that careful discrimination in selection is necessary.

A few words with reference to the stoves illustrated herewith will be of interest. The "Art Westminster," which is shown on our first page, is made by Rathbone, Sard & Co., Albany, N. Y. It may be described as a square, low feed base-burner with a round fire-pot. It is well proportioned in its working parts and makes no departures from the shapes and relation of parts which experience has shown to be conductive to the most satisfactory results in operation. In point of utility it leaves nothing to be desired which can reasonably be expected of a magazine stove. As a work of art it is rich without being "showy." Each part takes and keeps its proper place in the design, and there is no slighting of details in one part to emphasize the effect of other parts. The ornamentation is honestly carried out in every part. The plates in the back are as carefully and conscientiously enriched with ornament as those of the front. The only bright metal about the stove is that of the hinge-pins, the handles for opening the doors and moving the draft slide, and the end foot-rails, all of which are in brass and are appropriately ornamented. There is no glitter of any kind. The beauty of any piece of work is but indifferently conveyed by an engraving, and this stove, as well as the others we show, needs to be seen to be fully appreciated.

As already mentioned, the "Ideal," which is shown in our second illustration, has been before the public for some time. It has, however, undergone some modifications since first introduced, and as put upon the market the present season is superior to the earlier forms. In its general effect it still adheres quite closely to the original idea, which, as we have stated, was successfully revolutionary in character. The "Ideal" is made by the Magee Furnace Company, Boston, Mass., and in general features is of the same characteristics as described in connection with the "Art Westminster. It is a thoroughly practical stove as well as a beautiful stove. The detail ornament is probably the best that has ever been done in cast iron. It is rich without being at any point obtrusive, and the castings are exceedingly fine and beautiful. As a heater its utility has been satisfactorily demonstrated by the practical test of the thousands which have been sold the past three years.

Our third illustration shows a stove of another class, but which also combines art features with practical utility. The "Hub Franklin," made by the Smith & Anthony Stove Company, of Boston, may also be described as a beautiful stove. It gets but scanty justice, however, at the hands of the engraver. A photograph of the stove shows that it is entitled to a far more favorable opinion than the cut alone would warrant, while an examination of the stove itself is still more satisfactory. Our readers generally know the "Franklin" stove—a form of portable open-fire apparatus, useful in many different situations, which has been popular ever since the day of the person whose name it bears. The form of it here shown has been carefully considered by the artist, and the details of ornamentation throughout are pleasing. Our fourth engraving shows the panel which forms the top of the stove, and indicates in some measure the care which has been taken in working out the parts.

All of the stoves here shown are examples of the work of modelers rather than of pattern-makers. The introduction of art forms into stove construction and ornamentation necessitated a change in the character of patterns. It was necessary to go somewhere else than to the wood-pattern maker, who is a joiner rather than an artist, and, accordingly, the modeler has had a chance to show what he could do. The results can be gained from the examples before our readers. They show conclusively that for the future the modeler as well as the pattern-maker will have work in preparing stove patterns.

NEW PUBLICATIONS.

THE PRINCIPLES OF VENTILATION AND HEATING, AND THEIR PRACTICAL APPLICATION. By John S. Billings, Surgeon U. S. Army. Size, 6 x 9½ inches, 216 pages, illustrated, bound in cloth. Published by the *Sanitary Engineer*. Price, $3.

Dr. Billings in some respects has enjoyed exceptional opportunities for gathering facts relating to health questions, and for reducing them to proper form for presentation to those who plan and erect buildings and manage sanitary matters. There are very few, in the medical profession at least, that have as large an acquaintance with books bearing upon the special questions of his research, and with men eminent in science, as Dr. Billings, and, surrounded as he is by expert help in his office, he is in a position to render important service to the community at large by what he may write and publish bearing upon health. That he has not neglected his opportunities is evident by the present volume and others which he has issued, and by numerous contributions to the scientific and engineering journals of the country. This interesting and valuable series of papers first appeared in the *Sanitary Engineer* as a serial during the years 1880, 1881 and 1882, under the title of "Letters to a Young Architect." In reducing it to book form the papers have been rearranged and largely rewritten, with the addition of some new matter. The author discusses the question of ventilation and heating from various standpoints, beginning with the expense and following by an explanation of the laws which must be observed in the successful accomplishment of this work. There is next presented a very comprehensive description of the various methods of heating, together with some particulars relating to patent systems. Schools, hospitals and other public buildings which require exceptional methods are discussed, and perhaps receive a little more attention than the ordinary house. Principles are so carefully stated in all cases that their application is obvious. Seventy-two figures are introduced, and the volume is supplemented by a very comprehensive alphabetical index.

MODERN HOUSE-PAINTING. Containing 20 colored lithographic plates exhibiting the use of color in exterior and interior house-painting. By E. K. Rossiter and E. K. Wright. Second revised edition. Size, 9 x 12 inches, oblong, bound in cloth, with gilt sides, title. Published by Wm. T. Comstock. Price, $5.

The first edition of this volume met a demand that was more than complimentary to the work, which undertook something that had never been attempted previously. The difficulty of representing colors applied to buildings, whether for interior or exterior decoration, by means of lithographic printing on paper, was greater than many would suppose. The first edition having been exhausted, both author and publisher were glad of the opportunity to profit by the experience gained in the first instance, and put upon the market a revised work which should be better than its predecessor. In thus describing the circumstances under which the second edition has been issued, we do not for a moment detract from the merits of the first. While it had some shortcomings, it was a volume of unquestioned merit, and served an excellent purpose in the hands of all who made use of its suggestions. The changes which have been introduced in the new edition are for the most part corrections of what the authors have considered blemishes in the first, and of introducing happier combinations of colors in some instances than were shown in the original work. The authors have taken advantage of the criticisms that were made on the first volume, and, so far as possible, have made the present work acceptable to all. Of the changes made in the new edition the most important are found on Plates 4 and 9, which are substantially new. They are among the most satisfactory in the book. Plates 2, 6 and 10 are entirely changed in coloring, and others have been more or less modified.

HINTS AND PRACTICAL INFORMATION FOR CABINET-MAKERS, UPHOLSTERERS AND FURNITURE MEN GENERALLY. Size, 5 x 7½ inches, 130 pages, bound in cloth. Published by the Industrial Publication Company. Price, $1.

This little volume, which is an acceptable addition to the many practical works which the company above named have issued, seems to be a compilation of directions for work, recipes and other matters, which are properly included under the title it bears. In the preface the statement is made that, while a large amount of the matter contained in this work has long been before the public in one shape or another, it has been in many instances incorrect, and therefore unreliable. It has been the aim of the compiler of this volume to make all necessary corrections and to render the work as reliable as possible. To this end it is stated that no expense and pains have been spared. Considerable new matter that has never been generally known heretofore has been added to that which has been public property for a long time. The work has been divided into appropriate chapters, with numerous subject heads printed in heavy-faced type, so as to make the search for any item a comparatively simple matter. In addition it is supplemented by an alphabetical index.

ENCYCLOPÆDIA OF MONOGRAMS. Portfolio form; 130 plates, 9 x 11 inches. Compiled and published by John O'Kane. Price, $10.

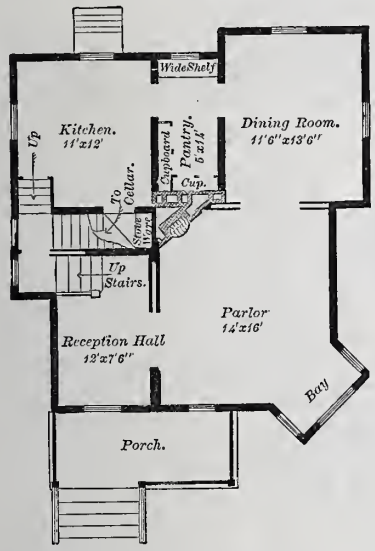
This work, which is probably the most complete of any on the subject, contains more than 5000 examples of two, three and four letter combinations in the English, French, German and antique styles. The designs are valuable for engravers, painters, metal-workers and designers generally. By means of this portfolio a very complete display of what has heretofore been done in this line is laid before any person who may consult it prior to attempting some special design he has in mind. The work will undoubtedly find appreciative purchasers among the special class for which it is intended. The last plate in the book, instead of containing monograms, to which all the others are devoted, shows the form and design of the crowns of some of the rulers of the Old World. Among those presented are the crowns of the English royal family, those belonging to Germany, the Napoleonic Imperial crown, the Papal tiara and others. The plates have been carefully printed by lithographic process, and throughout the work is attractive, whether casually examined or inspected for the purpose of obtaining practical suggestions.

MECHANICS' AND ENGINEERS' POCKET-BOOK. By Charles H. Haswell. Size, 6½ x 4 inches; 922 pages. Published by Harper Brothers. Price, $4.

Mr. Haswell's "Pocket-book for Engineers" is so well known and has within past years secured so wide a popularity and usefulness that it is entirely unnecessary for us to go into anything like details as to its general arangement and method of treatment of the different subjects it embraces. From the first edition, which was published in 1843, which covered 284 pages, the work has gradually grown to its present size, additions being made in some cases and entirely new subjects introduced in others. In the 45th edition, which is now before us, the tables of areas of circumferences of circles have been extended, and, together with those of weights of metals, balls, tubes, pipes, &c., have been computed and verified by the author. This edition is a revision and entire reconstruction of all the preceding ones, embracing amended and also much new matter, as, for example, those portions relating to masonry, strength of girders, floor beams, logarithms, &c. The book is provided with a very full index, and the matter is excellently arranged and classified, and, as in all preceding editions, will unquestionably prove of the utmost value and convenience to those who have occasion to refer to it.

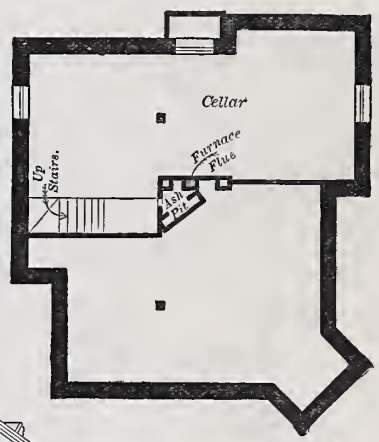
$1500 Frame House.

We submit herewith the third of the three successful plans in our Fourteenth Competition. The present design, the one published in our August issue, and the one shown in our number for May, received equal prizes. The author of the design here shown is Mr. D. S. Hopkins, Grand Rapids, Mich. The floor plan has several features to commend it. The parlor is large and capacious, and the corner bay window gives it an abundance of light. The reception hall is also conveniently arranged both in itself and with reference to the other rooms. The stairs, it will be seen, are so constructed as to make one flight serve the double purpose of front and back stairs. In this particular Mr. Hopkins's floor plan in some respects resembles that of Mr. Williams, which was presented in our August number. The resemblance, however, is only in general features, for the details are sufficiently different to

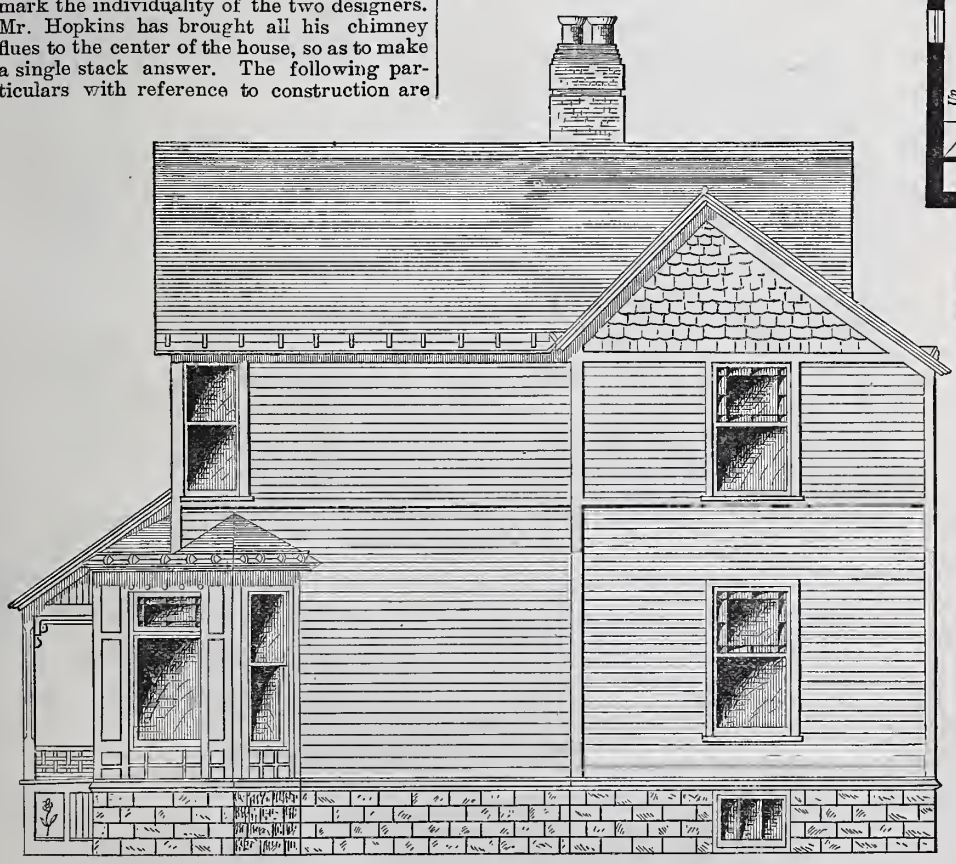


$1500 *Frame House.—First Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.*

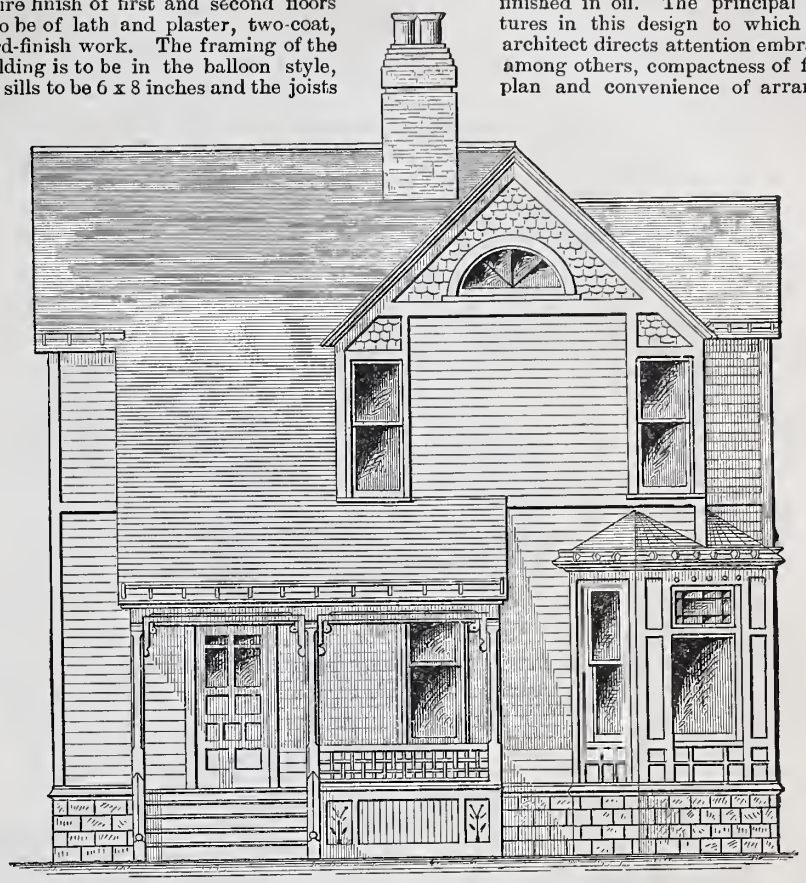
mark the individuality of the two designers. Mr. Hopkins has brought all his chimney flues to the center of the house, so as to make a single stack answer. The following particulars with reference to construction are derived from concise specifications which accompanied the design in the competition: The chimney is to be provided with an ash-pit base in the cellar, and is to be planned for the use of a furnace, the flue for the latter to extend to the bottom of cellar. The entire finish of first and second floors is to be of lath and plaster, two-coat, hard-finish work. The framing of the building is to be in the balloon style, the sills to be 6 x 8 inches and the joists for both first and second floors to be 2 x 10 inches; the studding to be 2 x 4 inches, placed 16 inches between centers. Paper lining should be used under all exterior finish and siding. Four-inch beveled sawed siding of second-quality pine is to be used. The windows are to be hung with weights throughout and glazed with first-quality American glass. The interior trimmings are to be of pine and worked as indicated by the detail drawings. The rail, balusters, &c., of stairs to be of pine, cherry-stained and finished in oil. The principal features in this design to which the architect directs attention embrace, among others, compactness of floor plan and convenience of arrangement; economy of room; the attractiveness of the parlor, having the bay window, to which we have already alluded, at one corner, and opposite it a fireplace, as shown in the first-floor plan. The following is the bill of materials furnished by author



Cellar Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.



Side Elevation (Right).—Scale, $\frac{1}{8}$ Inch to the Foot.



Front Elevation.—Scale, $\frac{1}{8}$ Inch to the Foot. D. S. Hopkins, Architect, Grand Rapids, Mich.

BILL OF MATERIALS.

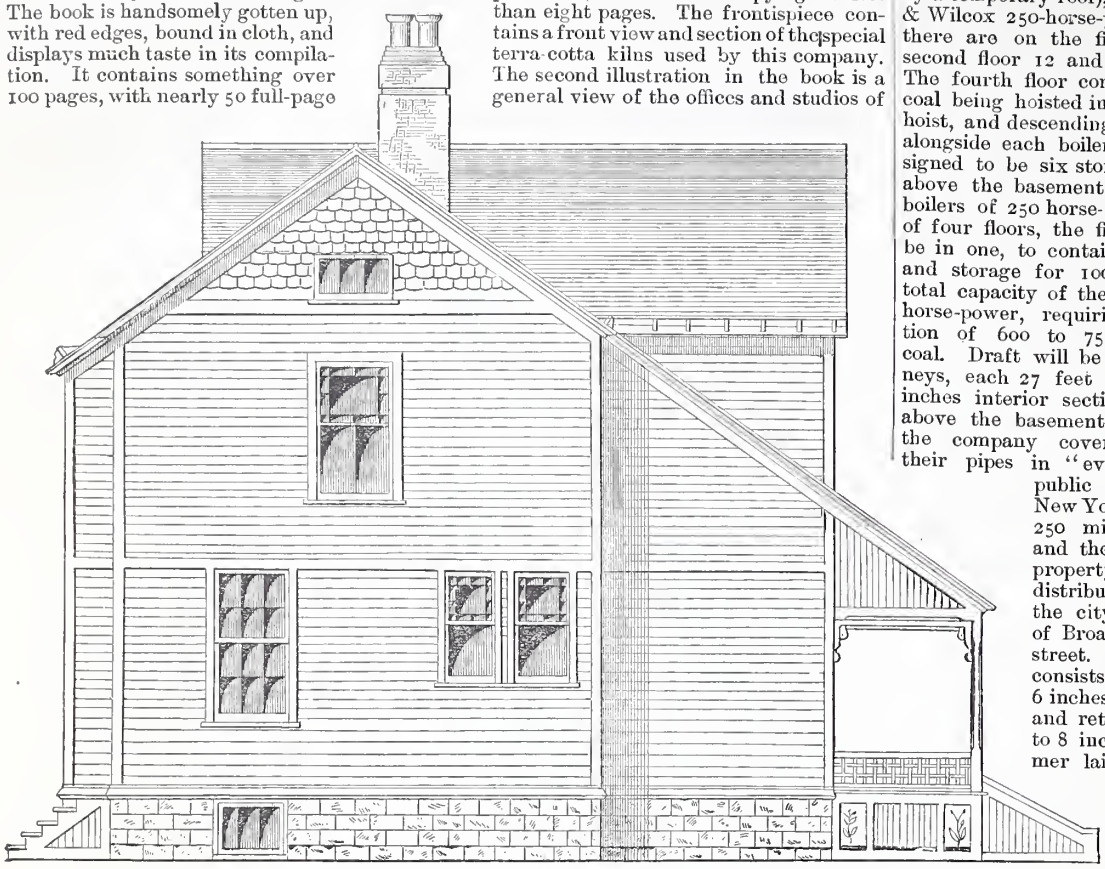
75 yards excavating.
63 perch of stonework laid in wall.
6500 brick laid in chimey and wall.
35 yards cellar bottom cementing.
600 yards plastering.
8000 feet common lumber, frame.
3000 feet roofing and sheathing.
10,000 shingles.
2000 feet 4-inch siding.
2000 feet finishing lumber.
16 doors complete.
17 windows complete.
3 cellar windows complete.
2 attic windows complete.
Front stairs, open and boxed.
Cellar stairs.
Mantel and grate.
Hardware.
Carpenter-work.
Tinwork.
Painting.
Architect's services.

A more detailed estimate of materials can be readily made from the drawings submitted herewith.

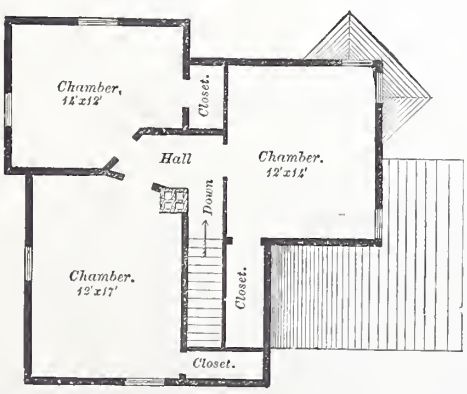
TRADE PUBLICATIONS.

Boston Terra-Cotta Company.

The Boston Terra-Cotta Company, with offices at 304 Federal street, Boston, have sent us Part 5 of their catalogue. The book is handsomely gotten up, with red edges, bound in cloth, and displays much taste in its compilation. It contains something over 100 pages, with nearly 50 full-page plates, including some that fold. The representations of terra-cotta work are printed in terra-cotta color, thus closely imitating the appearance of the work itself. The designs have been prepared with great care, and the variety shown is much larger than is usually found in works of this kind. In addition to the usual lines of work made in terra-cotta some mantel and fireplace trimmings are shown. Much of the work presented has the merit of being reproduced from designs executed to order, and contains information where it was employed. The work forms a very desirable addition to the library of any architect or master builder. Near the close of the book several plates are introduced, showing general views of buildings which have been trimmed with terra-cotta manufactured by this firm. Among these may be mentioned the new Cotton Exchange, Memphis, Tenn.; the New York Casino building; the "Berkshire" apartment house, New York; the "Central Park" apartment house, New York; the New York Athletic Club building, Grace M. E. Church, Brooklyn; the Portland Family Hotel, Washington; the new Pension Bureau, Washington. Several of these are supplemented by details of the parts made in terra-cotta. A folding plate contains the designs of sculptured frieze of the new Pension Bureau, Washington. A price list supplements the designs, and a list of buildings, with the names of the architects, on which this company's work has been used is presented, the latter occupying no less than eight pages. The frontispiece contains a front view and section of the special terra-cotta kilns used by this company. The second illustration in the book is a general view of the offices and studios of the company in Boston. The building shown displays in a satisfactory manner the application of terra-cotta to building construction



$1500 *Frame House.—Side Elevation (Left).—Scale, ⅛ Inch to the Foot.*



Second Floor Plan.—Scale, $\frac{1}{16}$ Inch to Foot.

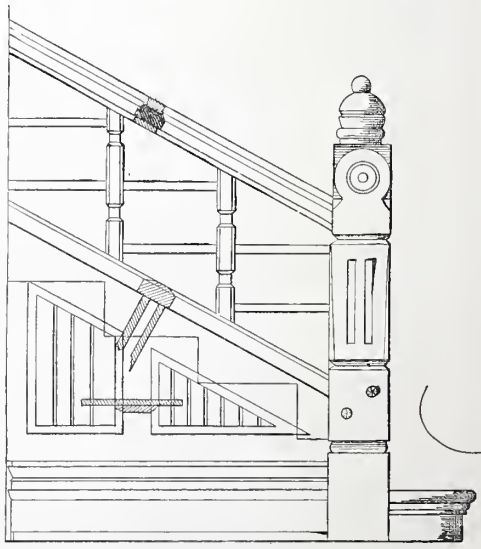
Steam Heaters.

We are in receipt of the catalogue of the Pierce Steam Heating Company. The general office and boiler works of this company are at Buffalo, N. Y., while the foundry is at Westfield, Mass. The company are the manufacturers of J. B. Pierce's wrought-iron tubular steam heater and the "Excelsior" direct and indirect radiators. Several cuts are presented; one shows the steam heater with mason-work complete, another the same with brickwork broken away, revealing sectional views, while still another shows a horizontal section presenting a diagram of brickwork and indicating the location of ash-pit, draft, flue-box, clean-out doors, &c. These illustrations are very carefully described in the text and all necessary particulars are given to enable an idea to be formed of the adaptability of this apparatus to any particular purpose. The radiators, both direct and indirect, are clearly presented and price lists are also given. A number of references and testimonials are presented at the end of the book.

The Distribution of Steam in Cities.

The experiments connected with the work of supplying steam in cities for manufacturing purposes and for domestic use have been watched with great interest. Almost everyone knows that the work of the New York Steam Company has been attended with success, but very few have an adequate idea of just what has been accomplished. For the purpose of indicating the magnitude of the work, and showing just what has been done, we present on page 172 a map in which the steam mains and buildings using steam from them are indicated.

The New York Steam Company, after two years spent in making plans and trying experiments in expansion joints and in non-conducting materials, began building their first boiler station in the summer of 1881, and commenced laying street mains in September 1881. The company now have their boiler station (B) on Greenwich street, above Cortlandt, in this city (a building 75 x 100 feet on the ground, with a basement and three stories complete, and the fourth story covered by a temporary roof), containing 31 Babcock & Wilcox 250-horse-power boilers, of which there are on the first floor four, on the second floor 12 and on the third floor 15. The fourth floor contains the coal-bins, the coal being hoisted in cars, upon a platform hoist, and descending in chutes to the floor, alongside each boiler. The building is designed to be six stories or 120 feet in hight above the basement, and is to contain 64 boilers of 250 horse-power each, 16 on each of four floors, the fifth and sixth stories to be in one, to contain Green's economizers, and storage for 1000 tons of coal. The total capacity of the station will be 16,000 horse-power, requiring a daily consumption of 600 to 750 tons of anthracite coal. Draft will be furnished by two chimneys, each 27 feet 10 inches by 8 feet 4 inches interior section, and 217 feet high above the basement floor. The grant to the company covers the right to lay their pipes in "every street, alley and public place" in the City of New York, which contains over 250 miles of paved streets, and the company now own the property for 10 boiler stations, distributed on both sides of the city, from near the foot of Broad street to Fifty-sixth street. The system of mains consists of a steam main of 6 inches to 16 inches diameter, and return-water main of 2½ to 8 inches diameter, the former laid between brick walls and surrounded by 6 inches to 12 inches of mineral wool, and the latter laid in hollow logs, with a space of 3 inches around the pipes also filled with mineral wool. The pipes are laid with an anchorage every 90 to 100 feet, and a double expansion joint midway between the anchorages, or with an anchorage and single expansion joint every 45 to 50 feet. The expansion joint is of the diaphragm style, invented by Mr. Emery for this company's use. The mains now laid are as follows:

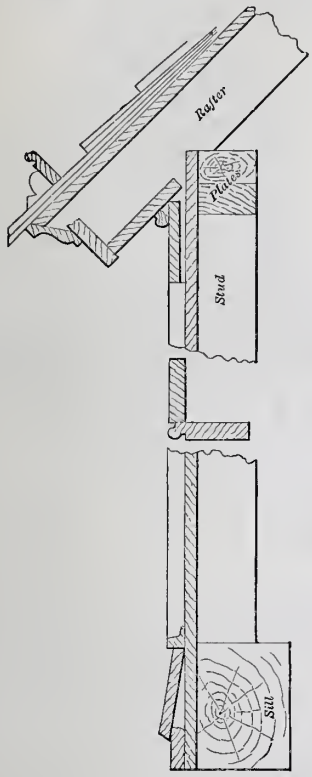


Details of Stairs.—Scale, ½ Inch to the Foot.

Steam mains.	Feet.	*Return-water mains.*	Feet.
Of 16 inches.....	746		
" 15 "	9,884	Of 6 inches.....	5,037
" 13 "	1,683	" 5 "	1,155
" 11 "	4,147	" 4 "	11,900
" 8 "	1,091	" 2½ "	3,800
" 6 "	5,802		
Total.....	23,353	Total.....	21,892

Or 4.42 miles of steam mains, and 4.14 miles of return mains—in all, 8.56 miles of pipes, exclusive of service-pipes. The most distant point to which steam is now deliv-

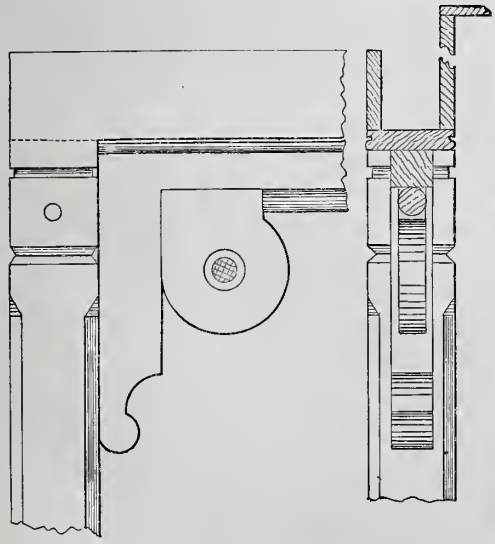
ered is 3359 feet from the boiler station, and the other extremities are 3187, 3133, 3044, 2073, 2920, 2880, 2625, 2261 and 2077 feet respectively from the boiler station. The pressure carried is 75 to 85 pounds at the boiler station, and carefully conducted tests show the pressure at the extreme points to be from 1½ to 2 pounds less than at the boiler station. The company have been furnishing, during 1884, 4156 horse-



$1500 *Frame House.—Details of Exterior Walls and Cornice.—Scale, 1 Inch to the Foot.*

power of steam to consumers, of which 1985 horse-power was for power and 2171 horse-power for heating and other purposes. Engines are being run of from 1 to 150 horse-power, and the supply of steam is regular, constant and satisfactory. The extreme northern point to which steam is supplied, as indicated on the map, marks the office of *Carpentry and Building*.

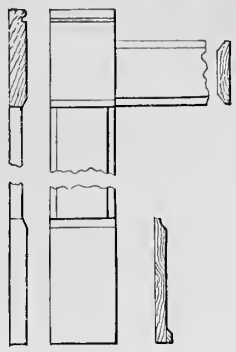
The map herewith given shows the city



Top of Porch Posts, Bracket, &c.—Scale, 1 Inch to the Foot.

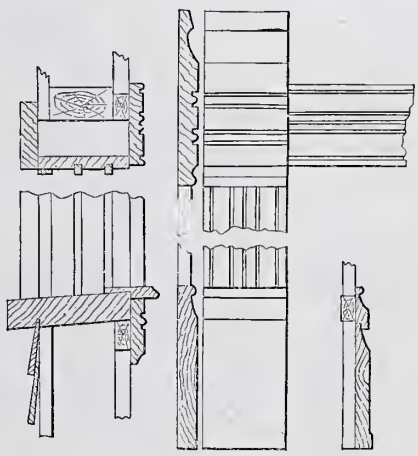
from Chambers street to the Battery Park, and upon it are indicated in black lines the mains now laid, while the black dots show the locations of buildings in which steam is furnished by the company. The point A is to be the site of a second boiler station, while B indicates the boiler station now in operation. Steam distribution has been successful in other cities, as the following account by Mr. William P. Shinn will indicate:

The system of steam distribution invented



Second Story Finish.—Scale, 1 Inch to the Foot.

by Birdsill Holley, M. E., has been in successful operation in Lockport, N. Y., for heating only, for seven years. The company have 4½ miles of mains, six 75-horse-power boilers, and supply over 200 consumers. During the first four years it was operated without meters at a loss. When

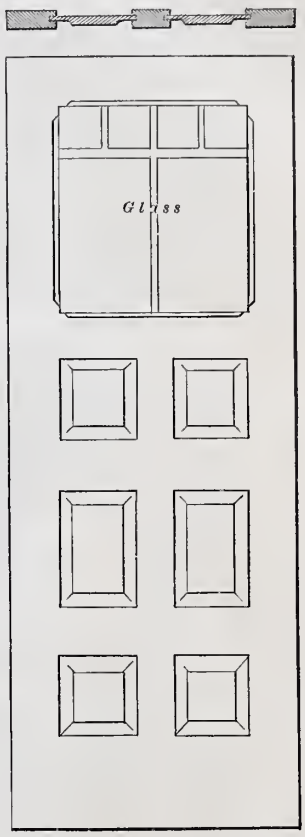


Window Frame, Baseboard Architrave, &c., First Story.—Scale, 1 Inch to the Foot.

meters were adopted three boilers were sufficient to supply the customers who formerly required the steam from six. The capital of the company is $50,000, and they are earning net 20 to 25 per cent. per annum. The largest main is 4 inches in diameter, and the pressure carried is 30 to 35 pounds. In Springfield, Mass., the system has been in use for five winters, for heating only. The company have 2¼ miles of mains and eight 75-horse-power boilers. The pressure carried is 20 to 40 pounds. The company have 196 consumers, and, on an investment of $50,000, have earned net 12 to 15 per cent. per annum since the second year. The steam is sold by meter, and readings are taken weekly. In Dubuque, Iowa, the system has been in operation for five winters, with 2⅛ miles of mains, and seven 50 horse-power boilers. The company are supplying 250 horse-power of steam to 140 consumers, for heating purposes only. The plant was constructed too cheaply, and has not been a financial success. It is now earning a small surplus, and consumers are all delighted with the service. In Denver, Col., the system has been in use during four years, for heating only. The company have nearly 3 miles of 8, 6, 4 and 3 inch mains, and 15 50-horse-power boilers, supplying 150 consumers. Upon an investment of $150,000 the company earned net, during the season of 1882-83, $7863, or $5\frac{2}{10}$ per cent., and the net savings for the season of 1883-84 were estimated at $10,000, or 6⅔ per cent.

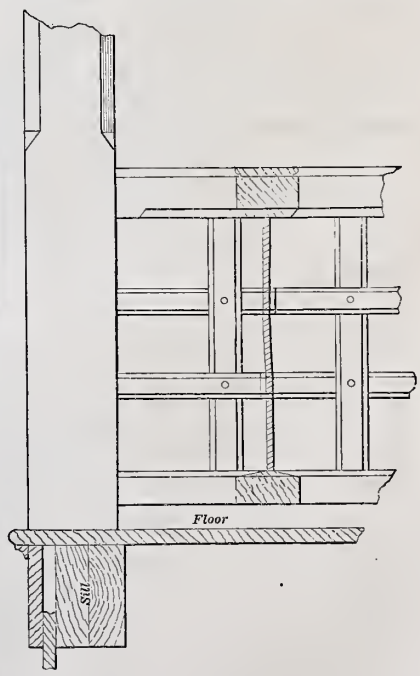
In Hartford, Conn., a steam plant has been in operation during four seasons, with nearly 2 miles of 6-inch, 4-inch and 3-inch mains and 20 80-horse-power boilers. This company carry 60 pounds pressure, and supply 150 consumers, principally for heating. The plant was poorly constructed upon plans designed to evade the Holley patents, and has not been profitable, but is paying expenses and improving in its results.

In Lynn, Mass., a "duplex system" was



Section and Elevation of Front Door.—Scale, ½ Inch to the Foot.

put in operation in February, 1881, and was run until July, 1883. This plant had a high-pressure main in which 70 pounds pressure was carried, and a low-pressure main carrying 20 pounds, the former being used for power and the latter for heating. I personally examined this plant in October, 1881, and again in June, 1882, and found it work-



Porch Balustrade.—Scale, 1 Inch to Foot.

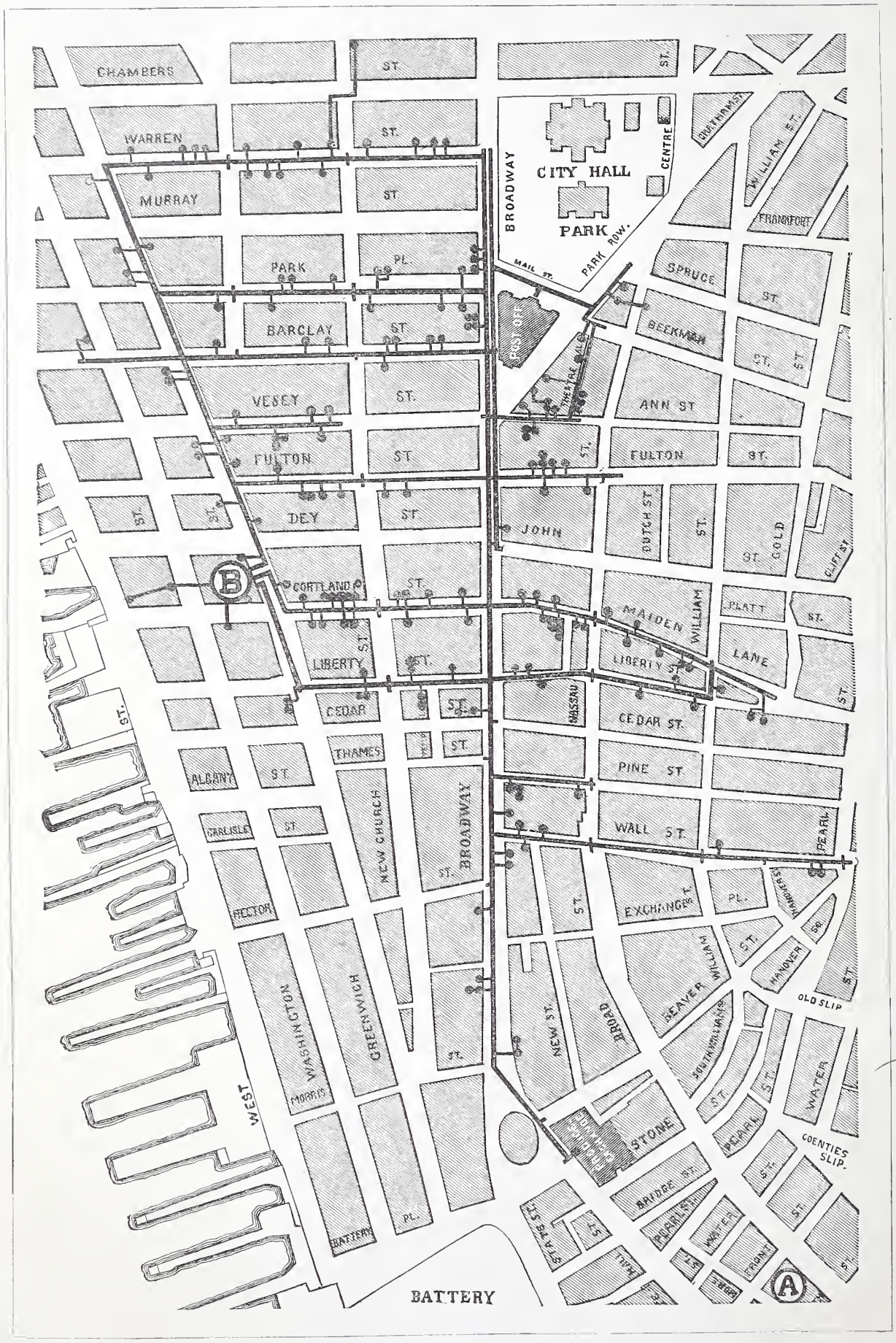
ing successfully and giving great satisfaction to its customers for power, the only ones then using the steam. The plant was poorly constructed, the boiler-house was badly located, and the company failed financially,

and in July, 1883, the plant was sold to a company, to be used for the distribution of water-gas. It has been so used during the heating season just ending, with a less favorable result than was reached by the steam

The plant was constructed on the "duplex plan," and during the first season furnished both power and heat, but during the past season it has furnished 500 horse-power of steam to 80 consumers, for heating only. The

have been in operation from three to four years, but I have no definite information as to their results.

In Milwaukee, Wis., a plant was constructed and operated during two winters,



DISTRIBUTION OF STEAM IN CITIES.—MAP SHOWING THE LOCATION OF THE MAINS AND SERVICES OF THE NEW YORK STEAM COMPANY.

company. In New Haven, Conn., a company have been in operation for two seasons, with about 2 miles of 8-inch, 6-inch, 5-inch and 4-inch mains, and 10 75-horse-power boilers.

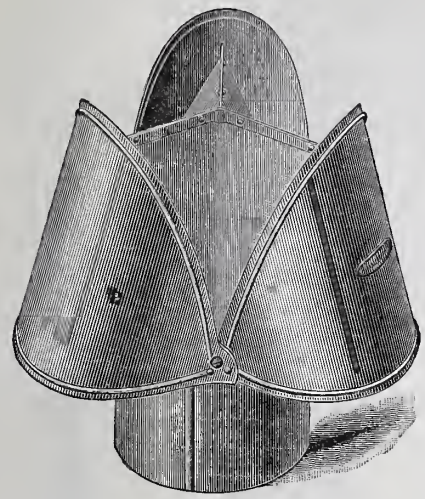
financial results have been bad, the earnings having failed to pay expenses, principally on account of bad management. In Troy, N. Y., and Detroit, Mich., steam plants

but, owing to faulty construction and still worse management, it was a financial failure, and it has not been in operation during the last two seasons.

NOVELTIES.

Clover Leaf Ventilator.

Among the recent additions to the styles of ventilators before the public is what is known as the "Clover Leaf" ventilator, manufactured by E. Van Noorden & Co.,



Novelties.—Fig. 1.—The Clover Leaf Ventilator.

No. 387 Harrison avenue, Boston. Fig. 1 affords a fair idea of the device. It will be seen that it is simple in its parts, and of such a character as to be readily constructed in a substantial manner. The pipe or shaft at its upper extremity is so formed as to present three openings at the sides, and each in turn is faced by a segmental shield that is fastened at its lower extremities to the main shaft. The form of these shields is such as to permit a bead being run around their edges, thus greatly stiffening them, as well as adding to their general appearance. The upper edges of the shaft are brought together and fastened by riveting with an extra piece of metal, and the same general finish is continued around the openings which occur behind the shields. The triangular character of the ventilator causes it to be favorably influenced by the wind in whatever direction it may be blowing, and at least one of the openings is always available for throwing out smoke, gases or foul air, as the case may be. By the arrangement of the shield an opening is afforded both above and below, thus facilitating the work of the device as an ejector. The manufacturer offers these ventilators as being specially suited for ventilating by exhausting through the roof to all such structures as paper mills, chemical works, dye-houses, wool and cotton mills, foundries, engine-houses, depots, schools and hospitals. They are also offered for use on smoking and sleeping cars The manufacturer states that this ventilator is very satisfactory for use in curing smoky chimneys, since by the peculiar arrangement of parts a downward wind creates an up draft in the flue.

Iron Saw Bench.

Frank H. Clement, Rochester, N. Y., is introducing a new design for a small cut-off and splitting saw bench, suitable for use in pattern shops, carpenter shops, furniture factories, car works and in all other wood shops where light and accurate work is done. The general appearance of the bench is clearly indicated in Fig. 2 of the engravings. The table rises and falls, in a direct line, 5 inches. It is moved by means of the large hand-wheel and screw shown in the cut. The table also tilts to saw beveling, and swings upon trunnions, thus permitting of the removal of saws and the oiling of bearings. Iron gauges for cutting off and slitting are provided, both of which can be adjusted to any angle up to 45°. With this machine ordinarily a hardwood table is furnished, glued up in strips and bolted fast to heavy segment bars to prevent warping. We understand from the manufacturer, however, that, when so ordered, an iron table is furnished with a hardwood centerpiece. The manufacturer states that all the parts are well fitted and adjusted true and square. The arbor runs in self-oiling boxes, and is nicely fitted with means of taking up end motion.

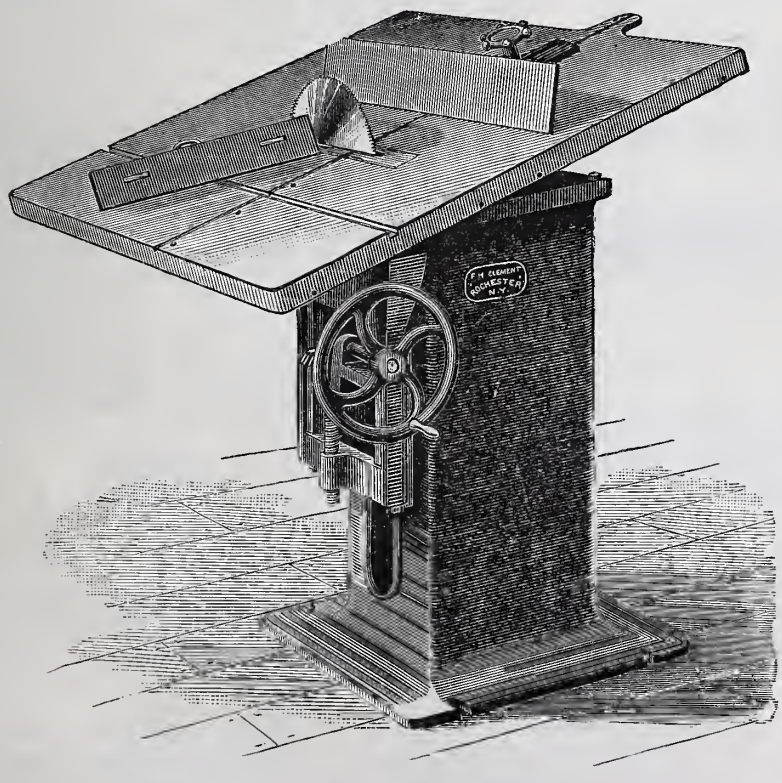


Fig. 2.—Iron Saw Bench.

The Atkins Adjustable Saw Set.

Fig. 3 shows a new saw set just being brought to the attention of the trade by Messrs. E. C. Atkins & Co., of Indianapolis, Ind. It consists of a vertical bar having a lower wedge-shaped end or point that is driven into a log or other suitable support. The upper end of this upright bar forms an anvil to support the saw, and is beveled in a suitable manner to give to the saw teeth the inclination required. At one side of the anvil bar, near the top of it, projects a horizontal arm, as shown in the cut, the end of which is perforated for the passage of a thumb-screw. A yoke projects obliquely from one side of this arm and carries at its upper end a thumb-screw which projects downward immediately above the screw on the lower arm and acts in connection therewith as a guide to regulate the degree of set. The saw is passed between these screws and laid upon the anvil with its teeth projecting over the bevel on the same, in which position it is held at any desired angle by means of the adjustment of the thumb-screws, so that it may be readily passed along while the requisite degree of set is imparted to the teeth by means of a hammer in the usual manner.

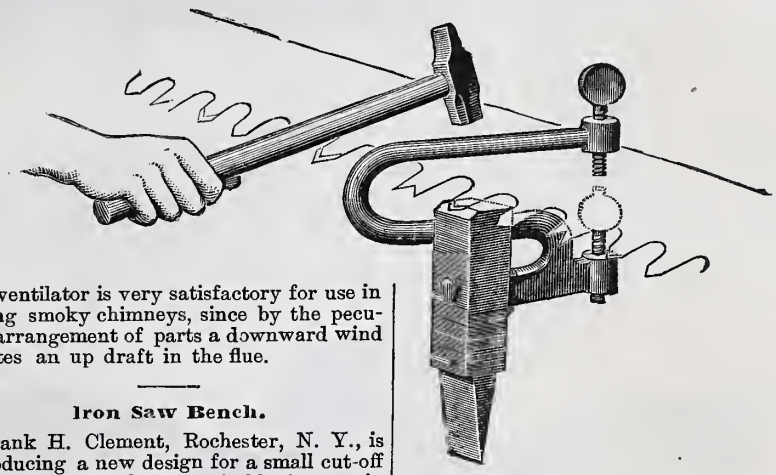


Fig. 3.—The Atkins Adjustable Saw Set.

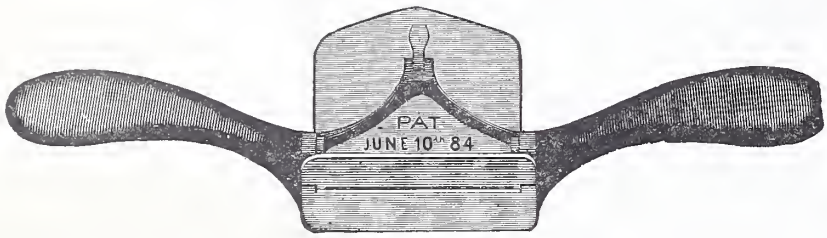
Plain and Encaustic Tile.

We have lately been much interested in examining a large line of samples of plain and encaustic tiles manufactured by the Star Encaustic Tile Company, of Pittsburgh. This concern was established in 1876, and, after a varied experience, was reorganized under the present name and management in 1882. Since the reorganization the company have doubled the capacity of their works and are now prepared to turn out about 200,000 square feet of tiles per annum. For the present they are confining their attention to the manufacture of unglazed tiles for floors, &c., in halls, vestibules, churches, depots, banks, &c. These tiles have been extremely well received, and are admirable in design and color, comparing favorably with the best imported tiles of the same class. In fact, nothing better in the way of tiles for floors, hearths, bath-room linings, &c., has ever been made. They are sharp, true, uniform in size, even in color, hard, strong and generally admirable. The company are looking forward with satisfaction to the introduction of natural gas into their works, as it will give them a fuel for fixing their kilns which will be cheap, perfectly controllable, and free from all the objections which have been found by experience inseparable from soft coal. The company expect ultimately to undertake the manufacture of art tiles, but for the present the demand for encaustic tiles is sufficient to profitably employ their capacity, and they prefer to bring this branch to the highest perfection before undertaking a different class of work. In this we think they are wise. The market for art tiles is pretty well supplied, but there is a chance for profitable success in

diversifying the designs and perfecting the manufacture of encaustic tiles, and we are glad to see this industry in such enterprising hands.

Improved Cabinet Scraper.

Samuel C. Tatum & Co., Cincinnati, Ohio, are introducing to the trade the cabinet scraper represented in Fig. 4. As will be seen from the illustration, the blade is held in an iron frame provided with convenient handles, the scraper having a clamping device so constructed that the blade is not only held near the top by a cam movement, but is clamped immediately at the cutting edge, so that there is no opportunity for any spring or chatter if the proper feed is used. This is accomplished by a contrivance by which the motion of an eccentric clamp not only securely fastens the blade at the point at which it presses upon it, but also at the same time draws together the jaws, which hold the blade, close to the cutting edge. There being no screws to loosen, the adjustment is effected very easily and rapidly. In operation the face shown in the cut is on the side away from the operator, whose thumbs are placed on the fixed framework against which the blade is clamped, and the scraper is pushed from him. To set the blade after inserting it through the bottom, the holder is to be placed on a level board or counter. When pressing the blade against the counter the eccentric clamp will fasten it securely. The manufacturers add that if this does not give sufficient set the blade may be tapped slightly with a hammer until it projects the requisite distance. The width of the cutter is 2⅞ inches, and the length of the whole tool about 11 inches. The manufacturers put this implement on the market with great confidence that it meets a need, and that for scraping panels or any surface requiring a fine finish, especially of hardwood, it will be found especially effective, enabling the operator to do his work not only quicker and better, but without the cramping and burning of fingers incident to the use of the common scraper heretofore in general use. They add that it will work right up to an edge, and in other places where an ordinary scraper cannot be made to do satisfactory work.



Novelties.—Fig. 4.—New Cabinet Scraper.

Adjustable Iron Planes.

By means of Figs. 5 and 6 the general appearance and construction of Steer's adjustable iron planesare shown. The special features embodied in these tools, which are being introduced to the trade by C. E. Jennings & Co., 96 Chambers Street, New York, are as follows: The bottom of the plane is made in composite form, as shown in Fig. 6. The metal is inlaid with rosewood strips firmly dovetailed, and so combined as to prevent the wood from wearing away. This improvement overcomes the very common objection to iron planes, namely, the clinging of the plane to the work when in use. A second improvement is the method of fastening the cutter in the plane, which does away with the heavy short irons used in some planes, and makes it possible to use a heavier cutting-iron, thereby avoiding chattering and enabling the user to adjust the cutter with facility and exactness. A third improvement consists of the method of adjusting the cap iron, by which the cap can be removed and replaced with exactness and without loss of time. These planes are provided with an adjustable mouth, embodying a new method by which the mouth may be made wide or narrow, as the work may require. Several different styles and sizes are made, adapting the planes for general use.

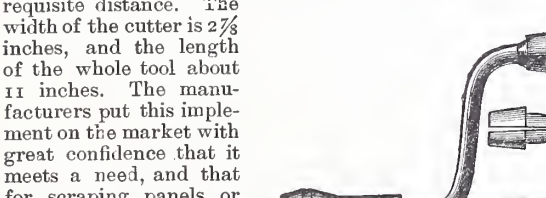


Fig. 5.—Steer's Adjustable Iron Planes.

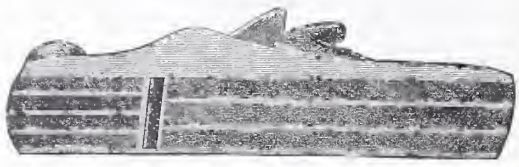


Fig. 6.—Bottom View of Steer's Iron Plane.

New Haven Bit Brace.

Fig. 7 represents the New Haven bit brace, which has just been put on the market by W. A. Ives & Co , New Haven, Conn., whose New York office is at 88 Chambers street. The socket and grasping jaws of this tool are one solid piece of metal, as represented in the cut. The jaws are made of wrought steel and tempered, and it is claimed that they will hold firmly a greater variety of bit shauks than any adjustable brace in the market. The manufacturers allude to the advantages that this article possesses from its simplicity and from the fact that there is no pin, spring or fastening to get misplaced or out of order, adding that they can be made at less expense than other good braces, and accordingly are sold at a low figure.

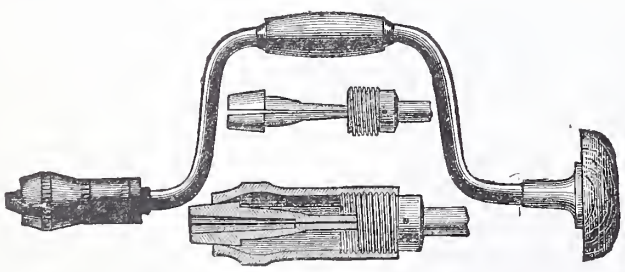
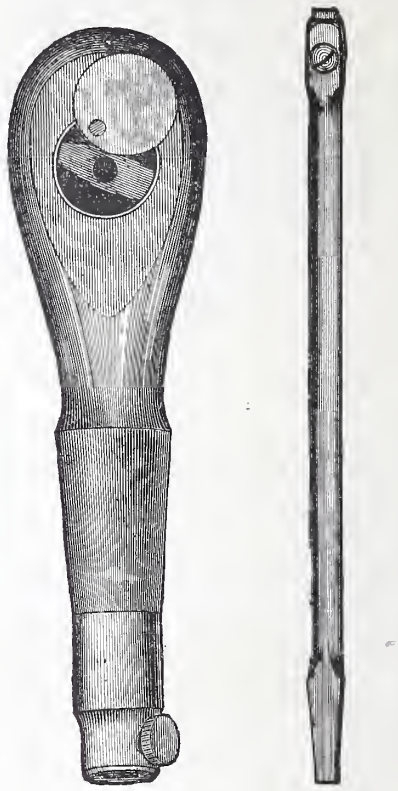


Fig. 7.—The New Haven Bit Brace.

Pratt's Multiform Screw-Driver

The Millers Falls Company, Millers Falls, Mass., and 74 Chambers street, New York, are about to put on the market the screw-driver designated above and represented in the accompanying illustrations. This ingenious tool, the invention of H. L. Pratt, the president of the compauy, consists of three parts—the handle, Fig. 8; the bit, Fig. 9, and the points, Fig. 10. The handle Fig. 8, is made of polished rosewood, and is 7 inches in length and finely finished. It has in it a receptacle for the points not in use, which is furnished with a brass cover operated from the other side of the handle, a little pressure on a projecting button slightly raising the cover and permitting it to be easily turned in opening. A spring in the interior of the handle draws the cover down and holds it snugly in place. The handle has also a socket or stock for the reception of the bit, which is held secure by a screw, as shown in the cut. The bit, Fig. 9, is represented ready to be attached to the handle with one of the screw-driver points fastened in it, being firmly held in place by a screw. This screw can be readily operated by one of the points held in the fingers. These points, of which each screw-driver has six, are illustrated in Fig. 10, and are made of different widths and thicknesses, so as to fit the different sizes of screws. In addition to the more obvious advantages which will occur to our readers, three points are made for the utility of this article: first, that the points furnished operate much better than an ordinary screw-driver, as they are not ground to a bevel; second, that in many cases where screws cannot be driven with an ordinary screw-driver, in this implement the points can be turned obliquely to or at right angles with the bit, and the screw thus be successfully driven home, and, third. that the bit can be taken out of the handle and used in a brace. The whole tool is well made and has a handsome appearance.



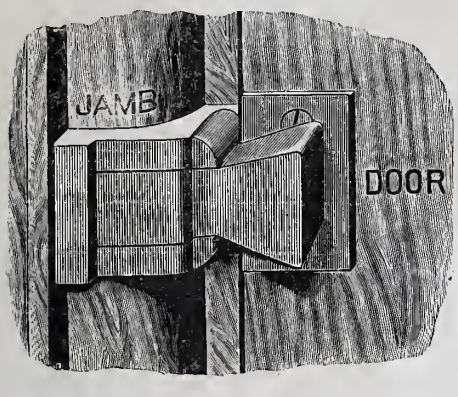
Figs. 8 and 9.—Handle and Bit of Pratt's Multiform Screw-Driver.

Fig. 10.—Screw-Driver Point.

Payson's Door-Jamb Bolt.

The Payson Manufacturing Company, of 1319 to 1325 West Jackson street, Chicago, are offering to the trade a new form of door-jamb bolt, the accompanying cuts of which show the way it is applied to a door, and also its manner of working. Referring to Fig. 11, the cut represents a door locked with the bolt. The bolt is let in the edge of the casing with the screw-plate

flush with the door frame, the casing for the movable part of the bolt projecting somewhat beyond the plane of the door. The striking-plate, which is simply a rectangular piece of metal, is secured to the face of the



Novelties.—Fig. 11.—Payson's Door-Jamb Bolt Applied.

poor at the place where the bolt catches, thus protecting the door from injury. From Fig. 12 some idea may be gathered of the construction and manner of operating the bolt. The bolt consists of a frame box made in two pieces and united together. At one end is a screw-plate for fastening it to the door, while the other end is slotted to receive the bolt piece, which is pivoted through the center, as shown in the cut. Fastened to the bolt piece is a spiral spring which at every quarter revolution draws it into the slot until it rests in recesses at the back or bottom of the slot, in which position it is impossible to

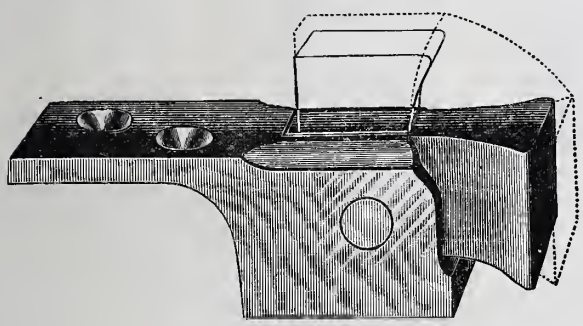


Fig. 12.—Payson's Door-Jamb Bolt.—Method of Operation.

rotate it. In unfastening the bolt, as shown by the slotted lines in Fig. 12, the bolt piece is first pulled directly out for a short distance and given a quarter revolution, when on releasing it the spiral spring draws it down into its seat. The bolts are made of bronze and bronzed iron. H. J. Brainerd, No. 125 Chambers street, New York, is agent in this city.

The Acme Sash Lock and Balance.

A new form of sash lock and balance, made by the Acme Lock Company, Newark,

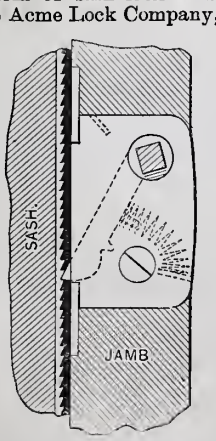


Fig. 13.—The Acme Sash Lock and Balance. —The Parts for the Upper Sash.

N. J., and for which Hymes & Hart, 34 Murray street, New York, are the general agents, and Butler & Constant, 18 Warren street, New York, are sales agents, is illustrated in Figs. 13 and 14 of the engravings. The device automatically locks both upper and lower sash at every ¼ inch. By this means ventilation and security from intrusion are obtained. By the use of this device sash weights and sash fasts of the common description are avoided, with the advan-

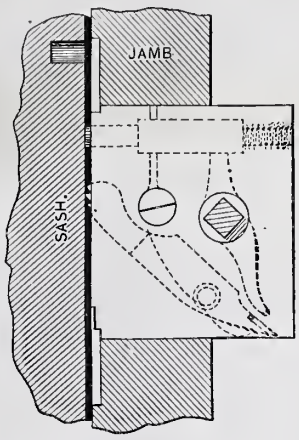


Fig. 14.—The Parts Used on Lower Sash.

tage of a material saving in first cost. The general features of this lock and balance may be gained from the cuts. The first shows it in the shape applied to an upper sash. The essential parts are a rack, in the form of a light casting screwed to the sash. The lock is attached to the sash and consists of a pawl controlled by a spiral spring working against the rack. By this it will be seen that the sash may be raised, but cannot be lowered, without lifting the pawl, which can only be done from the inner side. Fig. 14 shows the device arranged for use on a lower sash, and shows an additional feature necessary in that position, namely, a bolt for holding the sash up. The bolt is not depended upon alone to keep persons outside of the house from raising the window, but there is, in addition, the same features of rack and pawl as mentioned above, used, however, in a reversed position. By the arrangement of parts it will be seen that the same movement of the hand of the person opening the window releases both bolt and pawl.

New Form of Clamp.

F. Armstrong, of Bridgeport, Conn., is manufacturing a new form of clamp, known as the Davis patent clamp, a sectional view of the working parts of which is afforded by Fig. 15 of the illustrations. In its general features and in the results accomplished it

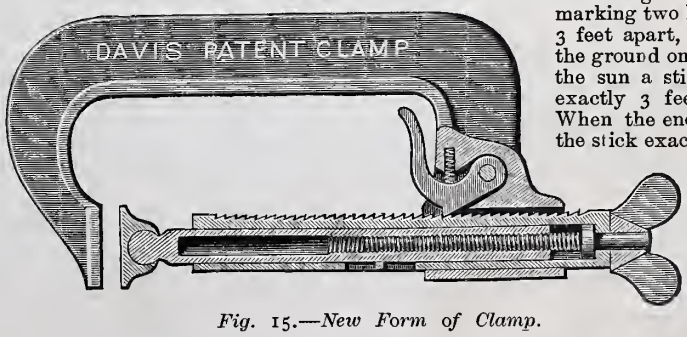


Fig. 15.—New Form of Clamp.

is not unlike some of the quick-motion vises now promineutly in the market. This clamp has the special advantage over others that it clamps the work without displacement. The plunger or screw does not turn the adjustable jaw, but is forced directly on the work by the thumb-screw. By examination of the engraving it will be seen that the jaw is readily adjusted to the work by slipping the barrel of the screw in or out, which is made possible by simply raising the lever shown near the center of the cut. When the clamp has been adjusted in this manner as near as may be, the lever is released and the work clamped in the usual manner by means of the thumb-screw. One great advantage of the clamp is the speedy release of work. This may be accomplished by first turning the thumb-screw enough to loosen it and then raising the lever and withdrawing the barrel by hand. The traverse of the thumb-screw is comparatively short, and just what it is is always indicated to the operator by means of the pin shown in a slot in the barrel near the bottom of the engraving. Several sizes are made, adapting the article to various uses. The clamps are of malleable iron and well made.

New Yale Drawer Lock.

We illustrate in Fig. 16 a new form of drawer lock which the Yale & Towne Manufacturing Company now have ready for the market. This is one of a line of cabinet locks which the company are bringing out, and which are claimed to possess several advantages in construction and convenience. As shown in the cut, they are all provided with the new patent corrugated key, which is considered so desirable as increasing the security and easy working of the lock. Another advantage mentioned in connection with this article is that it is so readily applied, it being evident that for the nose or

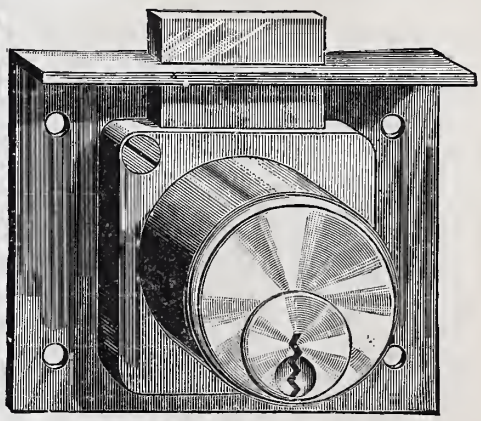


Fig. 16.—New Yale Drawer Lock.

escutcheon of the lock a simple auger hole is all that is required; and special attention is directed to the length of the escutcheon as being such that there is no danger while making a hole for the square cap of marring in any way the front of the drawer. Another advantage in this class of locks is that they are all made with detachable escutcheons, so that the same escutcheon will be adapted to any size of back, or any throw of bolt.

An English paper remarks: "Any person, however ill-informed, might easily get at the exact hight of a tree when the sun shines, or during bright moonlight, by marking two lines on the ground, 3 feet apart, and then placing in the ground on the line nearest to the sun a stick that shall stand exactly 3 feet out of the soil. When the end of the shadow of the stick exactly touches the furthest line, then also the shadow of the tree will be exactly in length the same measurement as its hight. Of course in such a case the sun will be at an exact angle of 45°. Measurements of this character could be best effcted in the summer, when the sun is powerful, has reached to a good hight in the heavens, and when the trees are clothed with living green, so as to cast a dense shadow. To many whom this idea may not have occurred, it might be made annually a matter of interest thus on warm summer days to take the hight of prominent trees, and so to compare growth from year to year."

How to Make a Cheap Lathe.—VII.

MISCELLANEOUS DETAILS.

We left, it will be remembered, our headstock, poppet and rest completely fitted, with the exception of the tightening screws, which are to hold them down upon the bed. For the headstock and poppet screws get two pieces of ⅝-inch round iron, 6 inches long, and screw about 1½ inches inward from each end, using stock and dies (Fig. 46). Screw one end of each tightly into its respective casting, either by holding the ⅝-inch rod in the vise jaws, and twisting the headstock round upon it, or by turning the rod with a pair of small gas tongs. For the

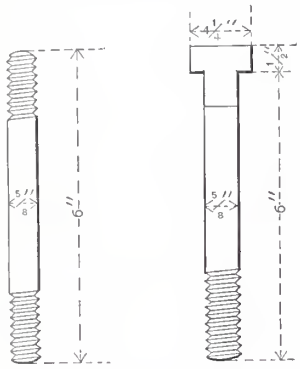


Fig. 46.—Headstock and Poppet Screws. *Fig. 47.—The Rest Screw.*

rest a piece of ⅝-inch rod having a T-shaped head and a square shoulder forged at its end will be necessary (Fig. 47)

Three tightening nuts will be required, being either large wing nuts, or shaped as figured and made of cast iron (Fig. 48). For the pattern, cut the looped portion out of a bit of hardwood, turn the boss and fit on. Leave the hole to be drilled in preference to coring it out. At the same time make a pattern for the washer (Fig. 49), one casting from which will be required for each nut, a ¾-inch hole being cored through to fit loosely round the screw. Fig. 50 shows a screw with washer and screwed nut in position relative to the cheeks of the bed. Get the smith to forge a crank out of 1¼-inch round wrought-iron bar to dimensions given (Fig. 51). Drill a $\frac{1}{16}$-inch hole about ¼ inch inward from each end, as in the headstock mandrel, slightly countersink them and have the ends case-hardened. Before case-

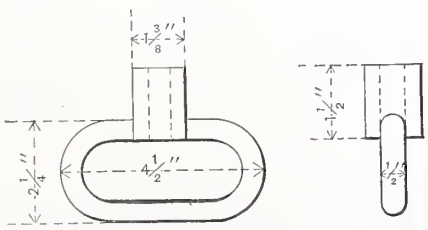


Fig. 48.—Tightening Nuts.

hardening, the end which is to receive the driving-wheel should be skimmed along with a cutting tool in the lathe, and have a facet about 3½ inches long by ⅜ inch wide filed for the key. To turn the portion of the crank round which the loop of the connecting-rod fits would be a troublesome job for an amateur, requiring a couple of chucking or centering plates on the ends to bring the crank in a line with the lathe centers. The readier method, therefore, will be to file this portion approximately circular, checking with a half-round metal templet from time to time. Bore the wheel to fit on the turned end of the crank axle, or, if too large for your lathe, get it bored. File key way ⅜ x ¼ inch. A turned rim has a good appearance, but it is not an essential, so the facilities you possess for the work, or the state of your finances, may influence your decision here. File key, Fig. 52, and key wheel on axle, Fig. 53.

The dead-centers for the crank-axle, Fig. 54, *a a*, are of steel. Two pieces of ⅝-inch rod, 4½ inches long, will be tapered down at one end as shown, the carrier being used

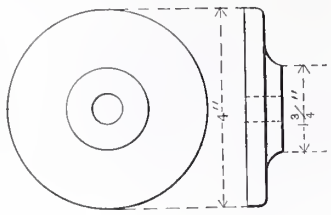


Fig. 49.—Washer.

for chucking, as was the case in our mandrel turning. Screw with stock and dies 1½ inches from each end, and have the points hardened. Provide nuts and washers. Bore a hole with a center-bit in the middle rail of each standard, somewhat out of center, Fig. 55, to receive the dead-centers, and screw them up moderately tight into the countersunk ends of the crank-axle.

For the treadle-bar get a piece of ¾-inch gas-tubing, 4 feet long, and either skim in the lathe or file the ends to a fairly decent fit into the bearings cast for their reception; grinding both bar and bearing together with a little fine emery and oil at the finish will

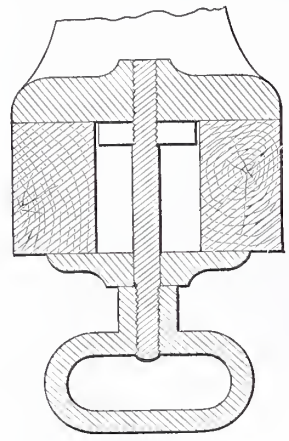


Fig. 50.—Screw, Washer and Nut in Position.

facilitate the easy motion of the bar. We want to keep the bar in position endways. A couple of collars furnish the readiest method of doing so. Turn two metal rings, 1 inch in the hole, 1 inch long by ¼ inch thick, or simply two pieces 1 inch long, cut from 1-inch gas-pipe, will answer the purpose sufficiently well. Into each of these collars tap a ¼-inch set-screw, by which to hold them in position on the bar. Drill two holes in each bearing for wood screws, slip the bearings over the ends of the bar, and screw in position on standards, Fig. 57. Now, temporarily slipping one of the end bearings off, take out the bar again, and fit to it the carriers for the treadle board. Cast 1-inch hole through the bosses of these, and they ought to fit just tight over the ¾-inch gas-tube without much filing. We must cut a keyway in each boss, ¼ inch wide by $\frac{3}{16}$ inch deep, and make keys to correspond; also flats on the treadle-bar. Drill, besides, a couple of holes for wood screw for fixing the treadle-board; then key up, and replace bar permanently in bearings. Prepare a piece of board 2 feet 6 inches by 4 inches by 1 inch, and screw in place. The

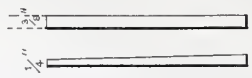


Fig 52.—Key.

treadle, now complete, has the appearance of Fig. 58.

Have the connecting-rod forged to dimensions (Fig. 59). Rig up a chain and wheel if you prefer it; but the rod is easier made, and answers well enough. Loop the rod into a ⅜-inch eye-bolt, let into the treadle-board, having a washer between the nut and the wood (Fig. 60). We may now consider the actual lathe as finished. For driving, get a piece of leather belting at a saddler's, ⅞ inch or 1 inch wide by 8 feet 9 inches long, and fasten at the ends with a common band-screw, Nos. 1 or 2. In a foot lathe, the removal of the strap from one speed to another is not so often necessary as in one driven by steam-power, because

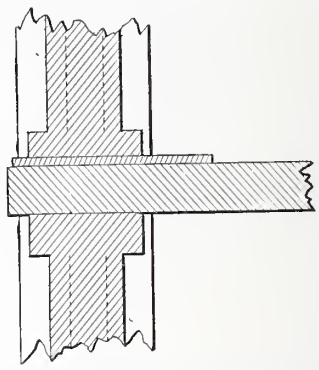


Fig. 53.—Wheel Keyed on Axle.

the speed can be regulated within a wide range by the foot of the individual who is treading. Hence, our driving-wheel of one speed only will seldom put us to the inconvenience of having to alter the length of strap. Then, however, the adjustment can be effected in a few seconds by removing the screw from one pair of holes to the other (Fig. 62).

A tool-rack is a convenient accessory to a lathe. Prepare two strips of wood 4 feet long by 1 inch by ⅜ inch, and screw them to four vertical strips 6 inches by 1 inch by ½ inch, the lower ends of which are to be screwed to the bar at the back (Fig. 61). A tool-board also, 4 feet by 9 inches by ½ inch,

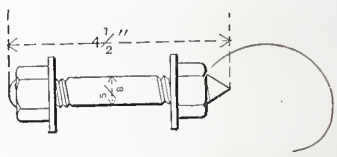


Fig. 54.—Dead-Center for Crank Axle.

screwed on the top edges of the standards, receives the tools and odds and ends of material which we have in use when working at the lathe. In counting the cost, let it be noted that prices will vary, and the experience of no two persons will be exactly alike. But the figures we state will be found approximately correct. The crank is the most expensive item. A piece of 1¼-inch round bar iron 4 feet long will weigh

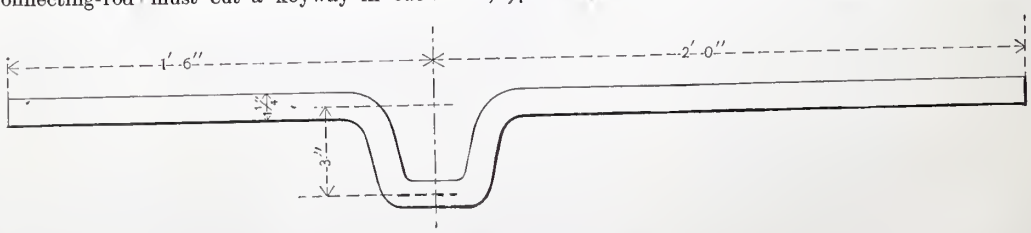
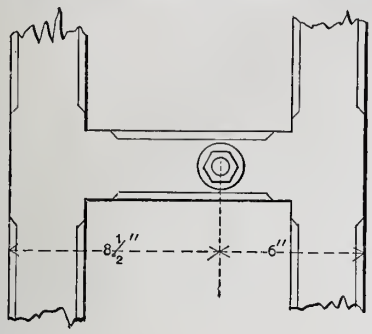


Fig. 51.—The Crank Forging.

16½ pounds, which, at 4 cents per pound, will cost 50 cents. A smith will forge it for, say, 75 cents. Then poppet, mandrels, screws, bolts, dead-centers for crank, nuts, should not cost more than $1.25. Another 50 cents will pay for the three cast-iron washers and tightening nuts, and the strap



How to Make a Cheap Lathe.—Fig. 55.—Position of Dead-Centers for Crank Axle in Middle Rails of Standards.

at 6 cents per foot will run to about 60 cents. The bit of timber for tool-board, rack and treadle, about 25 cents. Gas-tubing at 8 cents per foot, 30 cents. Total, about $4. This supposes that every little bit of wood and metal has to be bought; but odds and ends of wrought bar and strips of wood may often be had for the asking, and waste material may often be utilized.

NOTES AND COMMENTS.

In the death of Samuel Sloan, of Philadelphia, which occurred in the latter part of July, at Raleigh, N. C., the architectural profession lost one of its most useful members, and a man who in his day contributed in practical work and as an author more, perhaps, than any other to the advancement of his chosen profession. He was born in Chester County, Pa., in 1815. He commenced the study of architecture at an early age, and soon achieved an eminence that distinguished him throughout his life. A specialty with him in late years was public buildings, particularly insane asylums, and of the latter he designed no less than 32. He projected and edited one of the first architectural and building papers in the United States. It was called the *Architectural Review and Builders' Journal*, and was commenced in 1868. This was discontinued two years later, partly on account of lack

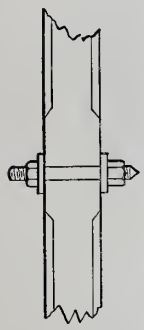


Fig. 56.—Side View of Standard.

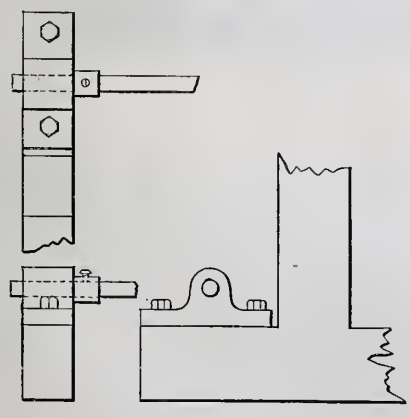


Fig. 57.—Bearings for the Treadle-Bar.

of patronage (for the building public which read at that time was far less in numbers than at present), and partly because the professional work of its editor gave him little time for literary matters. However this work was received at the time it was issued, there is hardly an architectural library in the country at present that does not contain one or both volumes of this pioneer periodical. Mr. Sloan was also the author of a number of works on architecture, most of which have had a considerable sale. Among these may be mentioned the "Model Architect." "Constructive Architecture," "City and Suburban Architecture," and "Homestead Architecture." Mr. Sloan continued in active life up to within a short period of his death. Among recent work may be mentioned the plans for the Western Insane Asylum, at Morgantown, N. C., and the State Exposition Building, Pennsylvania. The *American Architect and Building News*, in noticing Mr. Sloan's death, says: "Although belonging, like other architects who began business 50 years ago, to a school which has ceased to excite commotion in the artistic world, Mr. Sloan was one of the most distinguished of that school, and his career, in activity and usefulness, was one which the ablest of the younger generation might be glad to emulate. Indeed, many of the younger architects throughout the country owe something of their knowledge to the excellent books in which he sought to convey to others the results of his experience, and he deserves the credit of having been one of the first persons in

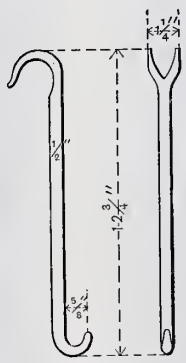


Fig. 59.—The Connecting-Rod.

the country to perceive the deficiency in technical literature which he afterward endeavored to supply by the publication of his *Architectural Review and Builders' Journal*."

Apropos of the description of the Cradock mansion, which appeared in our issue for August, it may be mentioned that one of the daily papers has been searching for the oldest house in America, irrespective of its present condition. One of its correspondents declares that the Fairbank's house in Deadham, Mass., built in 1636, is entitled to the honor. This is contradicted by a correspondent writing from Hanson, Mass., who gives the following particulars: "In the year 1628 two men by the name of Barker started from Plymouth on a prospecting tour, and finding in Pembroke, Mass., what they considered a suitable spot, they remained there during the winter. In the following spring they built a house about 15 feet square, consisting of flat stones laid in clay. Ten years later an addition was made to the house, and the whole structure is still standing in good condition. The house has been occupied by Mr. Peleg Barker, a direct descendant in the sixth generation from the original settlers. Mr. Barker died last year, and the estate is now in possession of his heirs." The Cradock mansion, as mentioned in our article, enjoys the distinction of being the oldest house in America which retains its original form. It will be seen from the statement above that the house referred to, built a few years earlier, has been practically covered up by additions subsequently made.

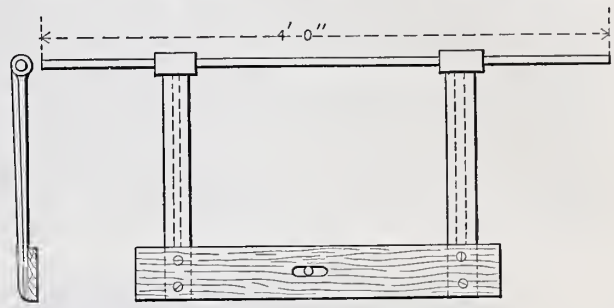


Fig. 58.—The Complete Treadle.

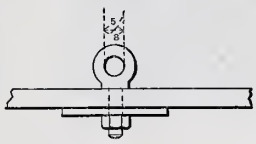


Fig. 60.—Eye-Bolt in Treadle Board.

Wood-carving is a subject which very justly receives close attention both on the part of those who are engaged in it on account of its practical value and those who indulge in it for pleasure and pastime. The article which we publish in another part of this issue, showing what may be done by self-instructed effort, will be found interesting. There are two schools, so to speak, among carvers. These may be described as the artistic and the practical. In this division we do not wish to be arbitrary, for the practical should in all cases include the artistic—that is, work done in a practical way for the decoration of furniture, for example, ought always to be artistic, but, unfortunately, it is not always so. Much of the work that is done for pay is performed in a perfunctory manner and with little regard to artistic considerations. Amateur work may belong to either of these schools, and it may be done for the purpose of qualifying the carver to earn his living by his art, or it may be undertaken for the purpose of gratifying one's artistic taste. The highest excellence, of course, should be aimed at in all cases. Our article on amateur wood-carving contains encouragement for all who have any taste in this direction and who are obliged by circumstances to pursue their work without a teacher. It is hardly necessary for us to remark that all who can should profit by the aid of a competent instructor. The excellent work produced by the Cincinnati School of Design, to which we have directed our readers' attention in the past, is evidence of the advantage of having a competent instructor.

Fig. 62.—Joining the Ends of the Belt.

At least two articles which appear in this number of *Carpentry and Building* are somewhat outside of the usual lines which are observed in papers relating to house building. We refer to the description of "Steam Heating in Cities," and our first article, on

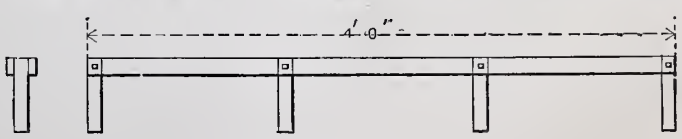


Fig. 61.—Tool Rack.

"Artistic Heating Stoves." New methods and new styles are continually superseding old, and every architect and builder who desires to keep abreast of the times finds it necessary to read up in many directions outside of the beaten lines of his profession or trade. Accordingly, in presenting the two articles named we undoubtedly meet a well-defined want. Our article on heating stoves is timely, for it will reach our readers just prior to the time that selections of heating apparatus are very generally made in preparation for a winter season. Advice is very frequently solicited from architects, builders and superintendents about stoves, as well as with reference to grates, mantels, furnaces, plumbing fixtures and other features which are sometimes outside of the original contract. To be able, therefore, to point out the very best from an artistic standpoint is desirable.

At a recent meeting of the Brick Makers' Association, which includes among its members prominent manufacturers whose yards are situated in the region supplying New York City and vicinity, it transpired that in 1883 680,000,000 brick were made. The association estimates the product of the present year as 136,000,000 less. It seems that there is an overproduction of brick in this market, and one object of the meeting was to induce manufacturers to agree to a further reduction of 20 per cent. The figures given above form a practical basis for gaining an idea of the amount of building in and about New York City.

Trinity Church is a landmark well-known to every visitor to the metropolis. A new scaffold has been climbing up the sides of old Trinity's steeple for several weeks, and not a man walks down Broadway but sees it and wonders what it means. Occasionally one asks the sexton and goes away satisfied. Others are harder to please, and go into details, manifesting much unlooked-for interest in the old church.

"What's wrong with the steeple?" asked one of these.

"Nothing at all, sir."

"What are you going to do with it?"

"Going to repoint it."

"Repoint it?"

"Yes, sir."

"Well, in the name of heaven, isn't it sharp enough already?" And the questioner stepped back a few paces to satisfy himself by a skyward glance that the steeple did have a pretty sharp point. It required no little self-command on the part of the man to whom these questions were put to restrain his risibles long enough to tell the inquirer that the seams between the stones or the joints, which had been filled with cement, were now open, owing to the action of the weather. To preserve the structure it was necessary that they be refilled with cement. The operation is called "pointing" in the language of the mason. It is likely that the entire church will undergo an overhauling of the same kind.

Mr. J. C. Cady, architect, of this city, is quoted as saying that a great change has taken place in church decoration in New York within 10 years, and that what is true in the city is also true of the country at large, which generally copies what is done here. The hard, stiff lines of 40 years ago have long since passed, and all forms of church decoration are now in demand. Among what some people have styled innovations in church arrangement may be mentioned the so-called private boxes which are now being introduced in Dr. Paxton's church, in West Forty-second street. These, however, are nothing more than old English pews, such as may been seen in the illustrations in some of Dickens's novels, and the equivalent of which may be found in many of the old English churches existing in this country. The purpose in view in this case is, in all probability, only that of making the galleries, in which it is quite difficult to induce people to sit, more attractive, and thus increase the available sitting capacity of the church.

Amateur Wood-Carving.

What may be accomplished by an amateur in the art of wood-carving is happily illustrated by the panels shown herewith, which, according to the *Decorator and Furnisher*, were carved by Mrs. Emma Price Willis, of Galveston. They are her first attempts, and were made without example or assistance in any way whatever. The lady never had instruction either in drawing or the use of tools, but was compelled to rely upon her own good taste and ingenuity in doing the work. The design and execution, our contemporary adds, are exceptionally good, and the marked success of the pieces in an artistic sense should be an encouragement for others to utilize the skill they may possess in the same direction.

Lily.

Sunflower.

AMATEUR WOOD-CARVING.

It may be generally remarked that wood-carving offers boundless scope for the exercise of taste and display of skill in manipulation. While light and shadow belong to its effects, it has yet the merit of being in no way deceptive. Its relief is real, and not that of the colorist. It allows at once of literalness in treatment of a subject, while affording a fine play to the symbolic style in its representations. There is a vast difference in the pleasure derivable from carving as employed in constructive decoration and forms impressed in plastic material or fashioned by machine work. The labor obviously spent upon carving, and the stamp of indi-

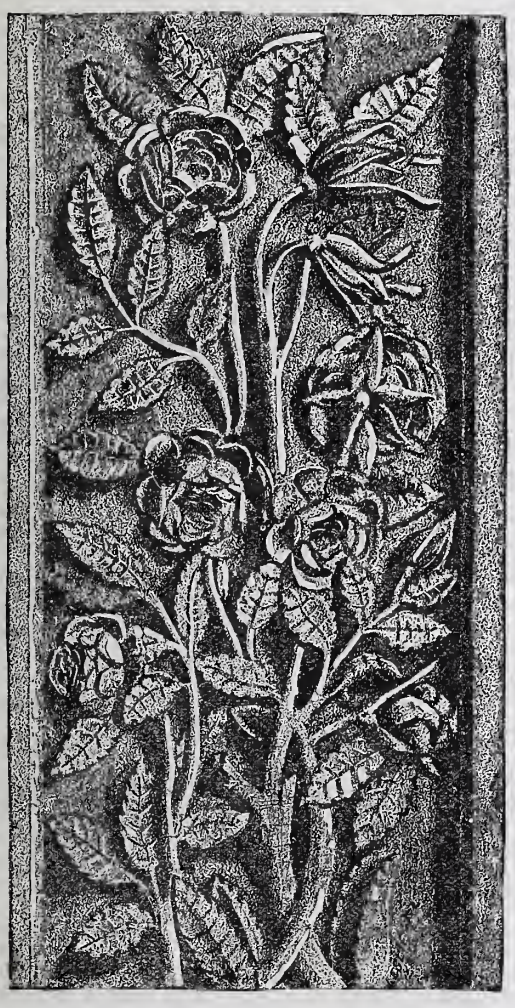
viduality expressed in the production, if of any merit, are distinctive elements of value. Nor even if we descend to imitation can the same type or design be exactly reproduced. One cannot but admire the devotion to this art, in the development of its fullest capabilities, shown by the artists of olden time. The evidence of sincere love of beauty and its realization exists in oaken watching-lofts, chantries, shrines, screens, choirs and pulpits, as well as in the delicate carving by which the rooms of mansions were decorated. The ancients masters of the art seemed to know just when and how deeply to incise with reference to artistic expression. Much antique work exhibits especial excellence in contrasted relief, and a consummate knowledge of the different effects produced on qualities of shadows, by under ceilings, edges and sinkings in the center leaflet of each group, in contrast with the convex forms interspersed here and there, so giving effect of boldness and strength to the details.

It is to be regarded as a hopeful augury of the future of this art that local individual wealth is in many instances extending to it, for purposes of household adornment, munificent patronage. This aids in keeping up its standard of excellence, encouraging designers and artists to put forth their best efforts, and gives an impulse to popular appreciation of the capabilities of wood-carving. It is noticeable that good artistic carving is being extensively introduced into furniture. The *Renaissance* style, with its varied types and combinations, aids the movement. Free development as to variety in wood-carving designed to constitute constructional adorment must be allowed. Dictation on this point is not to be tolerated. Even grotesqueness has always had its place in the art, though in the newer methods this feature is not so prominent as of old. The greatest triumph in this style, as regards the display of real art in manipulation, was in the mediæval period, when mysteries of religion were thus expounded without the thought of irreverence. Legends of the power of darkness gained in effect by representations of demons, with countenances horribly distorted, as from intense suffering, a portion of their writhing bodies struggling to get free from the mass of wood in which they were carved, the artists being especially free in fantastic renderings of the Devil tempting weak-minded mortals. In these extravagancies the execution operates like the play of wit. A fund of lightsome enjoyment is presented in the social caricatures and humorous scenes of the Dutch wood-carvers, not only in panels embedded in walls, but in wooden articles of domestic use. Satires and epigrams of Roman poets were at times directed to the carvings on the drinking cups in use. Both by the Greeks and Romans immense sums were lavished on carved tables. Homer alludes to the historic scenes set forth in the drinking cups of his heroes.

The art would seem to be as ancient as the world, and to have embodied to some extent the mental peculiarities and usages of various nations. Each great movement of the human race in early times is marked by distinctive forms and treatment of ornament, and carving is included in the record. The Italians seem to have retained that love of minute carving which was introduced by the wandering Greeks of the 13th century, but their half Gothic, half *Renaissance* style, florid in execution, which was developed in the 15th century, revealed at least a departure from foreign thraldom in the art. The Dutch carvers have found their delight in literal rendering of homely scenes; French carving has all the lightsomeness of the Gallic spirit; the Spanish, the barbarous magnificence of the Moors, and a plenitude of enrichment, consisting of Alhambra symbols, Arabesque scrolls and Gothic floriations. English carving, like our own, is eclectic, taking to itself what best suits its purpose.

There have been, as there will always be, among many failures great amateur successes in producting artistic woodwork. An amateur has been well described as a person who makes a business of amusements; he has not necessarily to study what will please others, or confine himself to what is marketable, and with more leisure possibly at command for any special production than can be bestowed by those who have, in doing ordinary work, to regard the price of compensation. The amateur can afford to make experiments, to waste time and materials, and so may possibly succeed in producing a *chef d'œuvre*. Practice in this healthful and beautiful art, in which proficiency can be far more easily attained than in painting, may be recommended as possibly calculated to elicit powers that might have been otherwise unsuspected.

The tools required for the practice of wood-carving have been described and illustrated in former articles upon this subject, but may be briefly referred to again in this connection: They consist of flat and skew chisels, shallow, deep and fluting gouges, one flat and one bent parting tool, a chisel with edge turned up to cut away wood, picks with one, two and three points, to break up surface where carved work is done on a level ground, and the ruffler or bent file for smoothing depressed surfaces after the work of carving is completed. The gouges are especially used for hollowing out leaves, leaving the mid-rib in relief and for scroll-work, also for cutting away adjoining wood. Arkansas oilstone may be used for sharpening the tools, using sweet-oil, neatsfoot or kerosene. There are two methods of carving open to selection—that in which the design is wrought out as a bas relief, and that in which it is brought even to the extended back of the piece of wood.



Rose.

Cat's Tail or Bulrush.

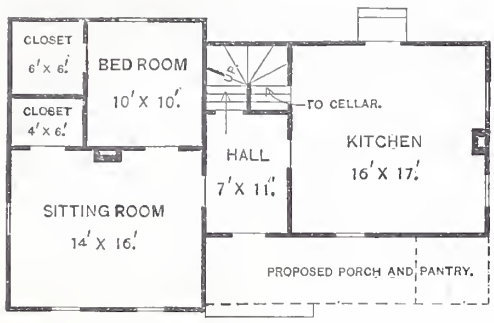
AMATEUR WOOD-CARVING.

In putting up your screen doors and windows be very particular to have a little hole in one corner so that the flies can go outdoors when they get tired of being inside.

CORRESPONDENCE.

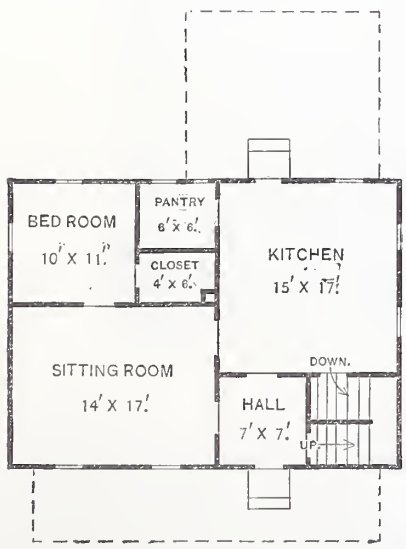
Arrangement of Rooms in a Cheap House.

From A. *Des Moines, Iowa.*—I inclose herewith a sketch showing the arrangement of rooms for a house built to the general plan submitted by "A. J. R.," published in the February number of *Carpentry and Building* for the current year. My object in doing this is to call particular attention to a lack



Arrangement of Rooms in a Cheap House.—Plan Submitted by A.

in house plans which prevails almost everywhere in the Western country. I refer to the omission of the hall or entry. On the cold prairies of Minnesota plans similar to the one referred to are very common among farmers. Their houses frequently have three outside doors, and sometimes more, depending somewhat upon the interior divisions. If, on the other hand, the house is divided according to the method shown in the first plan submitted herewith, every main room as well as the stairway may be entered from the hall, thus dispensing with a portion of the outside doors and rendering the building much more comfortable in cold weather. The second plan which I inclose is suitable for use in a still cheaper house. The arrangement is somewhat similar to that shown in the first. Some would prefer the second plan, however, because the two principal rooms communicate. A house built to this plan is the cheaper of the two, because it has less foundation wall, less exterior wall and no more floor and roof. It also has the advantage of using a single chimney. The second plan is better adapted for farmhouses than the first. A house built to it would



Arrangement of Rooms in a Cheap House.—Alternative Plan Suggested by A.

have the merit of being large and plain. The dotted lines in both diagrams indicate additions that may be made to the buildings at some time after they are built. In the first a porch and a pantry are suggested In the second there is a front porch and the outline of a kitchen, which may be built in the rear. In the latter case the room that is now marked "kitchen" would serve as a dining-room or general living-room.

Designs for Farmhouses.

From BEATRICE, *Middletown, N. Y.*—The Editor of *Carpentry and Building* spreads so many good things before his readers that one feels almost ashamed to ask for more. Contests in houses of five rooms for a common laborer; in houses of seven rooms for a better-waged mechanic, and in houses of eight rooms, with ample attic and basement in addition, costing, perhaps, $10,000 to $15,000, have been given. All of these, however, are either beyond the reach of the average farmer or fail to reach his requirements. The farmer must have more rooms than in the cheaper houses above mentioned, with plainer finish, so as to reduce cost. His house must be built to accomodate his workmen and visiting friends, and yet be done without investing more money than he can afford. A house of ten rooms, five on each floor, with perhaps an opportunity for two additional in the attic, about meets the requirements. Such houses are yearly built throughout the country at a cost of $4000 to $6000, and in the main are well constructed. They are, however, so uniform in appearance, and built so plain, that any one with taste must feel that a new departure in this direction is eminently desirable. Now, Mr. Editor, the object of this letter is to suggest a competition in farmhouses in order that such plans and designs may be brought out as will meet the requirements of those in whose interest I write. If you act from these suggestions I feel sure your efforts will be appreciated by many who are desirous of making farm life attractive to their growing families. I suggest, further, that the readers of *Carpentry and Building* should be allowed to vote on the floor plans, for a compact, convenient, practical plan is wanted, and those who are to occupy the houses, or who are engaged in building them, should by some means be allowed to indicate their preferences. There is wanted something that will make housework easy. Perhaps one should be allowed to have a bath-room and a small conservatory. A farmhouse should face either east or south, so that all the good to be obtained from the cheer of sunshine may be utilized.

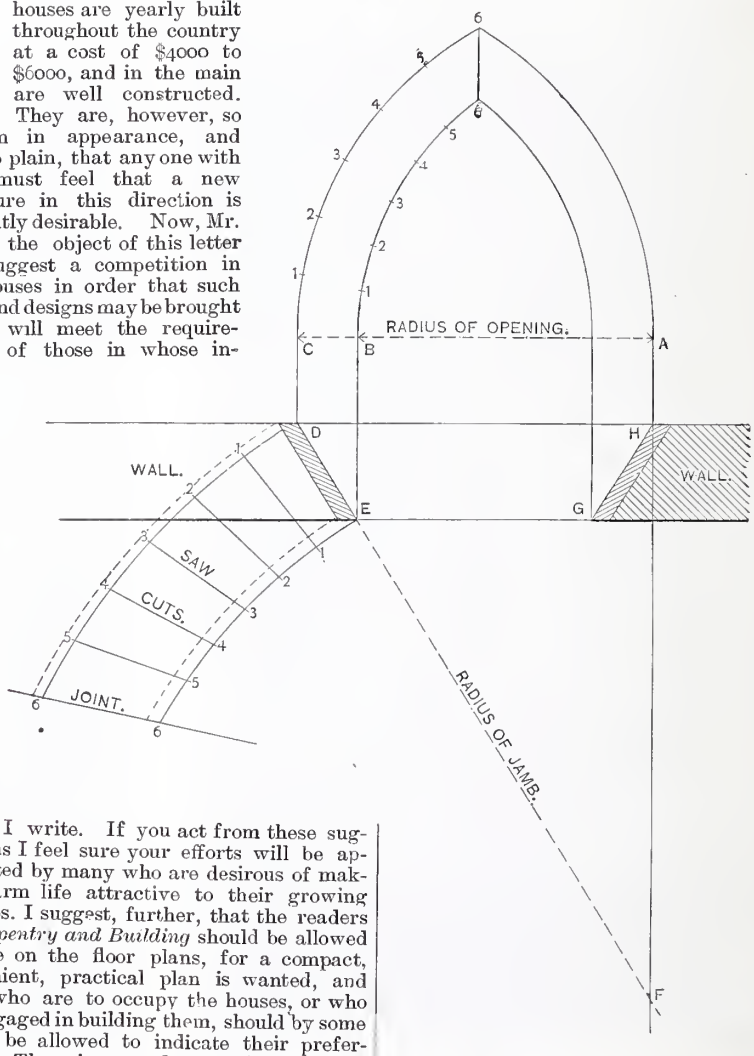
Note.—This letter, coming as it does from a woman of eminently practical ideas and the daughter of a farmer, suggests questions which it may be profitable for this journal to discuss. It is somewhat difficult for us, however, to know what proportion of our readers are specially interested in farm buildings, and, therefore, we are unable to tell how generally acceptable a competition of this kind would be without asking for an expression of opinion. We are now considering the subjects of our competitions for 1885, and shall be very glad to have suggestions from our readers with reference to them. We accept this letter as one of the kind which we shall be glad to have from many other readers. If a competition in farmhouses seems to be generally desired, we shall take pleasure in offering prizes and publishing conditions for its conduct.

Windmills.

From the AMERICAN WELL WORKS, *Aurora, Ill.*—We notice in the issue of *Carpentry and Building* for August an inquiry from "C. T. H.," of Waltham, Mass., in relation to windmills. We take this opportunity of directing your correspondent's attention to our establishment, and also of mentioning that our advertisement of windmills appears in another part of this paper. If "C. T. H." will address us we shall be glad to mail him our catalogue and to correspond with him in reference to his requirements.

Radius of Splayed Jambs.

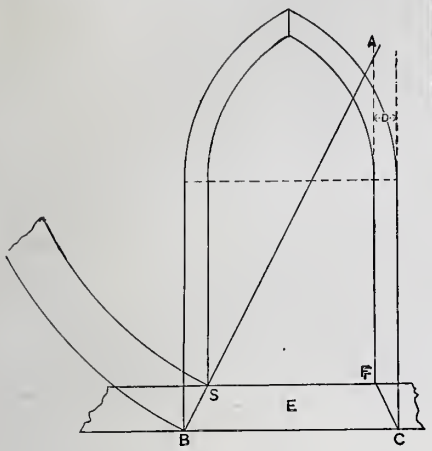
From J. V. H. S., *New York City.*—In answer to the question proposed by "R.D.M." in the April number of *Carpentry and Building*, which was for some rule for finding the radius of splayed jambs, I submit the accompanying diagram and the following explanation: Let the point A be the center from which to strike the opening lines, as indicated. Divide the inner and outer lines of the segment portions of the frame into any number of equal parts. H G and D E represent the splay of the jambs. In the present instance I have employed six. From the point A continue the vertical line of the outside of the jamb downward through the point H indefinitely. Extend the line D E until it cuts the line A F in the point F. Then from F as center, and F E and F D as radii, describe arcs as shown, and on them set off distances corresponding to the original divisions in the arcs of the frame, all as shown by corresponding figures. By this means the length of the piece to form the splayed jamb will be obtained. Connect



Finding the Radius of Splayed Jambs.—Diagram Accompanying Letter from J. V. H. S.

like figures in the outside and inside lines, as shown in the diagram. The lines thus drawn will indicate the direction of saw cuts. This rule, with the brief explanation here submitted, will, I think, be understood by your correspondent.

From J. R. L., *Chillicothe, Mo.*—I inclose a diagram showing a method by which the splayed jamb of a Gothic window may be

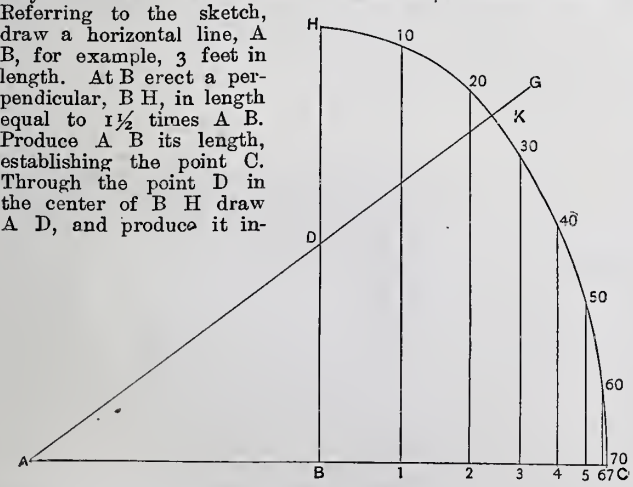


Radius of Splayed Jambs.—Diagram Submitted by J. R. L.

struck, and which I submit in answer to the inquiry of "R. D. M.," published some time since. Referring to the sketch, E shows the horizontal sill, C F indicates the splay and F A the line of the inside jamb; D shows the difference between the front and back edges of the jamb. Continue the line B S indefinitely upward, as shown. Extend the line F A, indicating the inside edge of the jamb, upward until it intersects with the line just drawn. From A as center, and with A S and A B as radii, strike arcs as shown. The form thus established will be the shape of the veneer required for either side of the head.

Projection of Cornices.

From J. R. L., *Chillicothe, Mo.*—Some discussion has arisen with regard to the projection of cornices. I have thought that perhaps it would be interesting to submit a plan that I have used with good results. The rule in question will be found in Hatfield's "American House Carpenter." Of course I do not wish to have it understood that the method is original with me. I submit the inclosed diagram for the benefit of those who may not have the work named for reference. Referring to the sketch, draw a horizontal line, A B, for example, 3 feet in length. At B erect a perpendicular, B H, in length equal to 1½ times A B. Produce A B its length, establishing the point C. Through the point D in the center of B H draw A D, and produce it indefinitely, as indicated by A G. From A, with A C as radius, describe the arc C K. From D as center, with D K as radius, describe the arc K H. Divide the curve G K H thus established into seven equal parts, as marked 10, 20, 30, 40, &c., in the sketch. From the points in the curves thus established drop perpendiculars to the line A C, as indicated by 10 1, 20 2, &c. By this means a scale is constructed that may be used in practical work. B 1 will be the cornice projection for a building 10 feet high, while B¹ will be the projection for a building 20 feet high, and so on. I think your correspondent, "P. E. C.," hit the nail squarely on the head when he said that the judgment of the architect is brought largely into play with regard to the matter of cornice projection. "J. B.," of Des Moines, Iowa, gives an arbitrary rule—namely, that the projection must be one-twelfth the hight of the building. This would make the projection of the cornice of a 72-foot building 6 feet. It is fortunate for the country that this individual is not the architect of the Washington Monument. As "P. E. C." says, the taste of the architect is really the only safe rule to be governed by. A cornice for a mill or factory is not one necessarily adapted for a store or church, neither will one that is suitable for a barn be suitable for a house. The inclosed diagram and the explanation above are on the assumption that a projection of 3 feet is correct for a building 70 feet high; 3½ or 4 feet may be used as the limit given above when circumstances demand a variation. Inasmuch as this rule admits of variations of the kind suggested, I like it. It can be made to satisfy the requirements of either "J. B.," of Des Moines, or "T. E. C.," of Wheeling.



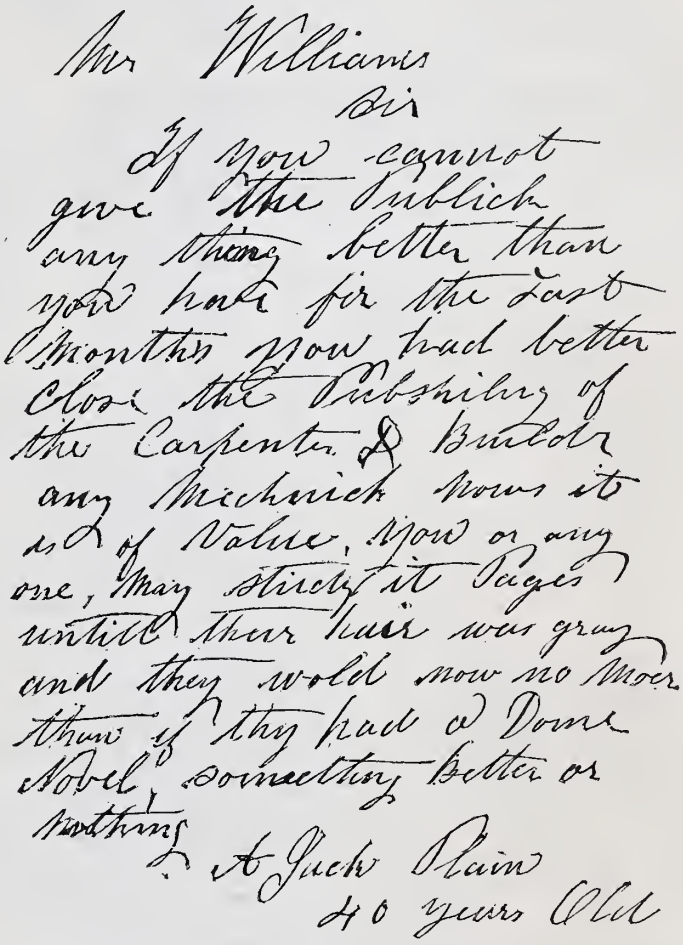
Projection of Cornices.—Diagram Referred to in Communication from J. R. L.

In Wind or Out of Wind.

From H. E., *Cohoes, N. Y.*—In answer to "S. F. G.," who inquires on page 143 with reference to the terms "in wind" and "out of wind," I would say that the door as he describes it is "winding." When he gets it correct in all particulars it will be "out of wind." I hope this will clear up your correspondent's difficulty.

"Something Better or Nothing."

It has always been the pride of *Carpentry and Building* that it has been able to publish adverse criticisms as well as letters which are complimentary to its management and contents. We have never asked our readers



to agree with us in all cases, and where they have differed we have taken as much pleasure in presenting their communications for consideration as those which have indorsed our utterances. We have succeeded in making the paper as acceptable as it is only by inviting free expressions of opinion, and then carefully noting the wishes of a majority of our readers. Occasionally we receive letters which, on account of their character, are very hard to publish satisfactorily. To put them in type, even though we attempt to follow copy *verbatim et literatim*, deprives them of some of their piquancy and flavor. It destroys their individuality, so to speak. We have recently had one of the kind referred to, which complains of the conduct of the paper. On this account we are anxious to lay it before our readers. The letter is without address, date or name of writer. This alone destroys whatever claim to attention it might otherwise have. Editors have very little respect for anonymous writers, and generally throw into the waste basket all letters from correspondents who have not sufficient confidence in their own assertions to sign their names. For reasons already stated, however, and because it is in some respects a literary curiosity, we have waived all such considerations. In order to give our readers the benefit of the communication, which reached this office July 29, and which we assure them is genuine, we have had a *fac simile* made of it, and present it herewith. It differs from the original only in being reduced in size. Further comment upon our part is manifestly unnecessary, as the matter very clearly explains itself.

Construction of a Mill.

From J. F. W. *Danville, Pa.*—I inclose herewith drawings of a mill built by me some time since, and the publication of which in *Carpentry and Building* may be of interest to the readers at large. The drawings so thoroughly show the construction that very little description is necessary. I would remark that the cost was about $7000. This was exclusive of the machinery. The following is the bill of lumber used in the mill, which was 30 feet wide and 48 feet long, and which is owned by John A. Cooper :

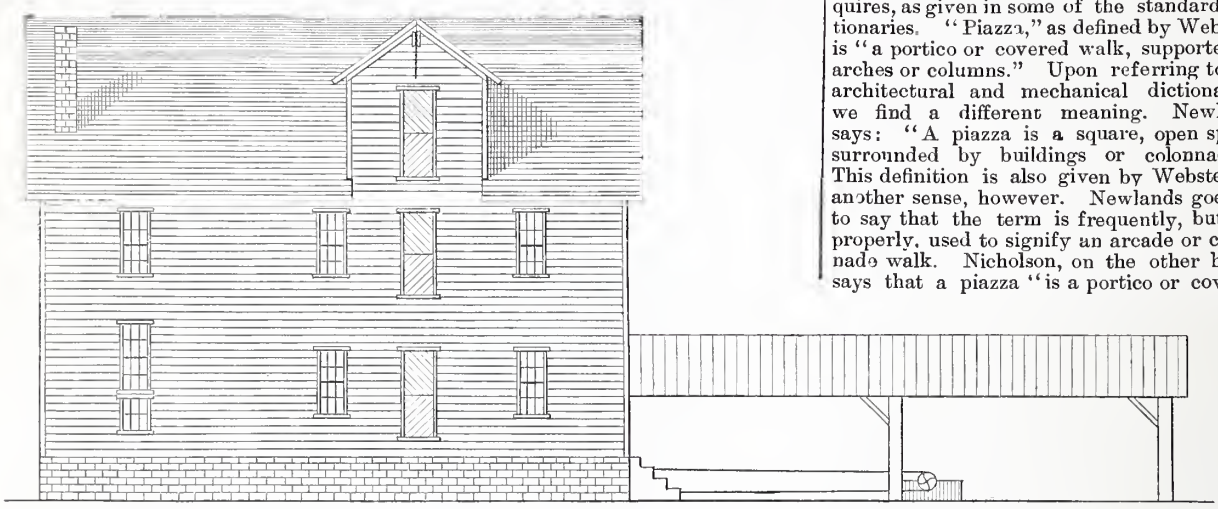
2 oak sills, 8 x 12½ inches, 48 feet long.
2 oak sills, 8 x 12½ inches, 30 feet long.
2 oak girders, 8 x 12½ inches, 25 feet long.
18 posts, 10½ inches square, 12 feet long.

The following is the bill of lumber entering into the saw mill, which is 17 x 53 feet in plan, covered with a board roof :

7 posts, 9½ inches square, 10 feet long.
2 plates, 9½ inches square, 53 feet long.
4 ties, 9½ inches square, 17 feet long.
2 ties, 3 x 9 inches, 17 feet long.
2 trusses, 6 x 8 inches, 12 feet long.
2 truss rods, 1¼ inches diameter.
50 rafters, 3 x 5 inches, 11 feet long.
1400 feet of roof boards.

The material entering into the construction of the engine-room, which measures 15 x 14 feet, and is covered by a slate roof, is as follows :

4 posts, 9½ inches square, 100 feet long.
1 plate, 9½ inches square, 40 feet long
4 ties, 9½ inches square, 15 feet long.
1 plate, 6 x 8 inches, 40 feet long.
4 posts, 6 x 6 inches, 6 feet long.

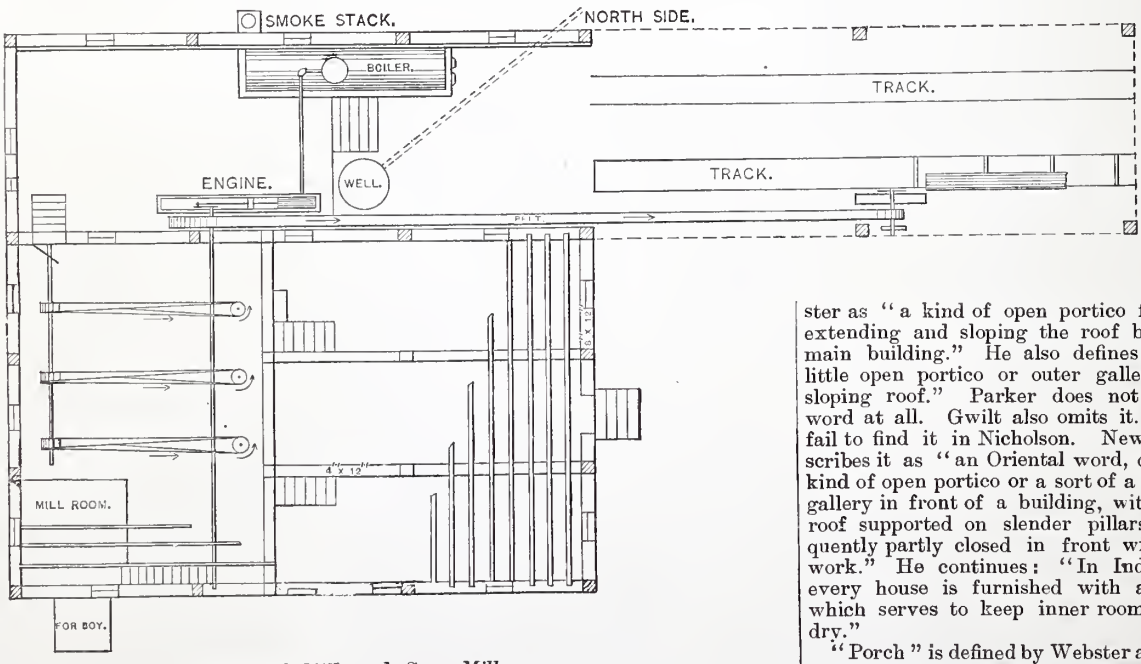


Construction of a Mill.—Side Elevation of Mill, Showing Saw Mill Shed.—Scale, $\frac{1}{16}$ Inch to the Foot.

2 ties, 10½ inches square, 48 feet long.
2 girders, 10½ inches square, 48 feet long.
4 ties, 10½ inches square, 30 feet long.
16 posts, 9½ inches square, 11 feet long.
2 ties or pents, 9½ inches square, 48 feet long.
4 ties or pents, 9½ inches square, 30 feet long.
10 posts, 8½ inches square, 8½ feet long.
2 plates, 8½ inches square, 48 feet long.
2 plates, 8½ inches square, 10 feet long.
26 pieces of setting, 3 x 5 inches, 12 feet long.
3 ties, 6 x 6 inches, 13 feet long.
4 ties or collar beams, 8½ inches square, 13 feet long.
1 tie, 8½ inches square, 10 feet long.
103 pieces of studding, 3 x 5 inches, 11 feet long.
21 rafters, 3 x 5 inches, 17 feet long.
600 feet of siding.
100 pound of 10d. nails.
5 pounds of 20d. nails.

The carpenter work on this job, not including the roofing or the millwrighting, amounted to 325 days.

Note.—The above contribution will be found acceptable to many of our readers, and will excite curiosity and surprise in the minds of many who are not specially interested in the kind of construction described.



Plan of Mill and Saw Mill.

30 pieces of studding, 3 x 5 inches, 8½ feet long.
133 joists, 3 x 8 inches, 10 feet long.
81 joists, 4 x 6 inches, 10 feet long.
50 rafters, 3 x 5 inches, 14½ feet long.
60 rafters, 3 x 5 inches, 8 feet long.
5350 feet yellow-pine flooring, 1¼ inches thick.
26 window frames and sash, 12 lights each, 9 x 16.
6 doors and frames, 3 x 8 feet x 2 inches.
200 pounds 10d. nails.
100 pounds 40d. nails.
5000 feet of lath for slate roofing.
2000 feet white pine lumber.

The sizes and lengths of timber in the above bills are unusual, and are hardly to be duplicated in any section of the country save where timber is specially cut for a given structure and worked to the sizes marked out beforehand by the builder. Our correspondent has very evidently endeavored to lay before the readers of *Carpentry and Building* a good idea of the construction, materials and labor entering into a grist mill and constructed to meet modern requirements.

Conflicting Terms.

From B. B., *Mexico, Mo.*—I should be greatly obliged if you would inform me how to distinguish between a piazza and a veranda, a porch and a portico

Answer.—The employment of these terms in modern architecture is in many cases very confusing, and, even among writers of recognized ability and standing, there are occasionally discrepancies which greatly confuse an ordinary reader. Perhaps we cannot better answer our correspondent's inquiry than by presenting herewith the definitions of the terms about which he inquires, as given in some of the standard dictionaries. "Piazza," as defined by Webster, is "a portico or covered walk, supported by arches or columns." Upon referring to the architectural and mechanical dictionaries, we find a different meaning. Newlands says: "A piazza is a square, open space, surrounded by buildings or colonnades." This definition is also given by Webster, in another sense, however. Newlands goes on to say that the term is frequently, but improperly, used to signify an arcade or colonnade walk. Nicholson, on the other hand, says that a piazza "is a portico or covered walk, supported by arches," and then refers to the literal signification of the word as already defined, and traces its introduction into the language. Gwilt agrees with Newlands, and says "the term is very frequently and very ignorantly used to denote a walk under an arcade." Parker's "Concise Glossary" gives the word in its Italian signification, as meaning an open area or square, usually with arcades.

The term "veranda" is defined by Webster as "a kind of open portico formed by extending and sloping the roof beyond the main building." He also defines it as "a little open portico or outer gallery with a sloping roof." Parker does not give the word at all. Gwilt also omits it. We also fail to find it in Nicholson. Newlands describes it as "an Oriental word, denoting a kind of open portico or a sort of a little open gallery in front of a building, with an open roof supported on slender pillars and frequently partly closed in front with latticework." He continues: "In India almost every house is furnished with a veranda, which serves to keep inner rooms cool and dry."

"Porch" is defined by Webster as "a kind of vestibule at the entrance of temples, halls, churches or other buildings; hence, a stately or ornamental entrance way." Newlands describes a porch as "an exterior appendage to a building, forming a covered approach or vestibule to a doorway." He continues: "The porches in some of the older churches are of two stories, having an upper apartment to which the name 'parvise' is sometimes applied." Parker's "Concise Glossary" defines a porch as "an external erection

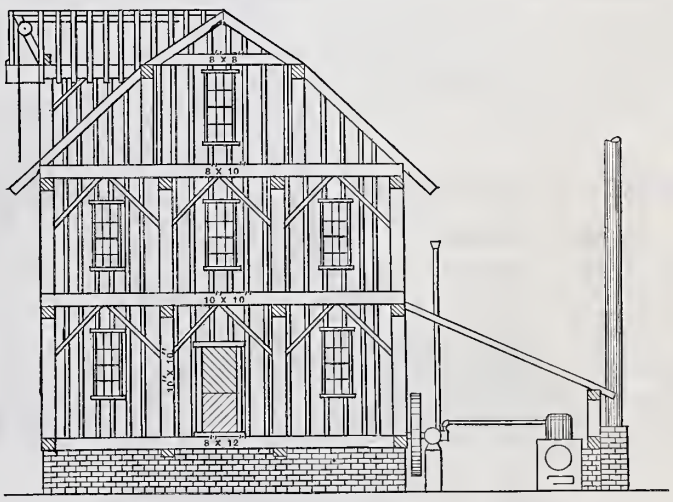
protecting the doorway of a large building," and follows this definition by a number of illustrations bearing out the idea that a porch is the entrance to a building of more than ordinary size and importance. Nicholson defines porch as "a kind of vestibule supported by columns, much used in the entrances of ancient temples, halls, churches, &c." Gwilt says: "A porch is an exterior appendage to a building, forming a covered approach to one of its principal doorways."

Construction of a Mill.—End or Front Elevation of Mill and Section Through Saw Mill.

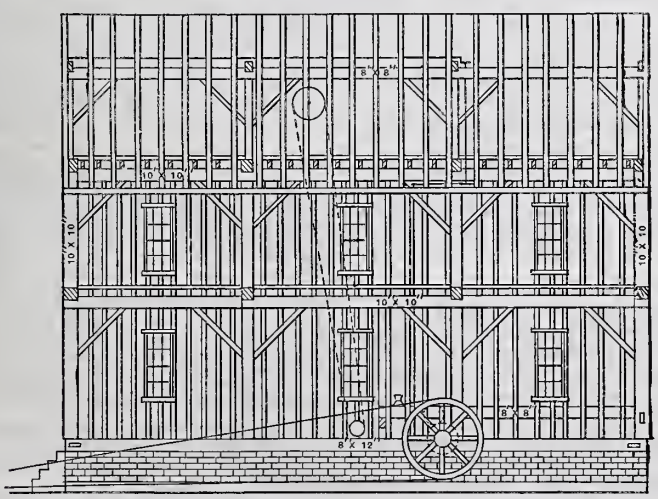
With reference to the term "portico," Gwilt gives it as synonymous with colonnade, the latter being defined as an arrangement of columns. Nicholson defines portico as "a kind of gallery on the ground, incompassed with arches or supported by columns. The roof is usually vaulted, sometimes flat." This definition is followed by references to the portico of Solomon's Temple, and to the Doric portico at Athens, and the portico of the Ionic temple, also at Athens. Among modern porticos there is mentioned that of Saint Peter, of the Vatican. Newlands defines portico as "an open space before the entrance of a building, furnished with columns." Parker defines portico as "an arrangement of columns in front of a building." From the foregoing it will be noticed that a porch has something of the diginity of the building to which it is applied inseparably connected with it. Portico conveys the sense of columns, and it would seem out of place to use this term referring to the little ornamental structures with which many modern buildings are adorned. Veranda and piazza are very commonly used in the same sense, and from their definitions as above given it would be hard to say in all cases which of the two terms is most appropriate to use.

Joining Stair-Rail.

From F. S. W., *Cleveland, Ohio.*—Some time since I noticed an inquiry as to the best method of joining a stair-rail to newel and angle posts. I have not yet seen any reply to the question. I venture to suggest that the best way is to make a butt joint and fasten the rail with a one-nut stair bolt, the milled point being screwed into the post. The mortise in the rail is made on the under side in the form of a T, so as to slip down over the bolt with a nut and washer on the end. After tightening the nut with a nail-set, a level rail will also need to be nailed in some convenient place to prevent it from turning. All bolts should be put in horizontally. In case of a shallow rail on the rake a very short bolt is required; one 3½ inches long will answer. Such bolts, by the way, are not to be found in this market. If they are made it would be a great convenience to stair-builders to know where to obtain them.



Cross Section Through Mill and Saw Mill.



Longitudinal Section, Showing Framing.

The Carpenter's Sister.

From C. M. B., *Moorcombe Lake, Charmouth, Eng.*—The letter from "J R. L.," published in the July number, reminds me that in the village where I was brought up two cottages were designed by ladies. The landlord was spending much money, time and thought on the buildings, and his two daughters asked that they might each design a cottage. Permission was granted, and both cottages built to their plans are substantial stone buildings, creditable in all respects to the designers. One, however, was much better than the other, and, encouraged by her first effort, the lady afterward designed the village smithy, with cottage adjoining. The work is one of the prettiest I have ever seen, and is universally admired by strangers. The only objection urged against the work of this lady, referring to her first effort, was that some of the chimneys of the house smoked. I have known houses designed by leading architects, however, which were not perfect in this respect. Of my own knowledge, I can say that the elevations and details were just as good as those drawn by professional men in the neighborhood.

Referring to the other subject mentioned by your correspondent, namely, the dignity of the carpenter's calling, I am one who does not try to except myself from the class of mechanics, greasy or otherwise. If the carpenter is not a mechanic, who is? I can mention several to whom the term greasy, and even dirty, may well be applied, although there is no excuse for this with a carpenter, as there is with a machinist, for example. The only ground I can stand on is the common one of the dignity of all honest labor. I shall never forget a remark made many years ago by a friend of mine in a very large cabinet-making establishment. His sons gave themselves great airs on the strength of being clerks, a class which I must confess I am not proud of. My friend said: "My sons have never yet done a day's hard work, but the time will come when they will learn that an honest mechanic is better than a skillful quill-driver any day." I then belonged to the same class, but, nevertheless, I agreed with him.

From "CARPENTER'S SISTER."—I never had a compliment that pleased me more sincerely than when "J. R. L." dusted off his tool chest and invited me to a place in the shop as a sister carpenter.

Question of Insurance.

The article published in the July issue of *Carpentry and Building*, on page 140, bearing the above title, has called out the following reply from Mr. C. J. H. Woodbury, of the Boston Manufacturers' Mutual Fire Insurance Company. Mr. Woodbury's remarks will be read with interest. He says:

In the absence of any specific contracts or clauses to the contrary, underwriters are liable within the limits of the policy for the damage by water used in extinguishing a fire, and also for unavoidable damage which ensues in a building exposed to the elements

by a partial destruction of the roof. However, an owner is bound to make use of all the appliances in his power to save and protect his property, both against fire and subsequent damage from any cause connected with the fire, its extinction and the subsequent action of the weather. He cannot fold his hands, and "turn the property over to the insurance companies," except by their consent, and any proposition involving the latter consideration should be accepted very cautiously, as the Supreme Court of Massachusetts has made two decisions which deny either to executive officers or to boards of directors the power to make any permission or concession in violation of the by-laws of their corporation.

In the case of your correspondent, the underwriters were surely derelict in waiting a fortnight before sending a representative to conserve their interests. The liability embodied in an insurance policy does not give a new article for an old one, but is limited to an indemnity, within the limits of the policy, for the loss sustained. In this instance, after 18 months' service the paint and paper were presumably nearly as good as new, but if they had been badly used the insurance company could be called upon only for a reasonable value of the paint and paper as they were at the time of the fire. Every insurer ought to make a detailed statement of his buildings and contents, with an appraisal of the valuation, as often as once a year. In case of fire he can act with intelligence and force in the matter of a just claim. Do not keep the policies on the property insured; have the store policies at the house and the house policies at the store, if there are no more secure places at your service; and the moral of the whole is: Read your policies carefully.

REFERRED TO OUR READERS.

Dormer Windows.

From B. S., *West Stockholm, N. Y.*—I have seen houses with one, two or three dormer windows so placed as to cut through the plate. I would like to learn from practical readers of the paper how the building is kept from spreading under these conditions. The roofs in question are of ordinary pitch, and the floor line of the rooms to which the dormers give light are somewhat below the eaves, so that evidently the plate is cut away.

Kerfing.

From H. L. T., *Des Moines, Iowa.*—I shall be glad if some of the practical readers of *Carpentry and Building* will give a method of kerfing a molding on the casings of the wall-string of a staircase.

Curled Maple.

From J. C. B., *Aledo, Ill.*—Will some reader of *Carpentry and Building* give me a recipe for finishing curled maple or cherry so as to produce the best effects?

Framing Church Spires.

From M., *Colorado.*—Why do not some of the readers of *Carpentry and Building* who are well up in geometry commence a discussion on the subject suggested by "E. W. C." in the January number? I refer to framing spires of any number of sides together with the braces required. Is it possible that our old hip-rafter friends do not understand this subject, or are politics too hot for indulgence in mechanical problems at the present time?

Bay Window.

From D. F. W., *Danville, Pa.*—If some of the readers of *Carpentry and Building* will furnish a plan for a two-story bay window suitable for the gable end of a house they will confer a favor. The hight of the lower story is 9 feet, the second story 8 feet, the joists are 2 x 8. The building in question, against which I desire to use the design referred to, is 14 x 24 feet, with a wing 12 x 14 feet. This wing is flanked by porches filling out the square of the house. The bay window, I think, should be about 3 x 9 feet.

Ink Stains on Ivory.

From O. B. M., *Bridgeport, Conn.*—If some reader of the paper will give me a recipe for removing ink stains from ivory he will confer a favor. I have a beautiful 18-inch scale from which I am unable, by any means known to me, to take the ink stains.

Portable Bench.

From L. W. F., *Syracuse, N. Y.*—I desire to learn the best means of putting up a carpenters' bench with folding legs. It should be convenient for moving from one job to another. If any reader of the paper can help me in constructing an article of this kind he will confer a favor.

TRADE NOTES.

The Smith & Anthony Stove Company, Nos. 52 and 54 Union street, Boston, have sent us copies of their current trade circulars, illustrating and describing some of the stoves they make. The "Hub Franklin," which is elsewhere illustrated in this issue, is prominent among them. The "Modern Hub," an art stove of great excellence, is also shown. One of the circulars contains a reprint of an article which recently appeared in *The Metal Worker*, commendatory of these goods. A round art stove called the "Hub Heater," and an oval stove of similar features, are also presented.

The contract for the marble work required in the construction of the Mutual Life Insurance building, New York City, is said to be largest that was ever let in this country. Over 200,000 square feet of marble, the most of it polished in the highest style of art, were used in the building. Over 150 marble, stone and onyx mantels were distributed through the several rooms. Messrs. A. U. Fauchere & Co., of No. 433 Seventh avenue, were the contractors. The entire work was completed in less than a year's time. This firm have executed the work for other prominent buildings in this city, among which may be mentioned the Wells building, the Equitable building, the Merchants' Bank building and the Vanderbilt houses.

The Egan Company, of Cincinnati, Ohio, manufacturers of wood-working machinery, some time since received the following, which explains itself:

Office of C. H. Pries & Co,
Manufacturers of Furniture,
Kansas City, Mo., June 28, 1884.

The Egan Company, Cincinnati, Ohio.—Gentlemen: Inclosed find draft on New York for the amount of your invoice of May 28 for the automatic knife grinder. Although we stipulated as a precaution for 30 days' trial if necessary, it did not take 30 minutes to ascertain that the machine was a good one and thoroughly satisfactory. We are well pleased with the machine, and if our name will assist in recommending the knife grinder to others, we cheerfully offer it. Very respectfully, &c.,

(Signed) C. H. Pries & Co.

The Cincinnati Corrugating Company, of Cincinnati, Ohio, have recently extended their business and increased their lines of goods by absorbing the New York Iron Roofing and Paint Works. This consolidation in business puts the Cincinnati Corrugating Company in a position to supply iron roofing in the form of flat sheets. Circulars have been issued, one signed by the New York Iron Roofing and Paint Works, soliciting for the Cincinnati Corrugating Company the same courtesies and patronage that have heretofore been extended to the old firm, and by the Cincinnati Corrugating Company calling attention to their present excellent facilities for manufacture.

The National Sheet-Metal Roofing Company, whose office is No. 21 Cliff street, are directing the attention of the trade at large to their charcoal tin shingles. This form of roofing has been before public for something over three years, and in that time has secured many friends among architects and those actively engaged in the roofing trades. The special point to which the company are directing attention at this time is that desirable territories and agencies for this article can be secured by those who apply first. We understand that the policy of the company is to have this article handled by only one party in a place.

An improvement in sheet-metal ceilings made of raised or sunk panels is the subject of a patent recently granted to A. Northrop, of Pittsburgh, Pa. The object of the improvement is to provide means whereby any water falling upon the panels or formed by condensation is speedily carried off. In each raised panel the inventor makes an opening at the central and lowermost point, which is closed by an ornament. With sunken panels the water flows through small side openings into recesses made in the moldings that surround the panels. In these trough moldings the water will run to the point where the next molding adjoins, and at this point a rosette is affixed for the reception of the drippings.

STRAY CHIPS.

The Board of Trustees of the University of South Dakota, at a meeting held a short time since, decided to push the erection of the new permanent building for the Presbyterian College to completion as rapidly as possible. Mr. Ernest Baillie, of Pierre, D. T., was appointed supervising architect, and will personally superintend the work during its construction.

Mr. J. D. Sibley, of Middletown, Conn., is at present employed in superintending the erection of a new hospital for the insane at that place. The building is to cost $75,000. The building trade in Middletown and vicinity is reported quite brisk at present.

Plans have been prepared and the contract let for three five-story stores, to be erected on the west side of Fourth street, St. Louis, on the site of the old St. Nicholas Hotel, burned last winter. These stores will have an aggregate frontage of 80 feet by a depth of 127 feet. They will have hydraulic elevators and all the conveniences of first-class store buildings. The front will be of stock brick and terra-cotta. Mr. C. E. Illsley is the architect

Mr. Fren. G. Atkinson, architect, of Washington, has prepared the plans for a new county building to be built at Accomac Court House, Va. The building will be two stories in hight, with basement, and will be fire-proof, the floors and ceilings being of brick and iron. The front will have a massive appearance, being constructed of brick and stone, and surmounted by a mansard roof. The estimated cost of the new court house is $25,000.

Stevens & Sherwood, of Gainsville, Texas, are erecting a corrugated-iron warehouse, 58 x 100 feet in size, and two stories in hight.

A new $10,000 building, to be called the Alabama Hall, is to be erected on the Normal School grounds, at Tuskaloosa, Ala.

Mr. W. G. Robinson, architect, of Grand Rapids, Mich., has the following work in hand: A structure of red-pressed brick and stone, to cost about $15,000, for the Fourth National Bank; a three-story brick warehouse, to cost about $25,000, for Mr. T. D. Gilbert; a three-story brick block, to cost about $25,000, for Mr. H. J. Hallister, and a wooden dwelling, to cost $4500, for Mr. F. B. Parmeter.

The Houston (Texas) Cotton Exchange are erecting a building at a cost of $39,000, and the Merchants' Exchange of San Antonio, Texas, will have one costing $50,000.

Mr. F. O. Weary, of Akron, Ohio, has recently completed the plans for the sheriff's residence and jail, to be of stone, brick and iron, and to cost $20,000; also, plans for the new $75,000 Episcopal church (St. Paul's) and the new $75,000 Central High School, and a large $5000 Queen Anne dwelling for Prosecuting Attorney Charles Baird; also a $10,000 dwelling for Wm. Hardy, a $3000 office for the Akron Iron Company, a pressed and enamel brick business block for Seil & Day, to cost $10,000, and a large addition to the Crosby School, all Akron contracts, besides a large amount of smaller work.

A dwelling for Miss Mary F. Judkins, of Newtonville, Mass., to cost $12,000, is being put up in that place. Mr. J. Brown, of Boston, prepared the plans.

A three-story and basement brick building, to cost $30,000, is going up at Modesto, Cal., for Dr. Tynan.

Mr. Theodore Justice, of Roxborough, Pa., is erecting a dwelling and stable, to cost $16,000, from plans prepared by Lindley Johnson.

Work has been commenced on the extension to the Institute for the Deaf and Dumb, at Olathe, Kan. Nichols, of Atchison, is the architect.

A brick block, 125 x 87 feet in plan and four stories in hight, is being put up in New London, Conn., by Mr. J. N. Harris. The cost is placed at $75,000.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME VI. NEW YORK—OCTOBER, 1884. NUMBER 10

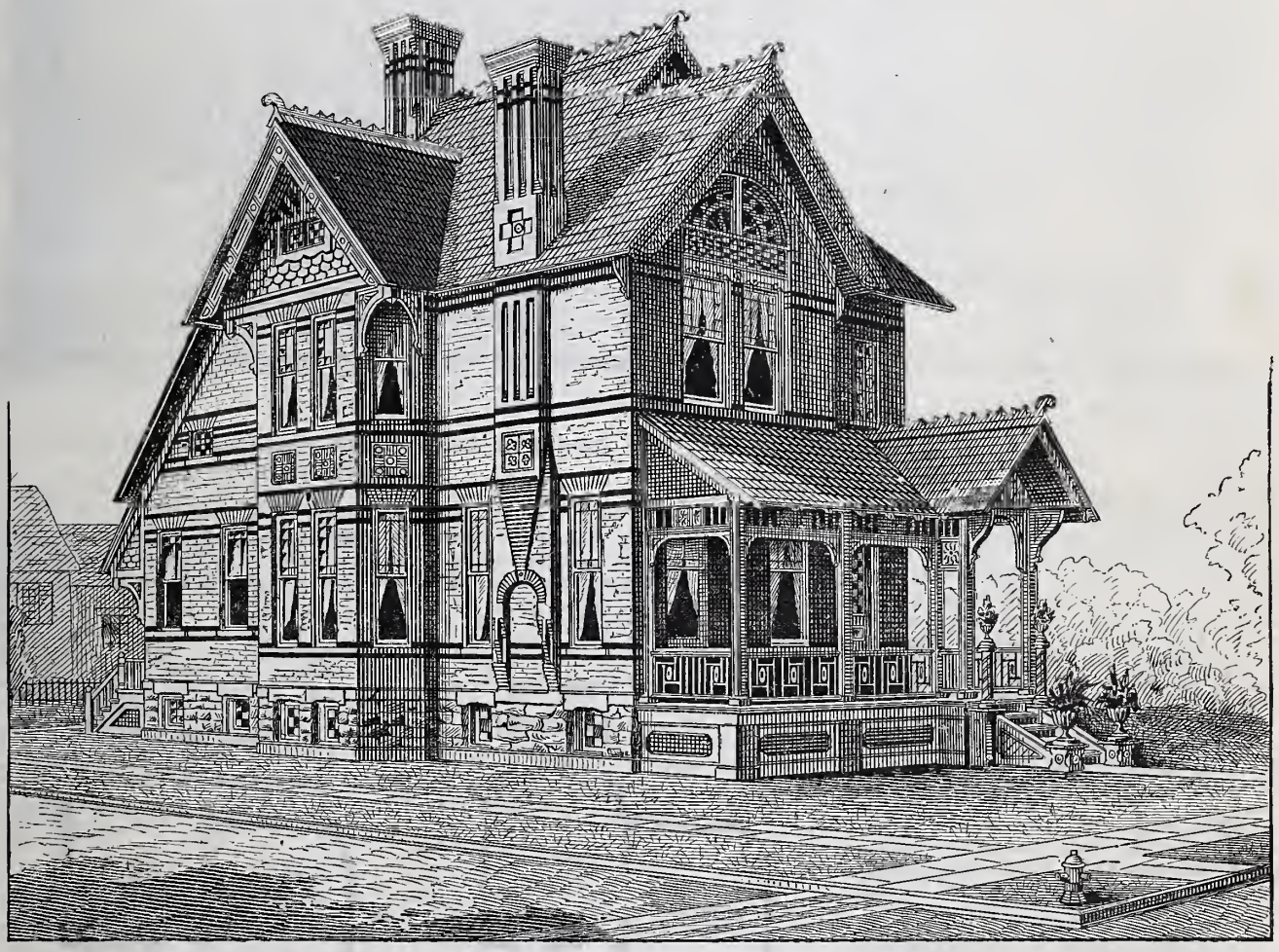
Seven-Roomed House in Brick.

The subject of the Twelfth Competition in *Carpentry and Building* was elevations and details of a house in brick, built to the same set of plans that has been used in similar competitions in wooden houses. We published the design receiving the first prize in this competition several months since, and now lay before our readers the third prize design, the author of which is Mr. H. L. Campbell, of 485 Main st., Buffalo, N. Y. We should add at this point that the publication of the third prize before the second prize is submitted is merely the result of an accident in the completion of the engravings. The second prize set will be presented to our readers at no distant date. Owing to the very complete manner in which Mr. Campbell has worked up this study in house-building, we find it impossible to present all of the details in this issue. We show herewith the perspective view, elevations, and the principal details relating to the brick-work. In a subsequent issue we will show the details of interior woodwork and exterior finish in wood, including porches.

From the particulars submitted by the author, with his drawings, for the consideration of the judges in this competition we glean the following items. It has been the endeavor of the designer to make the house as attractive as possible and still keep within the limits of a moderate estimate. The disposition of materials is as follows: The base and water-table of the foundation to be of hammer-dressed limestone or native stone, whichever may be the most conveniently obtained. The courses between base and water-table are to be rough-pointed, of the same material, and laid in regular and equal courses. The brick used in facing the walls above the foundation is to be of dark-red stretcher brick, of even quality and carefully selected. The window sills of first and second story, and the stone window head shown on front elevation, to be of rubbed white sandstone. The brick courses on the line between window sills to be of "Peerless" buff brick laid in white mortar. The courses in a line with the arches from windows to be of "Peerless" black brick, as indicated on elevations and details. The black and buff brick are to extend all around the house except on north elevation. All the red brick are to be laid in brown mortar, and the black brick in black mortar. Molded brick have been introduced in various places, and will be seen by examination of details. These have been selected from the catalogue of the Peerless Brick Company, and the designs are specifically referred to by number. On account of the houses being placed on a corner lot, the author has made the south elevation more elaborate than would be necessary if the same building were erected on an inside lot.

With reference to the woodwork of this building, the author says that it has been designed with a view to being substantial and of a character to resist the weather. His ideas with regard to painting would be to paint the cornices, casings, window frames, porches, &c., a medium olive or seal brown; the beads, chamfers, rosettes, &c., to be picked out in dark red; the sash to be painted dark bottle green; the shingles and beaded boards in south gable, the shingles on sides of dormer, the spandrils of brackets and beaded boards in porch gable to be dark red.

With regard to interior finish, the author claims to have kept on the economical side, and at the same time has endeavored to make it attractive. Only two designs for mantels are shown, as he considers them somewhat of an ornamental luxury in this age of expensive fuels. Especially is this the case when the efficiency of open fires as heaters is taken into consideration. The brick fireplace shown on page 191 has been designed for use in the dining-room, although it might be placed in the sitting-room with good



PERSPECTIVE VIEW OF HOUSE RECEIVING THIRD PRIZE IN THE TWELFTH COMPETITION.

H. L. Campbell, Buffalo, N. Y., Architect.

effect. The intermittent heat from such a source, however, is more tolerable in the dining-room than in the living-room of a dwelling. Referring to the stairs, the author says he has placed the newel square with the stairs on account of the construction being the least expensive and as it gives the largest amount of room. No effort has been made to obtain an attic story beyond placing a dormer on the side to light the stairs. The attic plan has been drawn to show where the stairs terminate and how the rooms might be located in case it should be desirable to finish them.

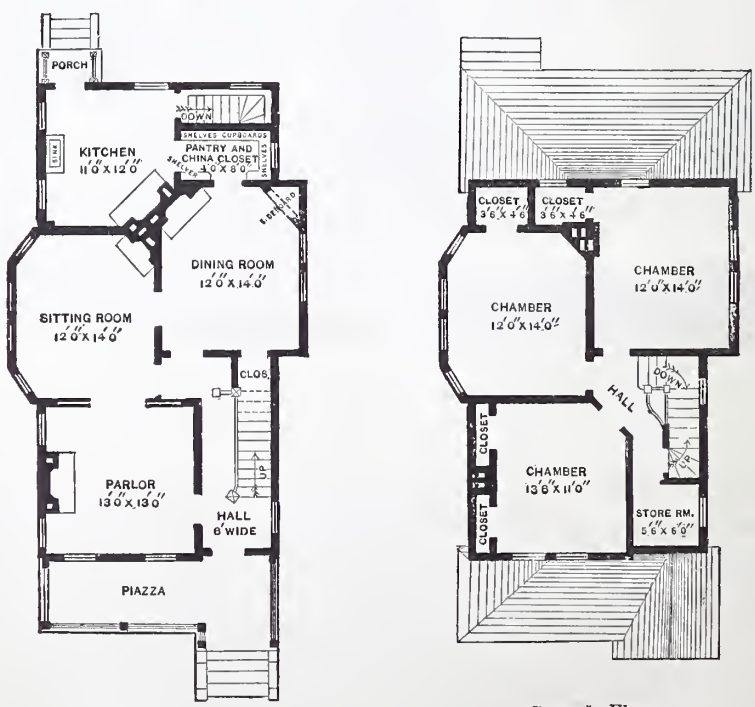
A slight variation from the original floor plans has been made in this design, as is shown by the elevations. This has been done, the author explains, in the spirit of economy. In order to roof the kitchen and pantry, and preserve the two windows shown on the plan in the rear, it would be necessary, the author states, to place an iron girder in the kitchen ceiling in order to carry the brick wall which would appear above the roof. This, of course, would require a heavy pier at the corner of the chimney to support the girder, and would necessitate moving the kitchen window, which would come under the girder. The author has not deemed the windows referred to of sufficient importance to justify the expense required to save them. He therefore has placed them on the sides instead of in the rear, and by roofing the kitchen, as shown in the side elevation, does away with the necessity for a brick wall between pantry and dining-room. The roof, he suggests, should be shingled and painted the color of slate. The distribution of color has been depended upon somewhat to make an effective design. With good work in this particular, the author says he should anticipate a very attractive building constructed to the plan submitted. In locating the houses on the lot, he advises that it should be placed 2 feet from the north line and 20 feet from the east line.

Third Prize Design, Twelfth Competition.—Front Elevation East.—Scale, ⅛ Inch to the Foot.

Quarrying Slate by Machinery.

In the slate district of Pennsylvania a machine has recently been introduced which bids fair to supersede the old method of drilling and blasting. The machine is the invention of John Crump, of Philadelphia, and of Richard Brereton, superintendent of Mr. Crump's quarry. Mr. Crump four years ago proposed to himself the project of devising a machine to cut and finish with true surfaces all kinds of building stone as it lies in the ground, thus saving the enormous waste of blasting processes and the handling of the waste. He engaged Mr. Brereton to assist him, and the result of their labors is this novel "rock quarrier and stone shaper," which they have had patented in all countries under the above name. Its cutting power is shown by the ease with which it goes through the flint in this slate quarry, where, at least, it is capable of doing remarkable work. Whether it can be as successfully employed in cutting and shaping granite and other hard rocks is not decisively proved as yet, though it is designed for such use.

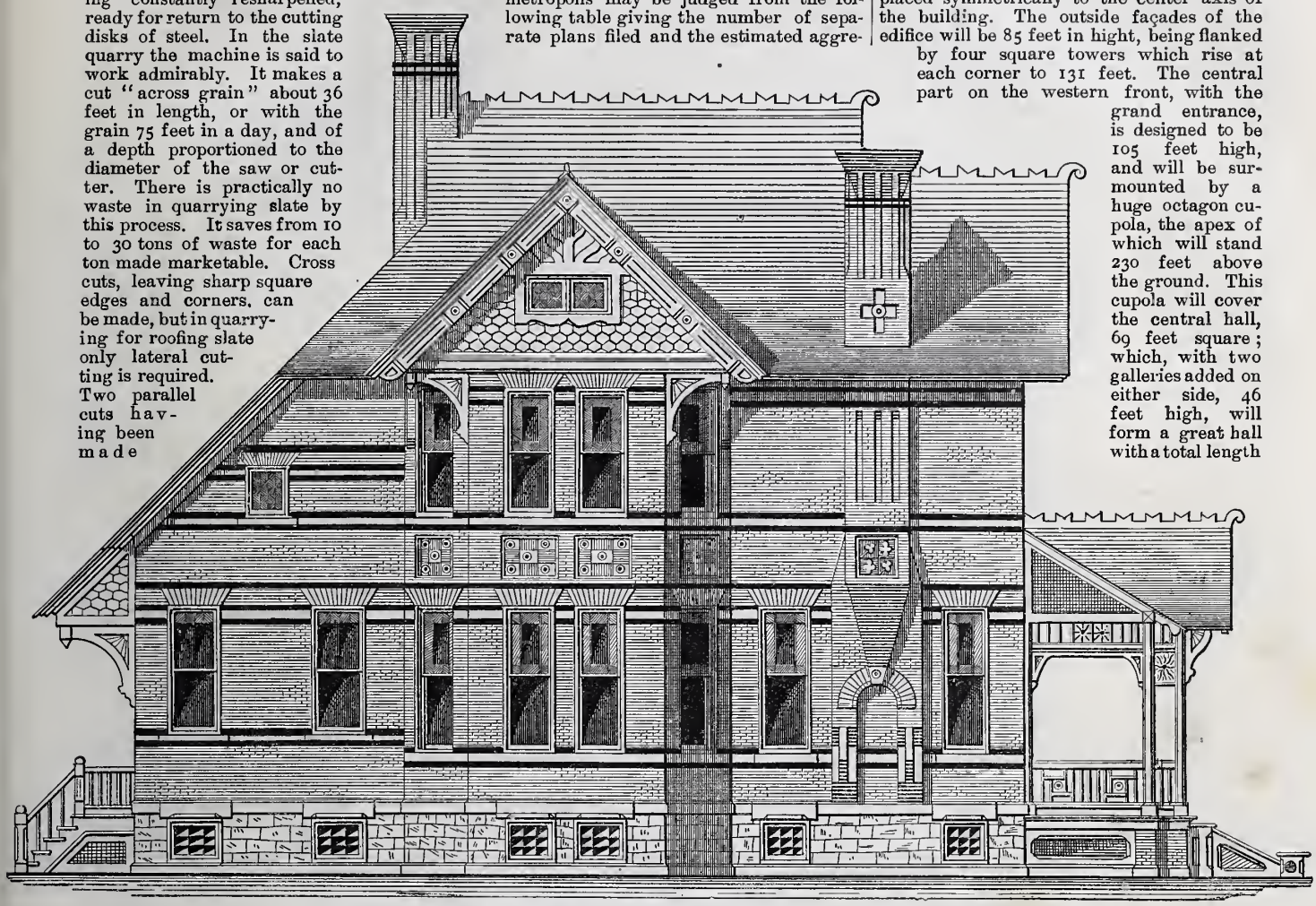
The machine in its essential features is as novel as it is effective. It looks like a very coarse circular saw, but is not driven like a saw, and it makes its cut in an entirely different way. Thus, it runs backward, cutting upward instead of downward, moves very slowly instead of rapidly, and is driven not from its axle, as saws are generally driven, but from its periphery. The cutting disk is substantially like that of a saw, with removable chisel teeth. These have an alternate "set," right and left, and at intervals there is a straight tooth to clear out the sliver that the two sets of teeth might otherwise leave. Near the outer edge of the steel disk there are two rows of oval holes in which the teeth of two pinion-wheels, one on each side, engage. This is the driving mechanism, and it serves two useful purposes. It applies the power at the most advantageous point, and it steadies the large, thin disk, ½ inch thick, while cutting through very hard rock, or rock containing hard particles of flint. The circular cutter is, in fact, simply journaled on its axle, and is pulled around by its periphery while making an upward cut. The feeding mechanism is worm-screws and cog-wheels, so geared with the cutter that they move in unison. The whole machine (including the boiler and the steam engine for driving the cutter) is mounted upon one framework, and all of the mechanism travels together upon pinion-wheels, the pinions of which engage in holes in an iron trackway laid upon the rock to be cut. The depth of the cut made is nearly one-half the diameter of the cutting disk, and may be of any length that the quarry permits. The cutter may be set at any desired angle, and if the stone is to be finished before its removal files are attached to each side of the saw-plate, slightly wider than the cutter, thus removing the saw-tooth marks. The teeth of the cutter are, as before remarked, removable, and they are removed and replaced while the cutter is at work. The cutters do not get hot. The machine moves so slowly that a boy has plenty of time to take out a dull tooth as the saw comes up from the stone, and replace it with another before the part of the blade from



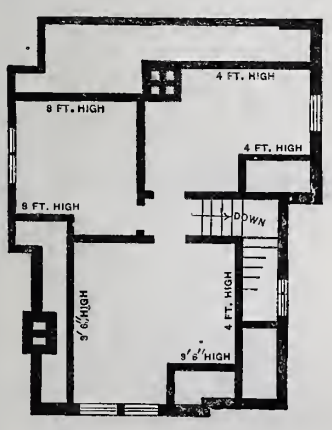
First Floor. *Second Floor.*

Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.

which it was removed has again passed below the surface of the stone. A boy is employed at this work all the time, and, with a set of machines at work, the teeth are being constantly resharpened, ready for return to the cutting disks of steel. In the slate quarry the machine is said to work admirably. It makes a cut "across grain" about 36 feet in length, or with the grain 75 feet in a day, and of a depth proportioned to the diameter of the saw or cutter. There is practically no waste in quarrying slate by this process. It saves from 10 to 30 tons of waste for each ton made marketable. Cross cuts, leaving sharp square edges and corners, can be made, but in quarrying for roofing slate only lateral cutting is required. Two parallel cuts having been made at any desired distance apart, say 2½ feet, a line is nicked out where it is desired to split off the block, and a few sharp blows determine the fracture. The blocks are then removed from the quarry, and at once split and shaped by expert workmen into roof slate. All the work except the simple process of splitting and cutting to size is done in the quarry, and without handling or any waste except that of the saw cuts. The slate, moreover, is removed without such incipient fractures as are liable to result from blasting and other violent processes of dislodgement. Roofing slate is sold by the "square," a square being as much slate as will cover 100 square feet of roof—say, a space 10 by 10 feet. It is claimed that slate can be quarried by this machine and prepared for the market at from one-third to one-fifth the present cost, besides saving a vast amount of material that is now wasted.



Twelfth Competition.—Side Elevation, South.—Scale, ⅛ Inch to the Foot.



Attic Plan.—Scale, 1/16 Inch to the Foot.

The Building Trade in New York.

The enormous capital that is invested from year to year in the building up of the metropolis may be judged from the following table giving the number of separate plans filed and the estimated aggregate cost for each in the first six months in the past three years:

	1882.		1883.	
	Plans.	Cost.	Plans.	Cost.
January	127	$1.749,885	180	$4,069,075
February	168	2,343,650	169	2,741,825
March	253	3,800,150	338	5,964,500
April	303	6,015,275	263	4,162,222
May	228	3,917,350	250	4,870,047
June	285	8,616,935	282	4,947,250
Totals	1,364	$26,443,245	1,482	$26,695,619

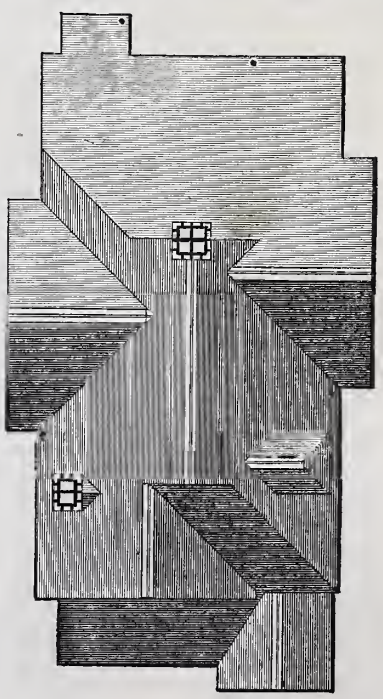
	1884.	
	Plans.	Cost.
January	103	$1,362,681
February	243	3,029,039
March	268	3,956,512
April	353	7,378,740
May	423	8,688,025
June	249	4,893,705
Totals	1,639	$29,308,756

It will be seen that there has been a steady increase in the number as well as the cost of the buildings. The great jump in operations in June, 1882, was due to the filing of plans for the Navarro flats and the Field buildings, as well as for the blocks built for the Clark estate on the West Side.

The New Parliament Building in Berlin.

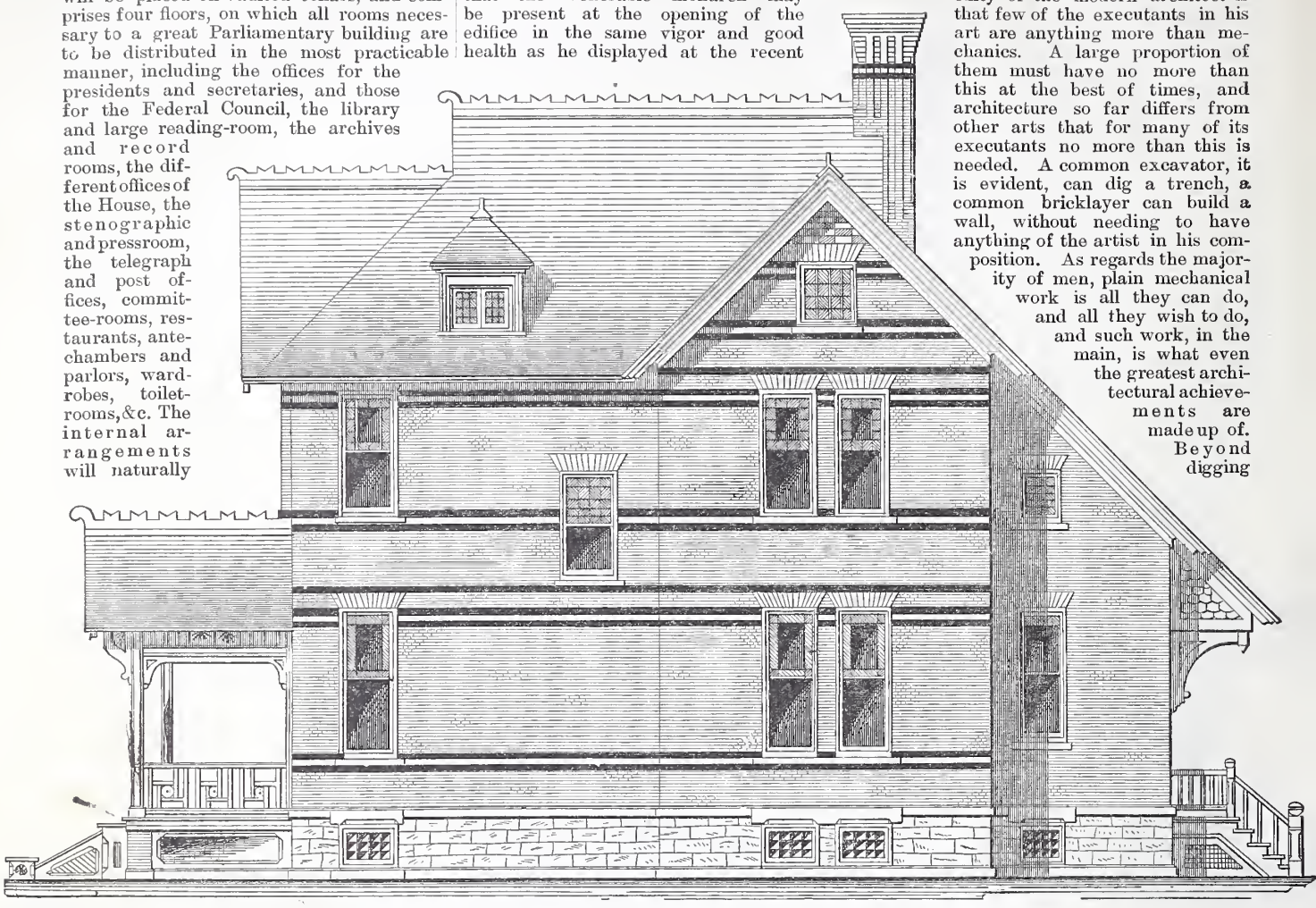
In Berlin, in June last, the corner-stone of the Reichstag building was laid by the Kaiser, with the greatest and most imposing ceremony performed by him since the completion of the Cologne Cathedral and the unveiling of the National Monument at Ruedesheim. Herr Paul Wallot, who not only designed the plans that received the first prize at public competition, but who has been appointed supervising Government architect during the erection of the building, has furnished the following details concerning the structure:

The building will form a great square, with a frontage of 446 feet on the two greater sides, facing west and east respectively, by 312 feet on the shorter fronts. It will inclose two interior courts, measuring 52 by 98 feet, placed symmetrically to the center axis of the building. The outside façades of the edifice will be 85 feet in hight, being flanked by four square towers which rise at each corner to 131 feet. The central part on the western front, with the grand entrance, is designed to be 105 feet high, and will be surmounted by a huge octagon cupola, the apex of which will stand 230 feet above the ground. This cupola will cover the central hall, 69 feet square; which, with two galleries added on either side, 46 feet high, will form a great hall with a total length of 295 feet, to be used as a members' lobby, and for great ceremonies and festivities. The session hall for the Reichstag will cover an area of 6560 square feet. It will be 43 feet in hight, and, like the great hall, receives the light from above. Besides the seats and desks for the 399 members, it will contain the places for the members of the Ministry



Roof Plan.—Scale, 1/16 Inch to the Foot.

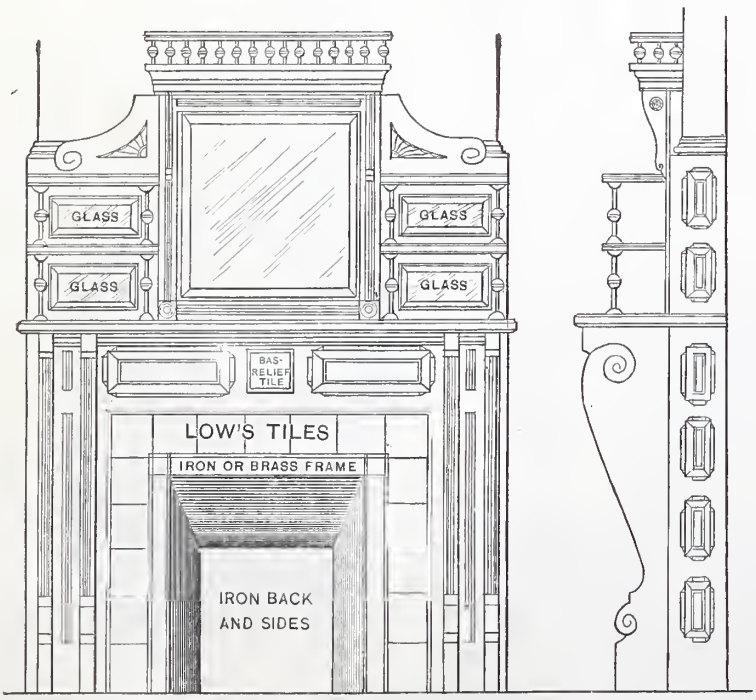
and the Federal Council, with galleries for the court, the diplomatic corps, the press and the general public. The entire building will be placed on vaulted cellars, and comprises four floors, on which all rooms necessary to a great Parliamentary building are to be distributed in the most practicable manner, including the offices for the presidents and secretaries, and those for the Federal Council, the library and large reading-room, the archives and record rooms, the different offices of the House, the stenographic and pressroom, the telegraph and post offices, committee-rooms, restaurants, antechambers and parlors, wardrobes, toilet-rooms, &c. The internal arrangements will naturally include the latest scientific improvements in electric lighting, telephonic communication between all parts of the building, hydraulic lifts, heating and ventilation. It is intended to employ none but German material exclusively in the erection of the entire edifice. The total cost, exclusive of internal fitting and decorations, is estimated at 18,000,000 marks ($4,375,000). The building of the edifice is estimated to be completed in from six to eight years, and the German nation has no wish more fervent than that the venerable monarch may be present at the opening of the edifice in the same vigor and good health as he displayed at the recent great historical ceremony. In the nature of things this can hardly be expected.



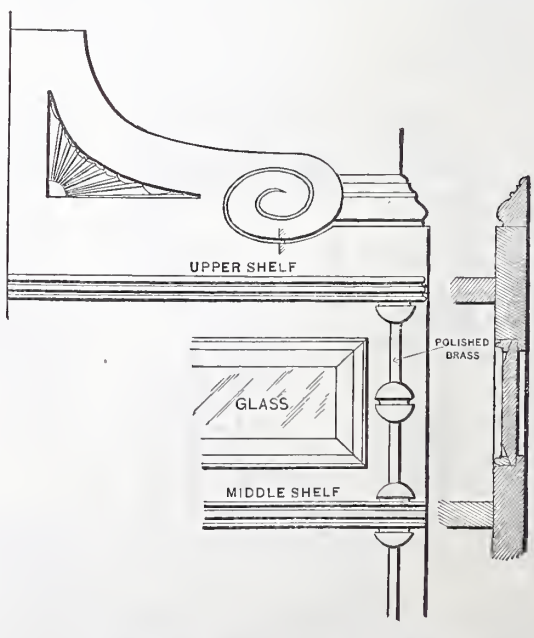
Twelfth Competition.—Side Elevation, North.—Scale, ⅛ Inch to the Foot.

Artisan and Artist.

A recent issue of the *Contemporary Review* contained the following: Architecture, like music and the drama, is an art which needs for each of its works one composer and many executants. If the building, the oratorio or the play is to be perfect, some, at least, of the executants must themselves be artists. The great difficulty of the modern architect is that few of the executants in his art are anything more than mechanics. A large proportion of them must have no more than this at the best of times, and architecture so far differs from other arts that for many of its executants no more than this is needed. A common excavator, it is evident, can dig a trench, a common bricklayer can build a wall, without needing to have anything of the artist in his composition. As regards the majority of men, plain mechanical work is all they can do, and all they wish to do, and such work, in the main, is what even the greatest architectural achievements are made up of. Beyond digging and walling there is very much, indeed, to be done that requires nothing more than good workmanlike ability. Nearly all those features of a building, very numerous and very important, which consist of straight lines and circular curves, can be perfectly worked from drawings by any one with fair mechanical skill. The architect has only to see that they are well designed, and there are plenty of workmen, even now, who will take care that they are well executed. But the critical point is passed

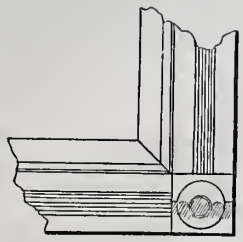


Front Elevation and Return of Parlor Mantel.—Scale, ½ Inch to the Foot.



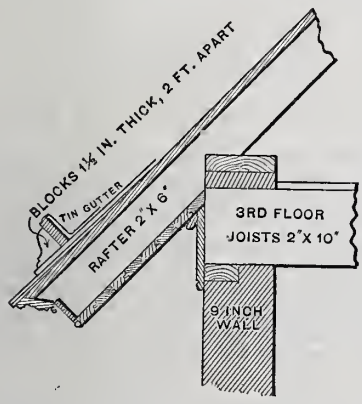
Detail of Upper Corner of Mantel.—Scale, 1½ Inches to the Foot.

when we come to features which a drawing cannot fully explain. The mechanical work-

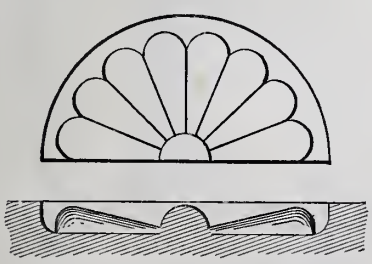


Twelfth Competition.—Bottom Corner of Mirror Frame Above Parlor Mantel.—Scale, 1½ Inches to the Foot.

man can produce from drawings the largest arch molding, the most complex nave pier, the finest window tracery; and from the same drawing of such things every competent workman will produce, practically, the same result. The reason is that every point about them can be absolutely fixed and settled by lines and figures, and there is, therefore, no opening in them, or only the smallest conceivable opening, for the workman's art power, even if he has any. But all this is changed at once when we come to details, which a drawing cannot perfectly explain. The mere mechanic is equal to the largest geometrical pattern, but not to the smallest piece of leaf ornament, much less to ornament of a higher class. All sorts of mysterious reasons have been assigned for the difference, because, like Sir Thomas Browne, art theorists "love to lose themselves in an *O altitudo*," and because the real explanation is too simple and obvious to leave opportunities for fine writing and declamation. The plain fact, however, is that the mere mechanic can only go with safety as far as he is guided; that he cannot be guided, except by way of partial suggestion, where difficult and complex forms come in, and that, therefore, in the latter case an artist-workman is wanted, who, in his own special department, can guide himself.



Section Through Main Cornice.—Scale, ½ Inch to the Foot.



Half Elevation and Section of Rosette at B in Front Gable.—Scale, 1½ Inches to the Foot.

A House of the Stone Age.

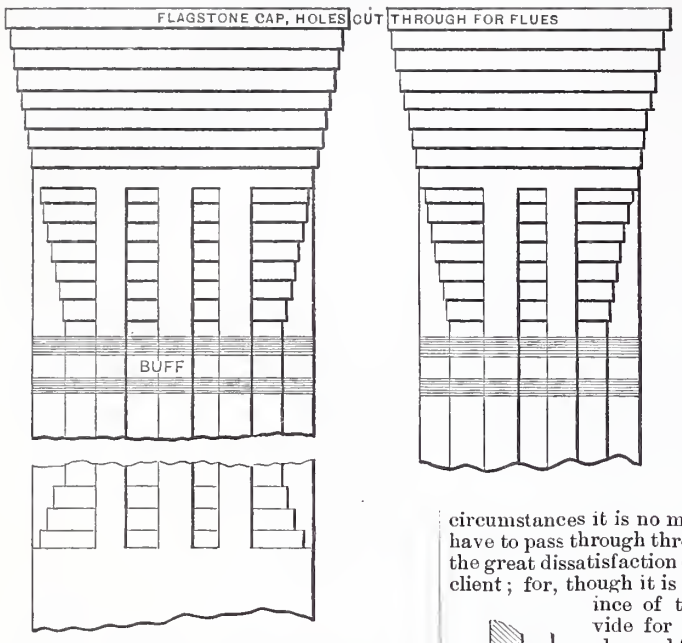
A short time ago there was discovered in a marsh at Schussenried, in Wurtemburg, a well-preserved hut of the age of stone. The flooring and a part of the walls were intact, and, as appeared from a careful admeasurement, had formed, when complete, a rectangle 10 m. long and 7 m. wide (32 x 23 feet). The hut was divided into two compartments, communicating with each other by a foot ridge made of three girders. The single door, looking toward the south, was 1 m. wide, and opened into a room 6.50 m. long and 4 m. wide. In one corner lay a heap of stones, which had apparently formed the fireplace. This room was the kitchen, "the living-room," and probably a night refuge for the cattle in cold weather. The second room, which had no opening outside, measured 6.50 m. long and 5 m. wide, and was, no doubt, used as the family bed-chamber. The floors of both rooms were formed of round logs and the walls of split logs. This, be it remembered, was a hut of the stone age. It may be safely presumed that the lake dwellings of the bronze age were larger in size and less primitive in their arrangements. At both periods the platform supporting the houses communicated with the shore by means of a bridge (probably removable at pleasure), and with the water by ladders. The ladders, as appears from an example found at Chavannes, were made of a single stang with holes for the staves, which protruded on either side. This but is the most complete yet discovered of the dwellers of this interesting period.

Details of Front Gable.—Scale, ½ Inch to the Foot.

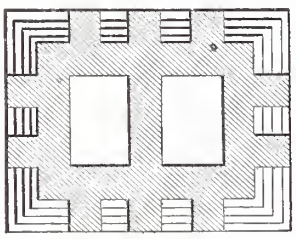
The Way Houses are Ordered Nowadays.

The Philadelphia *Record* holds the mirror up to nature, and describes how many of our modern houses are planned and ordered, in the following terms:

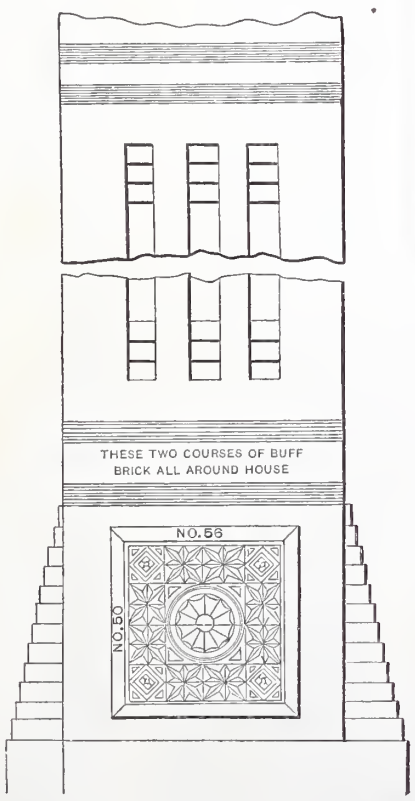
When a woman goes to a dry-goods store to order the materials for a dress she has usually something like a definite idea of the kind, color, quality and quantity of the stuff and trimmings needed; but whether a man, or a married couple or a woman give the order for a house, one and all have usually but a very undefined notion of the size or number of the rooms, of the quality and quantity of the materials, or of the kind of "trimmings," external or internal, that they require. All these things are left to the interpretation of the architect, if he is called upon, but, if not, to that of the builder, who, for the occasion, is compelled to do an architect's work. Under these circumstances it is no marvel that the plans have to pass through three or four editions, to the great dissatisfaction of both architect and client; for, though it is doubtless the province of the architect to provide for all the needs of the plan and for the details of construction and ornament, it is yet quite impossible that he can make the size and arrangement of the rooms to suit unless the client has definite ideas upon the matter and is capable of explaining them. Few people have clear conceptions of size. How large a room 16 x 12 feet is they have no idea. When the length and width are measured off for them upon the floor of a large office they think the dimensions awfully small, and make them 20 x 15. This does very well on paper, but when the estimates come in there is wailing and gnashing of teeth, and the design has to be submitted to the process often called "boiling down." A design for a house is usually made somewhat in this wise: A man suddenly makes up his mind that he will have a house built. He has waited until the last moment for his decision, and rushes to the knight of the T-square with the request that he will at once get out the plans and specifications for a house to cost so many thousand dollars. Perhaps he wants it like so-and-so's house, and occasionally he has a wish for a bay window in one of the parlors, or for two communicating bedrooms. He wants to see the drawings in a day or two, and to commence work in two weeks or less. The architect—who is generally, in these progressive and mechanical days, neither an artist in general nor a student of architecture in particular, but simply a man with considerable tact and knowledge of men, and with an extensive acquaintance among moneyed men and speculators on the one hand and among practical builders and artisans on the other—has been through the operation so often that he has become case-hardened, and simply orders one of his assistants, probably the youngest, to make a copy, with variations, of a plan that has been used before. This is done, the sketch is submitted, alterations are made and finally all is ready. The architect puts as little thought and labor into it as possible. In matters of construction, sewerage, ventilation, &c., he follows the exact routine to which he is accustomed, and in ornament and finish he sticks to his own stock patterns to save time. Except in a few points of arrangement which are evolved in consultation with the client, the house is as



Twelfth Competition.—Details of Front Chimney.—Front and Side Elevations of Upper Part of Shaft.—Scale, ½ Inch to the Foot.



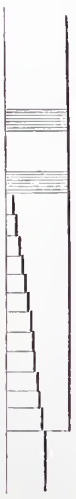
Horizontal Section Through Shaft.—Scale, ½ Inch to the Foot.



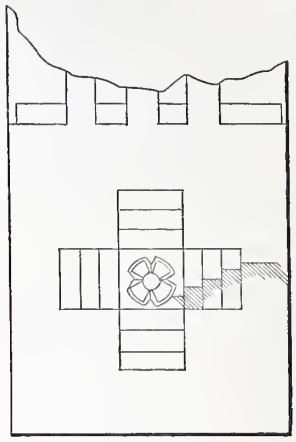
Center Pieces, No. 276. Side Pieces, No. 278.

Section of Chimney in Second Story.—Scale, ½ Inch to the Foot.

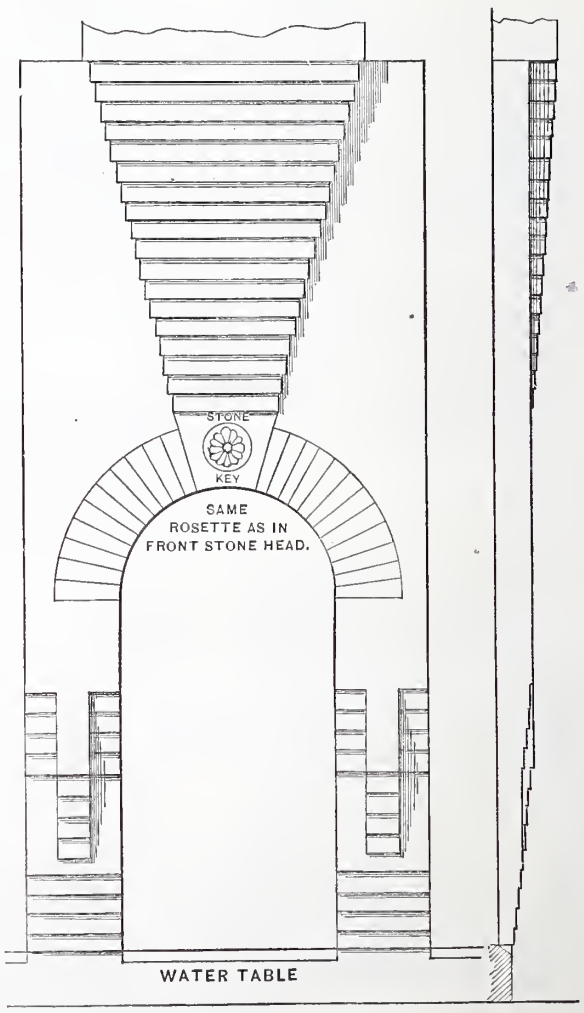
Sec. Through Panel and Recess in Second Story.



Profile.



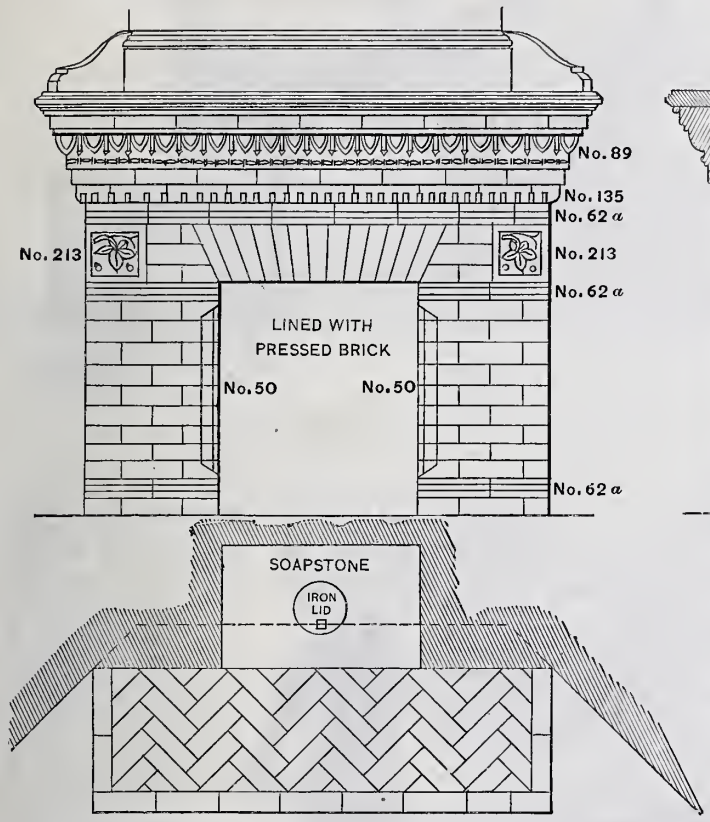
Detail of Panel Above Roof Line.



Section of Chimney in Lower Story.—Scale, ½ Inch to the Foot.

like a hundred others turned out by the same firm as though it were made by a machine. Some architects do better than this—think, plan, design, try to perfect sanitation, construction, ventilation, ornament, &c.; but such architects remain poor. They are voted slow and behind the age, get no work to do, and are usually considered fools for their pains.

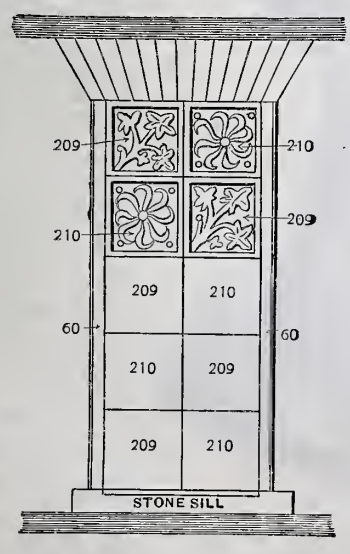
The same general truth holds good for houses and architects, medical practice and doctors, Congressmen and government, namely: The general public that needs houses, medicine and government must itself know more about house-building, physiology and social science before it can expect to be served by better architects, better doctors or a better set of law-makers.



Twelfth Competition.—Elevation, Section and Plan of Dining-Room Mantel.—Scale, ½ Inch to the Foot.

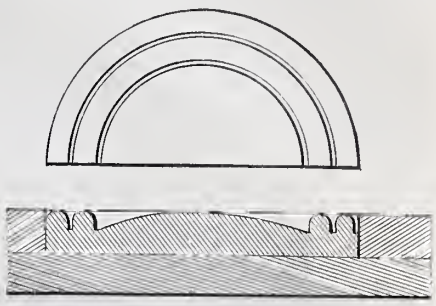
Plaster.

A recent issue of the London *Builder* contains the following particulars about the early use of plaster: The use of plaster, or "plaister," as it was formerly called, is of early date, even in the British Isles, in connection with domestic architecture. Long before lime plaster came into general use, a tenacious clay or sticky and unctuous earth was employed if procurable, and, in its absence, whatever clay or mixture of mud and earth produced the most binding material. The rudest and coarsest forms of daubing or plastering in the British Isles were those structures erected of wattles and daubed over with clay to keep out the cold. This kind of domestic buildings was common in Ireland in the time of Henry II. From necessity, or in conformity to the fashion of that country, the English monarch erected, according to Roger Hovenden, a royal palace with "uncommon elegance" of smoothed wattles, in 1172, and in such buildings his majesty, with the kings and princes of Ireland, solemnized the festival of Christmas. The Devonshire "cob," a class of building not yet extinct, is a fair illustration of the ancient fashion of daubing or plastering practiced in this country for long centuries. In the thirteenth and fourteenth centuries in this country the plasterers proper and the daubers formed two distinct classes of building workmen, and their wages, like the wages of other operatives, were subject to certain regulations summer and winter. The daubers were simply the layers-on of a mixture of straw and mud to a framework of timber. The plasterers in London in the 24th Edward III (1350) were bound to take no more for their working day between the feasts of Easter and St. Michael than 6d., without victuals or drink, and for the remainder of the year 5d. Upon feast days, when they did not work they took nothing.



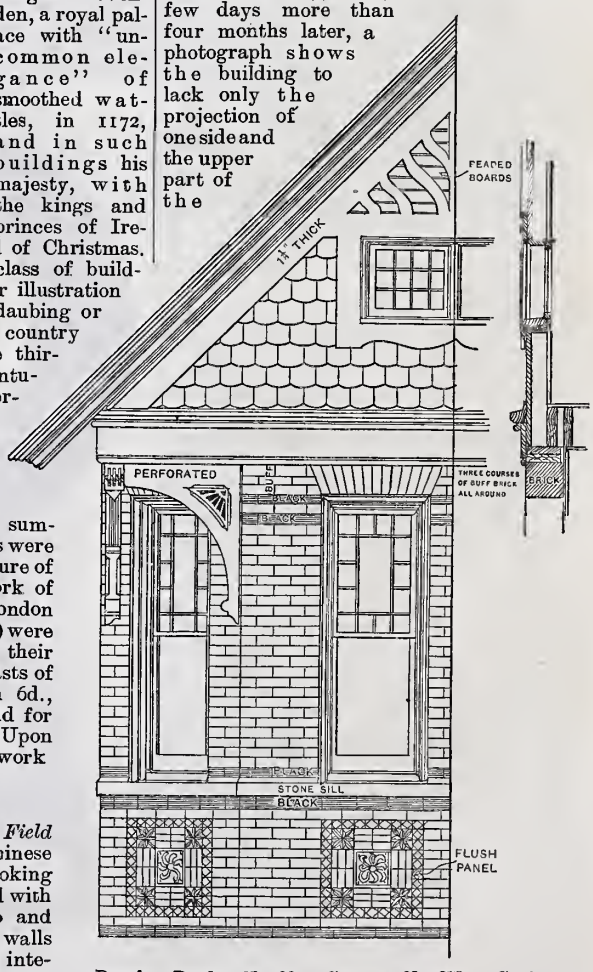
Detail of Brick Panel Over Porch Gable.—Scale, ½ Inch to the Foot.

A recent issue of the *Farm, Field and Fireside* says that the Chinese farmhouse is a curious-looking abode. Usually it is sheltered with groves of feathery bamboo and thick-spreading banyans. The walls are of clay and wood, and the interior of the house consists of one main room extending from the floor to the tiled roof, with closet-looking apartments in the corner for sleeping-rooms. There is a sliding window on the roof made out of oyster-shells arranged in rows, while the side windows are mere wooden shutters. The floor is the bare earth, where at nightfall there often gathers together a miscellaneous family of dirty children, fowls, ducks, pigeons and a litter of pigs, all living together in happy harmony. In some districts infested by marauding bands, houses are strongly fortified with high walls containing apertures for firearms, and protected by a moat crossed by a rude drawbridge. With grain, swine and a well under his roof, the farmer and his men might hold out against a year's siege.



Half Elevation and Section of Rosette at A, Front Gable (See page 189).—Scale, 1½ Inches to the Foot.

The New Capitol of Dakota.—An instance of the practical application of science to every-day life is well shown in the building of the Capitol building of Dakota, at Bismarck, by the aid of electric light. This building, says *Science*, costing $250,000, consists of three stories, basement and sub-basement, measuring 155 by 92 feet, and contains over 4,000,000 bricks, with trimmings of Joliet stone, and has been erected in the midst of winter. The corner-stone was laid September 5, 1883; and on the 10th day of January, 1884, a few days more than four months later, a photograph shows the building to lack only the projection of one side and the upper part of the tower. This was accomplished by the electric light, which half the time replaced the sun, enabling double gangs to work day and night. The frozen sand was thawed by a red-hot cylinder; the mortar, made with boiling water and hot lime, had its moisture absorbed by the dry bricks before it had time to freeze.



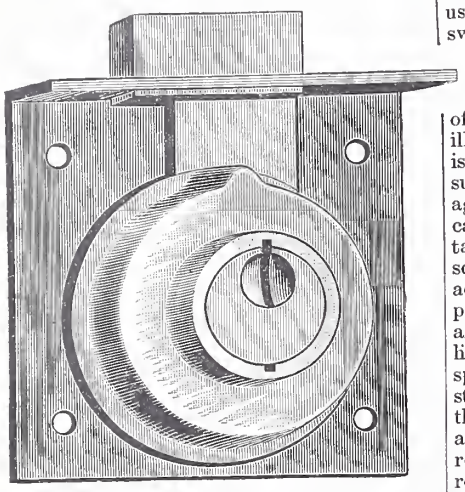
Panels.—Border, No. 36. Corners, No. 278. Center, No. 210. Sides, No. 289.

Details of Side Gable.—Scale, ¼ Inch to the Foot.

NOVELTIES.

Improved Drawer Locks.

The D. K. Miller Lock Company, 821 Cherry street, Philadelphia, have placed upon the market some improved drawer locks which possess features that are of special interest to all who have occasion to use goods of this character. The locks contain circular tumblers or disks, and are adapted to the use of a small flat key. They are known under the general name of "Champion" locks, and are the invention of Milton Jackson, the manager of the Miller Lock Company. We



Novelties.—Fig. 1.—"Champion" Flat-Key Drawer Lock, Made by the Miller Lock Co.

have only space in this connection to illustrate one of the new locks, but it is typical of the entire assortment, so far as its leading features are concerned, and therefore will convey a satisfactory idea of the merits of these goods. The inner cylinder of these locks is shaped like a thimble, with the open end toward the key-hole. The cylinder carries a dog that in locking enters the tumblers inside the cylinder, and in unlocking is forced into a recess formed in the outer shell. The extra security afforded by this lock cylinder arises from the difficulty of arranging the disks without the use of the proper key, so that their notches shall be in line under the dog. The arrangement is such that no motion or strain on the bolts or of any other part can in any way aid in locating the notches. Should any notch chance to be placed properly, it would be displaced by movements that are necessary to locate the others. In short, the manufacturers claim that the processes by which other locks are readily picked always fail when applied to this lock. A further advantage claimed is the absence of all springs save one. Mechanics well know that in any mechanism springs are frequently the source of trouble; accordingly, the fewer that are employed the more positive will the action of the device be and the more reliable it will be after long periods of service. The "Champion" lock cylinder as above described is readily adapted to a wide range of locks. Although the last patent of this device bears date within the present year, the manufacturers have already in the market quite a list, among which may be mentioned locks for drawers and closets, locks for chests and desks, and also locks for post-office boxes, and for safe-deposit boxes. All of these embody the features which we have described. In addition to the particulars already presented, an important advantage which these locks possess is the application of a master-key to an extent far beyond what has been accomplished in other locks. Having a rotary disk or tumbler, the "Champion" lock readily admits of a very wide range of combinations and at the same time of a special combination to fit the master-key. The manufacturers state that one master-key may control an entire set which may be variously used for drawers, closets, desks and a night latch, thus greatly relieving the proprietor of an establishment of a cumbrous pocketful of keys. These advantages are likely to be appreciated by all who have occasion to apply or use locks for the general purposes mentioned above. Fig. 1 shows one of the ordinary forms of drawer locks to which this principle is applied.

Portable Scroll-Sawing Machine.

Fig. 2 of the engravings shows a new portable scroll-sawing machine built by Frank H. Clement, 131 Mill street, Rochester, N. Y. This machine has been built from new designs, and the maker claims that it avoids many of the difficulties experienced in the use of the ordinary suspension or clear-sweep scroll-saw. He states that it is a fact that five-sixths of all the curved sawing that is done comes within the compass of an ordinary band-saw arch. It is for work of this kind that the portable machine here illustrated is specially adapted. The arch is cast on one piece in tubular form, and is sufficiently strong to sustain the saw rigidly against its work and resist the vibration caused by the action of the strain. The table is of kiln-dried hardwood, firmly screwed to a heavy tilting bar, so as to be adjusted for beveled sawing. The vibrating parts are of steel and wood, and, while amply strong for the work, are constructed light and admit of a high speed without special foundations for the machine. The strain is of leaf-spring steel compounded so that the labor is distributed through a large amount of material, while the actual motion required is very slight. The bearings of the rocker and its attachments are of steel bronze, made in a form to reduce friction and weight to a minimum. A combined brake and shifter is attached by which the machine may be stopped almost instantly. In all other respects equally careful attention has been given to details and to the requirements of work. The machine is provided with various adjustments adapting it to a wide range. Saws may be used up to 14 inches in length. The machine has a 4-inch stroke, saws 5½ inches deep, and to a center of 84 inches.

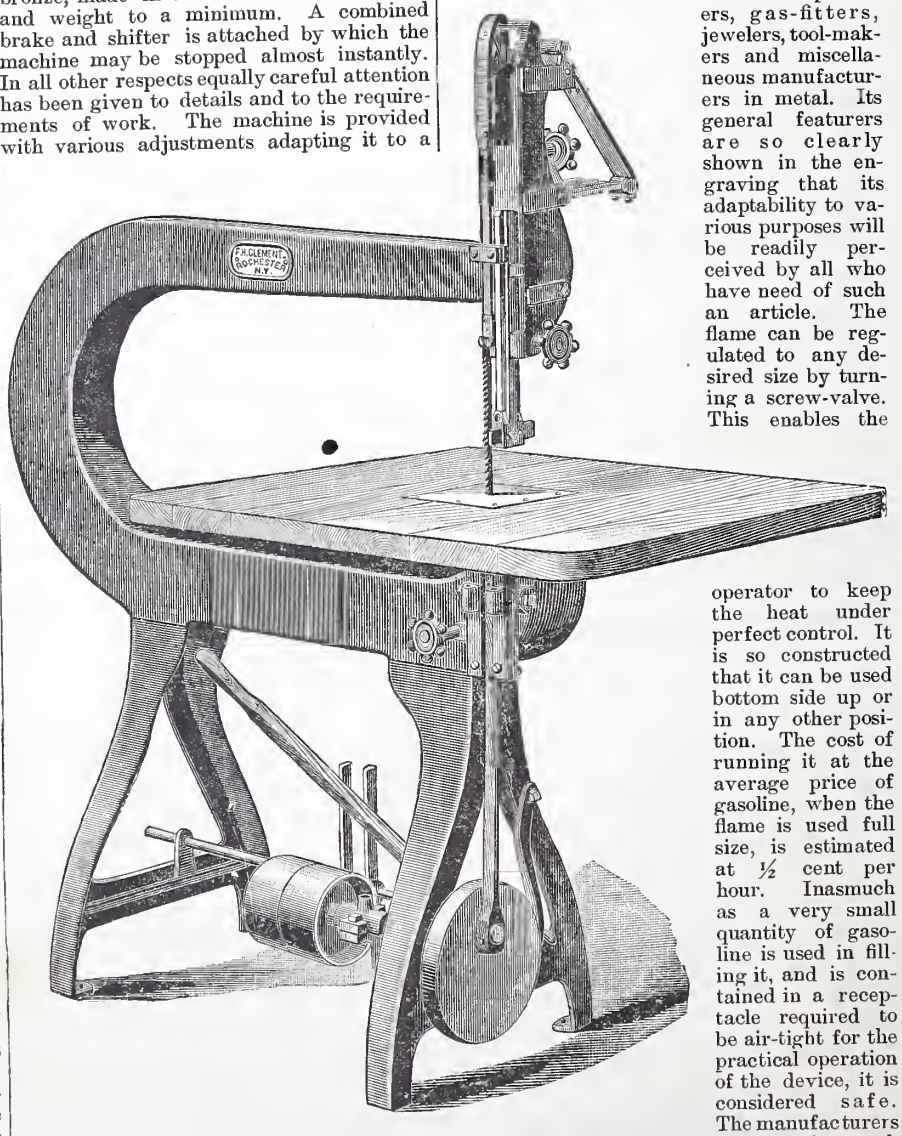


Fig. 2.—New Portable Scroll-Sawing Machine, Built by Frank H. Clement, Rochester, N. Y.

Gasoline Paint-Burner.

Every one who has had occasion to remove old paint, or who has watched the operation of the painter engaged in this work, has some idea of the manner of using what is called a paint-burner. These have been made in the past in various ways, but the application of gasoline to an article of this kind is of comparatively recent date.

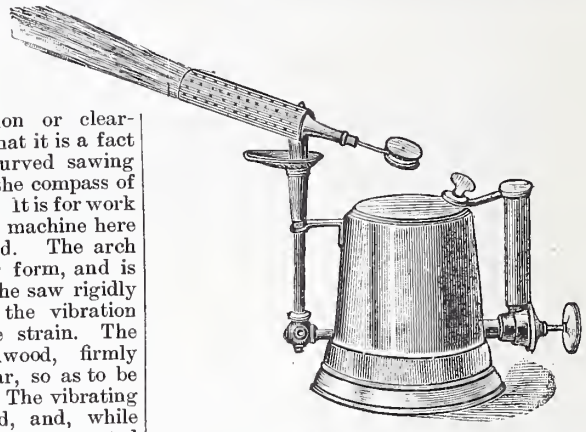


Fig. 3.—Combination Paint-Burner and Torch.

The accompanying cut, Fig. 3, represents a paint-burner and automatic torch brought out by the Hull Vapor Stove Company, Cleveland, Ohio. In addition to its usefulness for painters, it also meets the requirements of plumbers, gas-fitters, jewelers, tool-makers and miscellaneous manufacturers in metal. Its general featurers are so clearly shown in the engraving that its adaptability to various purposes will be readily perceived by all who have need of such an article. The flame can be regulated to any desired size by turning a screw-valve. This enables the operator to keep the heat under perfect control. It is so constructed that it can be used bottom side up or in any other position. The cost of running it at the average price of gasoline, when the flame is used full size, is estimated at ½ cent per hour. Inasmuch as a very small quantity of gasoline is used in filling it, and is contained in a receptacle required to be air-tight for the practical operation of the device, it is considered safe. The manufacturers offer it for such work as brazing small articles, tempering tools without danger of burning, burning off old paint, thawing out frozen water and steam pipes, and for melting holding-wax used by metal pattern-makers and engravers.

Safety Guard for Molding Machines.

In Figs. 4 and 5 we show a safety guard for variety molding machines that is being offered to the trade by Messrs. Squires & Shriver, 175 George street, Baltimore, Md. This guard is presented, we are assured by the firm above named, not as an experiment, but as a reality. The guard consists of a wrought-iron band with malleable-iron standard and thumb-screw. The parts are so arranged that the guard can be conveniently adjusted to any position and applied to any variety of molding machine made. The engravings show the guard in two different positions, and indicate the method of adjustment. The guard is fastened to the table by a standard working through a slot in it. This standard is held in position by a thumb-screw working on the under side. The wrought-iron band is held to the standard, and adjusted to any position required by a thumb-screw working in a slot in the band and also in the standard. By this construction it is evident that the guard can be thrown up for the purpose of setting the cutters or sharpening them, without the necessity of removing the guard from the table.

Novelties.—Fig. 4.—Safety Guard for Variety Molders.—Position in Use.

New Fast-Feed Flooring Machine.

The machine shown in Fig. 6 of the engravings is one recently designed and introduced by the Egan Company, of Cincinnati. On account of the rapidity with which it turns out work the name "Lightning" has been applied to it. The aim in the construction of this machine has been to make a reliable, convenient and rapidly-working machine, and one that should give a minimum of trouble while turning out a maximum of work. A special feature of this machine is the doing away with all links and levers in the expansion gearing, thus avoiding a very common source of annoyance and expense. The engraving gives a general idea of the machine, while the following particulars will enable it to be fully comprehended. The capacity of the machine is said to be 100 lineal feet of practically perfect flooring per minute in either white pine, yellow pine or hardwood. The feed consists of 9-inch rolls geared in the best mechanical manner. The rolls are held down by strong steel springs capable of standing a pressure of 7 tons, and so arranged that more or less pressure can be given them by simply turning a hand-wheel. All the feed rolls are provided with scrapers which enable them to revolve even in the gummiest yellow pine without taking any dirt. The pressure-bars of this machine hug close on each side of the knife and are adjusted to and from it, giving the machine the advantages of an inside molder and enabling the operator to adjust them so as to do the smoothest and most perfect work, and prevent all tearing out, even in cross-grained wood. The manufacturers recommend this machine to large mills and others having large quantities of flooring to make. They inform us that they test and try every machine of this pattern that goes out of the factory, and make it work yellow pine to their entire satisfaction before shipping.

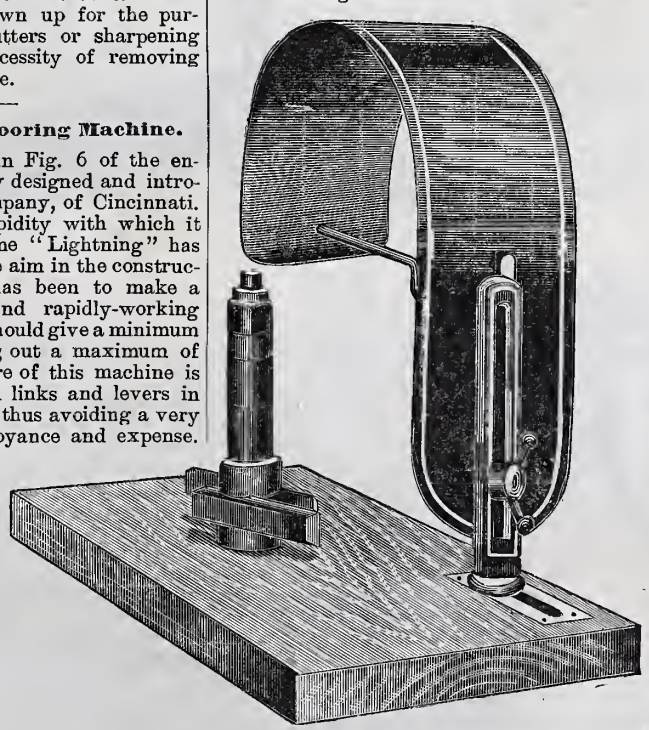


Fig. 5.—Safety Guard for Variety Molders, Thrown Up to Permit Getting at the Cutters.

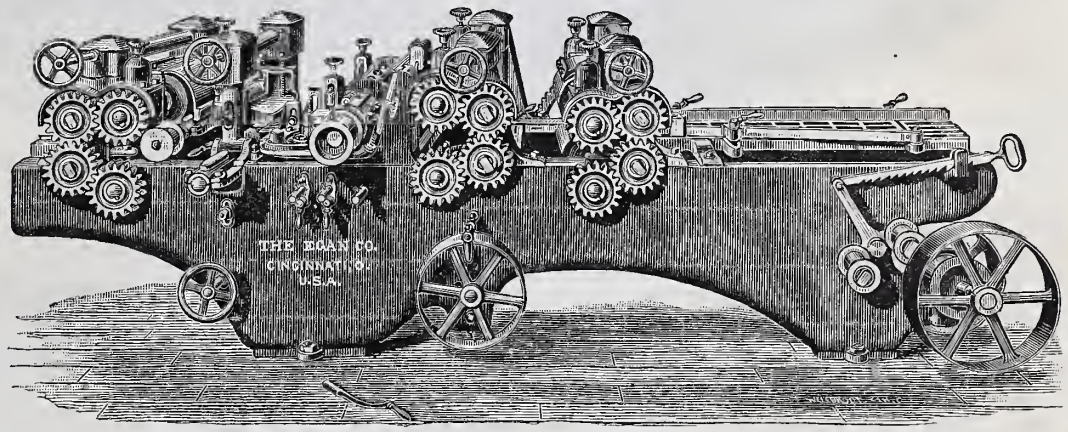


Fig. 6.—Special "Lightning" Flooring Machine, Built by the Egan Company, Cincinnati, Ohio.

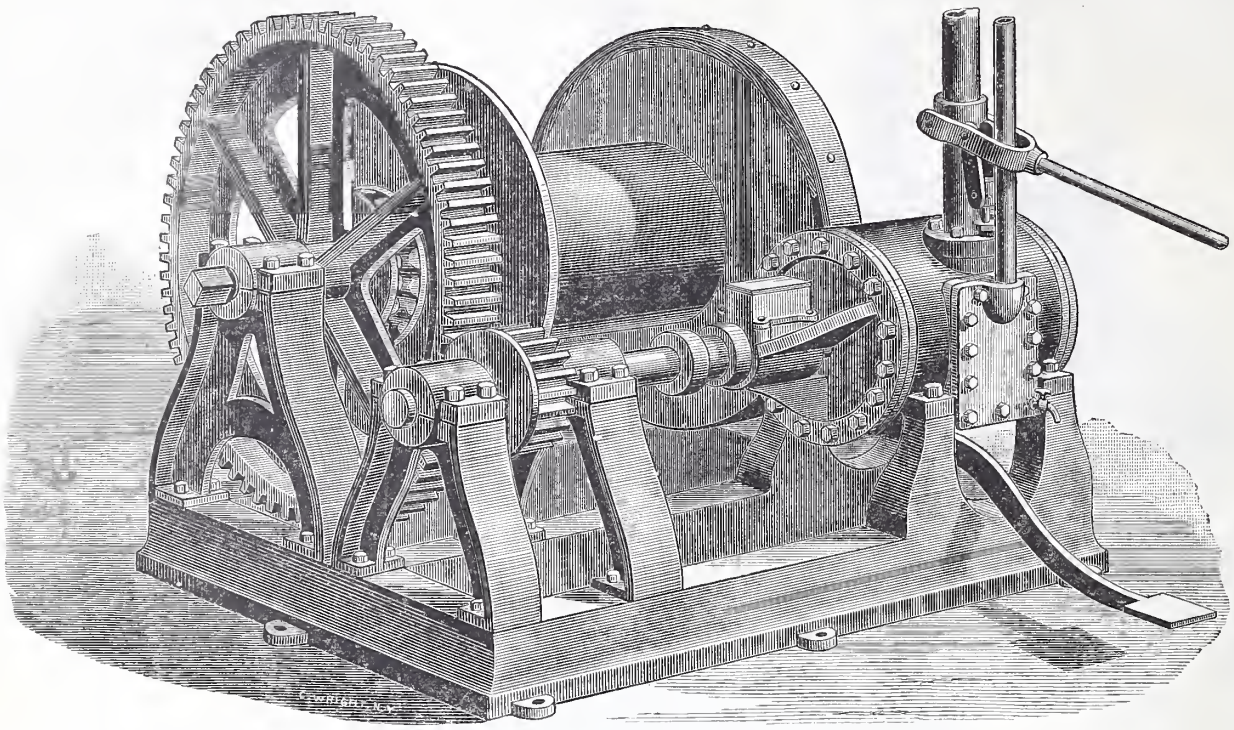
New Rotary Hoisting Engine.

Mr. E. W. Bliss, of Brooklyn, N. Y., well known for the excellent quality of the special machinery which he builds, has recently put upon the market some rotary engines adapted to hoisting, pumping, &c., which, on account of their general convenience and utility, as well as economy, are of interest to contractors and builders. One form of these engines, in connection with a hoisting drum, is shown in Fig. 7 of the engravings. Some of the leading features of these engines will be understood from the following partial description:

The inner portions of the cylinder in which the piston-heads revolve are cylindrical and true to a common center, while the intervening part is shaped to give such a reciprocal motion to the piston-valves that an equal transmission of power is maintained at all points of the revolution. The piston is of cast iron, slotted radially through its full length at four equidistant points, each of the slots being of sufficient capacity to receive the piston-valve which travels therein. The opposite slots or recesses are connected with each other by means of two holes, into each of which is fitted a cylindrical tube, bored from both ends, leaving an intermediate portion solid. These cylindrical tubes contain springs which bear on the valves, keeping them in contact with the inner periphery of the cylinder, the tubes and springs moving reciprocally with the valves. Each end of the piston is let into and accurately fitted and secured to a cast-iron piston-head, the periphery of each piston-head and the inner periphery of its cast-iron packing-ring forming a ground joint. The arms of the packing-rings are fitted into recesses in the piston-heads, and the ends of the arms are in contact with the periphery of the piston, their inner faces being in line with the sides of the recesses of the piston. The packing-rings and arms are kept in contact with the ends of the cylinder by means of spiral springs inserted between them and the followers screwed to the piston-heads. The four piston-valves which transmit the power of the steam travel in the recesses in the piston, between and in contact with the arms of the packing-rings. They are of crucible steel, and are recessed in such manner that only the portions which travel between the arms of the packing-rings and the parts required to form a close connection with the piston are subject to contact.

The shafts are also of crucible steel, each formed with a flange of sufficient diameter to give a broad base, which is fitted into a recess on the outside of the piston-head. The bolts or screws which combine the piston and piston-heads pass through these flanges, thus in effect making of these parts one solid piece, revolving with the packing-rings on a common center. A metallic packing invented for and peculiar to these machines prevents any steam or water which may accumulate between the piston-

heads and the cylinder covers from coming into contact with or escaping by way of the shafts. Each shaft packing consists of a gun-metal cylinder having a uniform internal diameter of sufficient capacity to enable it to receive the base of the shaft, the annular space between the packing cylinder and the shaft being filled with asbestos packing, compressed by means of a gland screwed on the shaft. The entire packing revolves with the shafts, but the packing cylinders are free to move laterally, being kept in contact with the engiue cylinder heads by means of spiral springs inserted in the packing cylinders and bearing against the flanges of the shafts. The reversing apparatus consists of an ordinary slide-valve, somewhat modified to suit the requirements of the engine, with which it is combined in a manner as simple as it is compact and reliable. This valve starts, stops and controls the speed of the engine, as well as instantly reversing, even when at full speed.



Novelties.—Fig. 7.—New Rotary Hoisting Engine, Built by E. W. Bliss, Brooklyn, N. Y.

Lane's Patent Door Hanger.

Lane Brothers, Poughkeepsie, N. Y., have recently brought out the door hanger represented in Fig. 8. of the illustrations, and also a track for the same, each protected by separate patents. As indicated in the cut, it will be seen that this hanger is anti-friction in its movement, having a rolling motion only, the load being carried by the small steel axle of the wheel, this axle resting under the parallel ways of the hanger, while the periphery of the wheel follows the track. The wheel being many times larger than the axle, the door is allowed to open from 5 to 10 feet while the axle traverses the length of the parallel ways. The point is made in favor of this construction that friction is reduced to a minimum and a motion secured very much easier than where the axle runs in a stationary box. The whole hanger is made of wrought iron except the wheel and axle, the latter being made of steel. It will be observed also that the shape of the hanger is such as to insure strength and give a wide bearing on the door. It is mentioned also in its favor that no oil is required and that noiseless motion is always secured. The special features of Lane's patent track are also exhibited in the illustration. It consists of flat wrought iron $1\frac{1}{4} \times \frac{3}{16}$ inches in size and supported in position by hollow iron brackets, as shown in the cut. These brackets are each fastened to the building by a single screw at distances corresponding to the holes in the track, and when so fastened a common coach screw or carriage bolt is put through the hole in the track, passing also through the bracket into the building, making, it is claimed, a very strong fixture of neat appearance. The lower edge of the track is even with that of the brackets, and the door is hung beneath as near as possible without contact, thus effectually preventing derailment without any additional device. In favor of this track the following points are made: That it requires no boxing or roofing, as snow, ice or other matter cannot lodge to prevent working; that there is no liability to decay; that the swell and shrinkage which apply to all wood track ways having iron rail attached, or otherwise, are also avoided; that the cost is less than that of wood track, and the track is superior when completed. The manufacturers call attention also to the fact that it is not necessary to use this track with their hanger, but that the ordinary iron track of either cast or flat wrought iron may be used if desired. The hanger is made in two sizes—No. 1 for doors to slide 5 feet and No. 2 for doors to slide 10 feet.

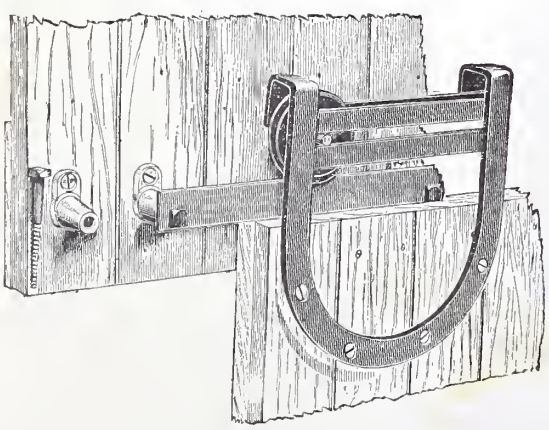


Fig. 8.— Lane's Patent Door Hanger.

The Kelly Patent Adjustable Shelving.

The Kelly patent adjustable shelving, as shown in Fig. 9, needs very little description and is evidently simple in construction,

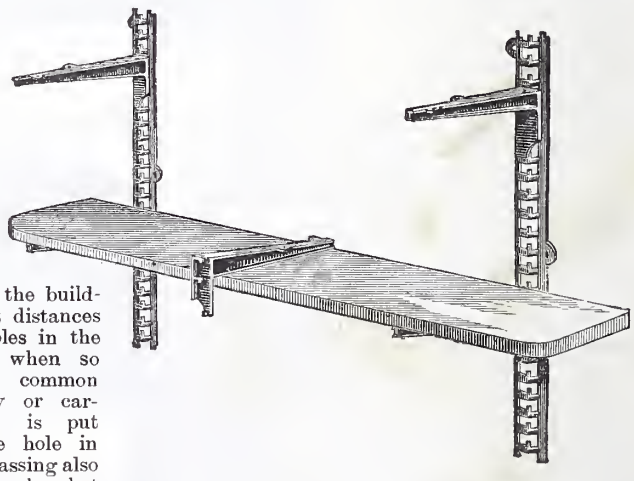


Fig. 9.—The Kelly Patent Adjustable Shelving.

easily adjusted, and can be attached to any wall or level surface. The manufacturers recommend it for fire-proof buildings, vaults, &c., since when sheet iron is used for shelves the structure is entirely metallic. Another advantage claimed for the use of sheet iron for shelves is in the economy of space, as $\frac{7}{8}$ inch is saved by substituting a sheet-iron shelf in place of wood. Its cleanliness is another desirable feature mentioned, as there are no corners to catch and hold the dirt, and each shelf can easily be lifted out and cleaned or painted without the use of a single tool. The uprights, as shown in the cut, are provided with slots into which the bracket fits, the pin shown in the slots holding it immovable and preventing displacement by jarring. The device is made entirely of air-furnace malleable iron, and, it is claimed, possesses great strength. Four feet space between the uprights is sufficient for ordinary use, while for heavy goods, by making

them stronger and placing them closer, the shelves will hold any desired weight. The erection of the shelves is simple, the uprights being made in sections, so arranged as to be accurately fitted to each other, and re-erection being, therefore, easily effected. The shelves can be adjusted to any distance from 4 inches apart upward. In addition to these

Novelties.—Fig. 10.—*Adjustable Handle Draw Knife, Showing the Knife Closed.*

advantages the manufacturers call special attention to the important saving in the expense of shelving which results from the use of this device. It is manufactured by the St. Louis Malleable Iron Company, 2111 Market street, St. Louis, Mo.

New Adjustable Handle Draw Knife.

The accompanying illustrations, Figs, 10, 11 and 12, represent an adjustable handle draw knife which has just been put on the market by A. J. Wilkinson & Co., 184-188 Washington street, Boston, Mass. The illustrations represent some of the different positions in which the handles can be fastened, Fig. 10 showing the draw knife closed, and Figs. 11 and 12 representing it in other positions which may be convenient to the carpenter or other woodworker in the use of the tool. These cuts indicate clearly the general appearance of this article, and show its construction and method of operation. The handle, it will be perceived, is pivoted at the end of the blade and is held in the desired position by means of a ratchet and pawl, the latter being carried into the ratchet by means of a spring. By this arrangement each handle can be fastened in either of four positions—closed down on the blade, as in Fig. 10; at right angles with the blade, as the left-hand handle in Fig. 11; straight out in the same line with the blade, as the right-hand handle in Fig. 11, and turned back, as both handles are in Fig. 12. The convenience of being able to put either or both of the handles in these positions will be appreciated by those using this class of tools. The pawl by which the handle is fastened is moved by a slide on the outside of the handle, which is in convenient reach and may readily be operated by the thumb or forefinger of the hand which grasps the handle. This tool is put on the market as an article of the best quality, and is represented fully warranted. There are manifest advantages in connection with such an implement, among which the manufacturers mention the following: The economy of space required by the tool when not in use, an 8 inch knife for example, with handles folded occupying only 14 x 2 inches; the protection of the edge of the draw knife, the handles closing down over it, thus keeping the edge uninjured when packed in chest with other tools, or when in the carpenter's box; and the convenience of having adjustable handles which can be arranged as desired for work, there being many cases in which the carpenter will find it a great advantage to fasten the handles in another position than that in which they are usually used. In alluding to this the manufacturers mention the case of a carpenter desiring to shave down work close to his bench. With the old-style fixed-handle knife this could not be done, whereas with this tool, by simply turning out one of the adjustable handles, as in Fig. 11, chips can be taken off as close as desired. They also allude to the utility of being able to change the handles for all close work in corners or on wide flat surfaces, &c. A further advantage to which they refer is the greater convenience of this implement in grinding, an operation which can readily be performed by turning the handles round back of the blade, as in Fig. 12, a position also in which the knife will be found convenient for some kinds of work. The tool is made 6, 7 and 8 inch.

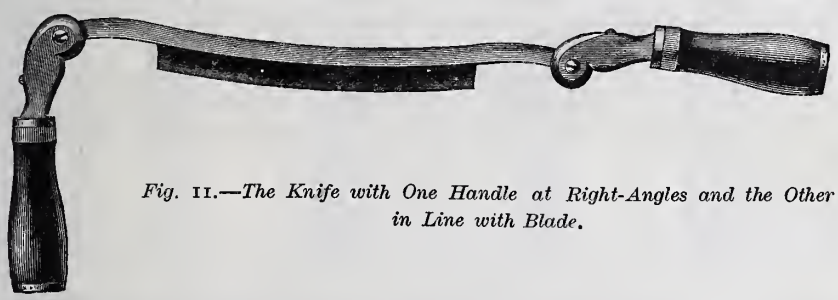


Fig. 11.—*The Knife with One Handle at Right-Angles and the Other in Line with Blade.*

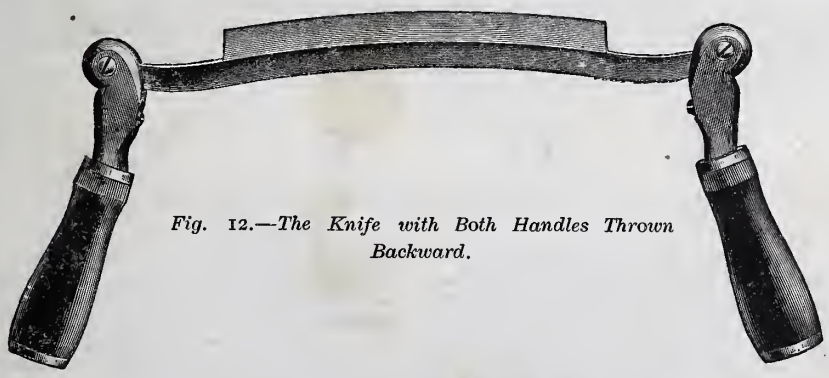


Fig. 12.—*The Knife with Both Handles Thrown Backward.*

Acme Sash Lock.

In our description of the "Acme" sash lock and balance in our last issue by error we conveyed the idea that the two articles shown in Figs. 13 and 14 were the two parts necessary to be employed upon a single pair of sash. The makers have since directed our attention to the fact that the two illustrations show two different articles. The sash lock shown in Fig. 13 is applicable to both upper and lower sash, requiring only to be inverted for the upper sash. The device shown in Fig. 14 is a combined sash lock and balance, and is adapted to be used where sash weights are not employed. We take pleasure in making this correction.

A New Syphon-Valve.

Alphonse Major, No. 232 William street, New York City, is introducing a syphon-valve to take the place of a water-closet cistern or spring valve for water-closet washouts. The general appearance of the article is shown in Fig. 13 of the engravings. The lever is connected to the pull by means of a chain. As soon as the lever is pulled down the water is turned on. The water rushes up on one side of the syphon and down on the other, then into the water-closet. Just as long as the lever is held down the water flows and at the same time the syphon is charged. As soon as the pull is let go the air rushes into the pipe and forces all the water out of the syphon, which overflows the pan. Another feature to which the maker directs attention is that with this syphon no water or air is drawn from the bowl in case water is being drawn from the supply-pipes on the floor below. Annoyance of this kind is prevented while the pull is held up, since the air-pipe supplies air for bowl, supply and syphon. The special advantages of this device claimed by the maker are its cheapness compared with a tank; nothing to get out of order; neat appearance and indefinite durability. A good pan water-closet, the maker asserts, fitted with this syphon-valve, is better than many of the so-called sanitary closets.

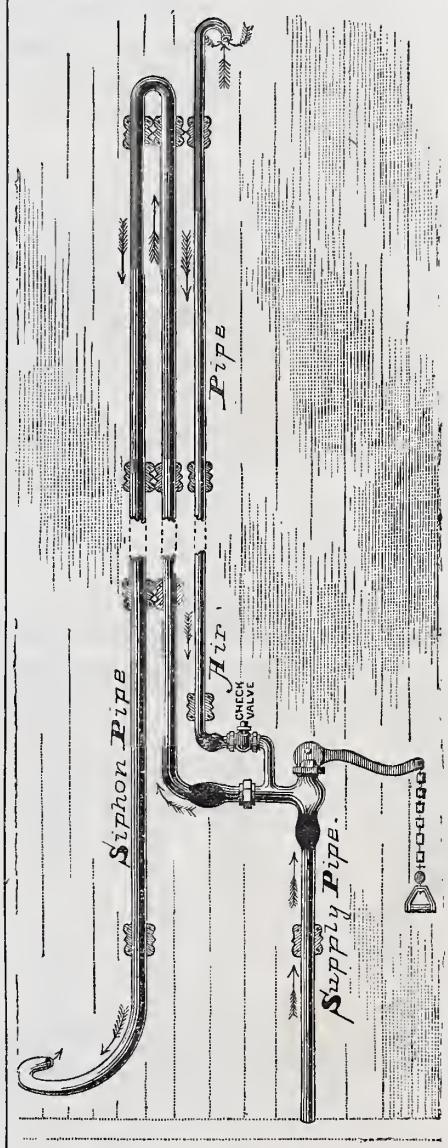


Fig. 13.—*Major's Syphon-Valve for Water-Closets.*

The American Institute of Architects is to hold its eighteenth annual convention in Albany, N. Y., beginning October 22, and lasting four days. The programme as arranged provides for the reading of papers on architecture; their discussion; visits to the public buildings and to points of historical interest, including the Manor House, the Schuyler Mansion and the Van Rensselaer Mansion. It is the intention of the committee to invite connoisseurs in art and other gentlemen to be present. The session will end with a dinner.

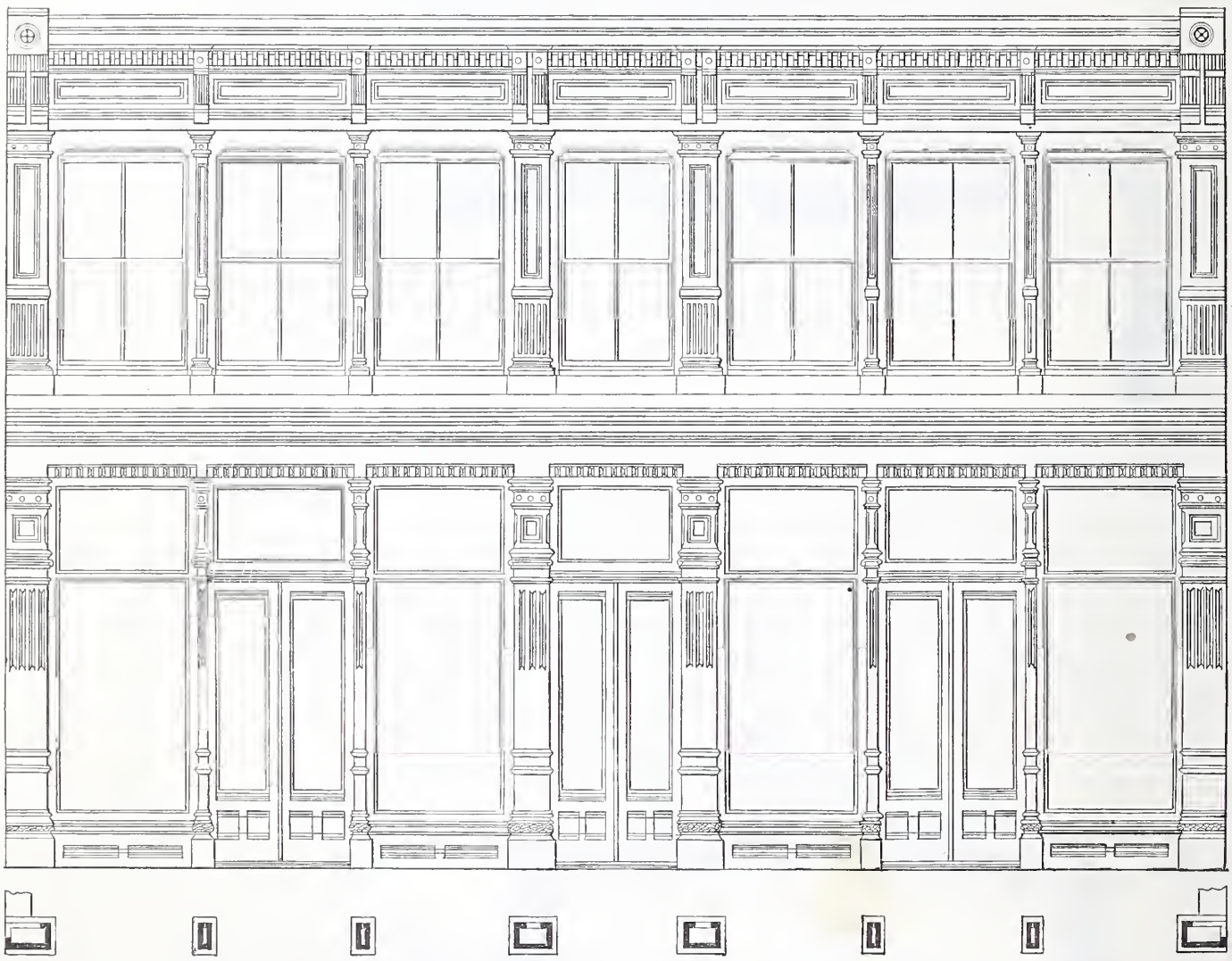
For furniture polish take turpentine (oil) 1 pint; alkanet root, ½ ounce; digest until the liquid is sufficiently colored, then add 4 ounces of beeswax, scraped fine. Put the vessel into hot water, and stir the contents until thoroughly mixed. If wanted pale, the alkanet root should be omitted.

Architectural Ironwork.

The application of cast iron to architectural purposes has had the same vicissitudes as almost every other material that has been adapted to a special use. The facility with which it could be applied to fronts and to the purposes of decoration generally induced its very extensive employment at the outset in forms which experience ultimately indicated were not best adapted to it. A reaction set in, and a period followed in which cast iron was less employed. A revival to a certain extent has taken place since, so that cast iron in its employment about buildings may be considered at the present time to be in its third stage. At present it is being used with far more skill and with a far better knowledge of its real utility than ever before. It is largely combined with brick, so that the objections to it on account of its sudden destruction by fire have been in a large degree removed. It is also very extensively used in the way of trimmings, and in combination with wrought-iron frames. Cast iron is perhaps more extensively employed at the present time than ever before, and yet in such ways as to be open to few or none of the objections which formerly prevailed against it.

We are indebted to Messrs. J. B. & J. M. Cornell, of the Cornell Iron Works, this city, for the originals from which the accompanying engravings were made, and which illustrate in some degree modern applications of iron to architectural purposes. The designs presented have been selected somewhat with reference to the expressed wants of readers of this journal. The first is an elevation of a store front in cast iron, with a plan showing the shape and location of the columns. The building is two stories in hight, and is of a character adapted for use in many of the smaller towns throughout the country. It measures 56 feet front and is divided into two stores, with a stairway between communicating with the upper story. Plate-glass windows are used in the store front, not extending the whole hight, however, but being divided on a line even with the heads of the doors. The upper story is characterized by abundance of light, and yet the pilasters and columns are not so small as to reduce the strength of the supporting wall. The upper cornice may be supposed to be of galvanized sheet iron. It would probably be better made of that material than of cast iron, considering cost and utility. The whole design is of a character to admit of modifications and adaptations to use in various situations.

The engravings shown on the opposite page represent a balcony fire-escape, and indicate a form of construction which in its general features is being very largely employed in this city at the present time. A balcony either of ornamental pattern, as in this case, or of the simplest possible construction, is thrown out at each floor line, so as to include two or more windows of the building. Communication from one balcony to the other above or below it is effected by means of a ladder, either fastened against the wall, as shown in the engraving, or inclined between the two. The design given herewith is much handsomer than those most commonly employed in this city, and at the same time the construction is of a more substantial character.



Architectural Ironwork.—Elevation, with Plan of Columns, of Store Front in Cast Iron.—Scale, ⅛ Inch to the Foot.

NOTES AND COMMENTS.

This issue contains more than the usual allowance of house plans and designs. We present in part the study that received the second prize in our competition of seven-roomed brick houses, and also two contributions in our Correspondence Department, illustrating and describing houses of moderate cost. One of these is the record of the experience of a correspondent who has built to satisfy his own requirements, while the other is a contribution from an architect in answer to a request from one of our readers, published two months since. All of them will bear careful study, and each will, no doubt, prove valuable in many directions.

A somewhat remarkable controversy has been in progress during the past few weeks between the master plumbers and the dealers in plumbers' supplies in New York City and Brooklyn. Perhaps we would be more accurate by giving it a longer period, for the action upon the part of the National Association of Master Plumbers which precipitated the controversy took place several months ago at the convention which was held at Baltimore. The plumbers of New York and Brooklyn had a joint meeting with the dealers in and manufacturers of plumbing material during the latter part of August, and at that meeting the plumbers submitted to the dealers certain propositions which had been adopted unanimously by their local associations and which it was demanded the trade should accede to. Their demands upon the trade were as follows:

1. That the manufacturers and dealers in materials shall not sell to others than licensed plumbers, who shall exhibit a certificate duly signed by the president and secretary of their respective associations. This certificate guarantees that such plumber is entitled to all privileges, and is to be renewed every three months.

2. That no manufacturer or dealer shall figure on plans or specifications for any persons, whether engaged in the plumbing business or not.

3. That no plumber, manufacturer or dealer in patented articles shall sell to others than licensed plumbers, as stipulated in Article 1.

4. That any plumber who waives his discount in favor of his customer shall be dealt with as one not entitled to the regular trade

discounts, and his certificate shall be revoked and remain so until he be properly reinstated and receive a new certificate from his association.

5. That manufacturers and dealers shall not furnish repairs, or do the same, except through a regularly licensed plumber.

6. That manufacturers and dealers shall not become sureties for the fulfillment of any plumbing contract.

7. That where manufacturers and dealers require security from plumbers such security shall not be accepted from any interested party, whether owner or contractor.

8. Agents of manufacturers and dealers shall be prohibited from selling plumbing goods to any person other than those stipulated in Article 1.

9. That the manufacturers and dealers pledge themselves not to sell or deal with any person or persons other than those stipulated in Article 1.

Every builder knows the advantage of being able to buy all the materials for a building, whatever their character, and how necessary it is to do the purchasing in many cases, hire the labor and manage all departments of the work personally in order to keep cost within reasonable limits and secure satisfactory quality. Plumbing, it is well known, is no exception to the rule, and, therefore, it requires no extended argument to show that, while the action of the plumbers was ill-advised on their own account, it was also a menace to the public, since if it were successful it would materially enhance the cost of buildings and put it beyond the power of architects and contractors to control the work. All this and more was perceived by the trade addressed by the plumbers, and, accordingly, the following dignified business-like and unmistakable reply was promptly returned, bearing the signatures of some 37 firms and companies—practically the whole trade of New York and Brooklyn:

"We much regret the receiving from your association the set of resolutions, which we now most respectfully return. We regret it for the simple reason that we do not like to feel that a document so untenable, so unbusinesslike, so opposed to all the established laws of commerce and trade, both written and unwritten, should have emanated from your body, and which, were it possible to carry into effect, would not only, in our opinion, be ruinous to your business, dishonorable to yourselves, but would place you in the very unenviable light of extortionists before the eye of the public. To say that we cannot give any consideration seems almost like reiteration; nor can we yet believe that it represents the intelligence, or that it is the result of the thoughtful and deliberate majority, of your craft.

"We further regret the position you have placed us in, as we are most desirous of furthering the interests of the plumbing trade, recognizing how largely our interests are mutual. Why you, as intelligent men, do not see and appreciate this fact, we are at a loss to explain; it cannot be possible that you so underrate our business ability and common sense that you imagine we cannot see that the most friendly and intimate relations with the plumbing trade are to be desired by us above all things. Furthermore, we must embrace this opportunity of stating more distinctly that we find no just cause for any special protection other than that which the usual and accepted laws of commerce accord alike to all. That misunderstandings do occur, that there should be friction sometimes, is only in the nature of all human things, and no set of resolutions can make it otherwise; but why these matters cannot be adjusted by the usual business methods in the future, as they have been in the past, we fail to see.

"Finally, let us ask you, and believe that we do so in the most friendly spirit, to do nothing rashly; confer with the less impulsive and conservative members of your association. Also, remember that a great deal of good may result from mutual confidence and friendly intercourse, while combinations, threats and such like will only tend to provoke opposition. And let each one, whether buyer, maker or dealer, look to a well-earned reputation for upright and honorable dealing as the only lasting and safe protection of their interests."

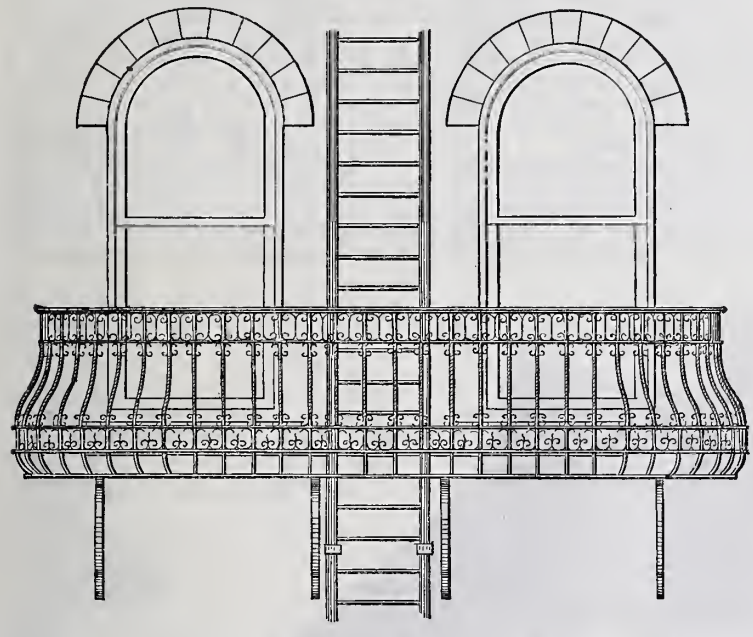
Owing to the fact that both the resolutions of the National Association of Master Plumbers and the demands of the local plumbers were before the meeting, and that the latter only were acted upon, the reply of the dealers as above being addressed to the president of the National Association, some questions have arisen between the trade and the plumbers since the meeting which to an outsider appear very much like an attempt upon the part of the plumbers to draw attention from the main issue by means of a quibble. We have not space to present the matter in full, but append two of the national resolutions, merely to show that the demands of the local trade were strictly in keeping with the instructions received from that body. The first and third of the resolutions adopted at the national convention, held in Baltimore in the latter part of June, read as follows:

Resolved, That any firm manufacturing plumbing materials selling to others than master plumbers, that we withdraw our patronage from such firm.

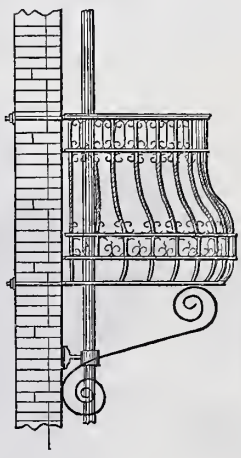
Resolved, That the master plumbers shall demand of the manufacturers and wholesale dealers in plumbing materials to sell goods to none but master plumbers.

The immediate result of the reply from the dealers, as given above, was a letter from the president of the National Association of Master Plumbers of the United States, addressed to the vice-president of the States and presidents of the local associations, inclosing the answer of the dealers, and commenting on it. The spirit of this letter was not unlike the preposterous demands made at the outset. It has been pronounced by some critics as being almost communistic in tone, since it threatens "boycotting" in a very marked manner. The resolutions of the National Association, by the way, contain a threat, it will be noticed, expressed in no uncertain terms. Under date of September 3, the dealers issued a circular containing all to which we have above referred, addressed to the architects of the United States. As likely to be of interest to our readers, we append it in full:

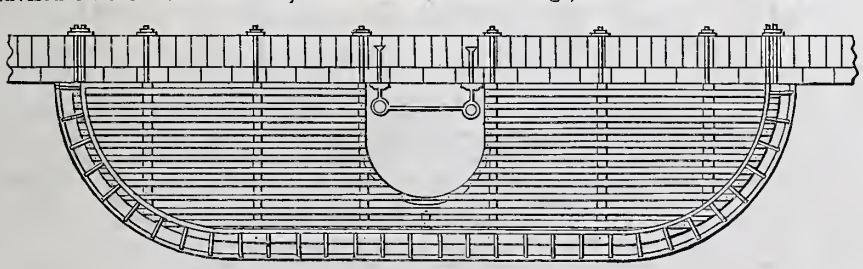
"On the following pages we present the demands of the Master Plumbers' Association for trade protection, and our reply to same; also, copy of a letter without date, but evidently written by Mr. Young since his return to Chicago. We place these documents before you with the following remarks: Firstly, their demands, as characterized in our answer, are so unbusinesslike and impracticable, and, we may add, so outrageous, that we feel justified in calling your attention specially in this manner, in order that you may fully understand the situation. We think it is due to you and to ourselves, as well as to the more intelligent and conservative members of the craft, that such an apparent effort to combine for the purpose of extorting from the public more than fair and reasonable prices for materials used in the business should be thoroughly comprehended; also, that the few who indorse the sentiments expressed in their demands should not be allowed to injure the reputation of the many leading and responsible master plumbers who, we feel well assured, do not hold the opinions or indorse the business principles as laid down in these demands. Still, in view of Mr. Young's later epistle, and considering its communistic and vindictive tone, it may be well to remind you that some of the less thoughtful and more impulsive men may not use, or in some way may misrepresent, our goods when specified by you; hence, we ask that you kindly guard our interests, and lend us your influence to stamp out a spirit of trades-unionism in one of its worst phases—a spirit not only opposed to all well-established business laws, but one



Architectural Ironwork.—Balcony Fire-Escape, Elevation.—Scale, ½ Inch to the Foot.



End View.



Top View of Balcony Fire-Escape.

that is directly antagonistic to the freedom of our laws and the spirit of our institutions. We ask this in view of the stand we have been compelled to take, which is, in our opinion, the only one that could be taken by upright and honorable business men."

This very reasonable appeal to architects, we are certain, cannot fail of having an important influence upon the controversy, although it would have been in far better taste if the architects had been asked to protect their clients' interests instead of the interests of manufacturers of plumbing goods. The interests of the building trades in this issue are unquestionably upon the side of the manufacturers and dealers.

As would be very natural to suppose, this controversy has called out numerous newspaper criticisms and comments. The daily press, as well as all the trade and technical papers, with the exception of the organs of the plumbers' associations, have been on the side of the manufacturers and dealers and of the public at large, as opposed to the preposterous demands of the plumbers. *The Metal Worker*, which foresaw this difficulty from the time of the organization of the National Association of Master Plumbers, has been very pronounced in its views. It has analyzed some of the demands made by the plumbers as given above, with the following results:

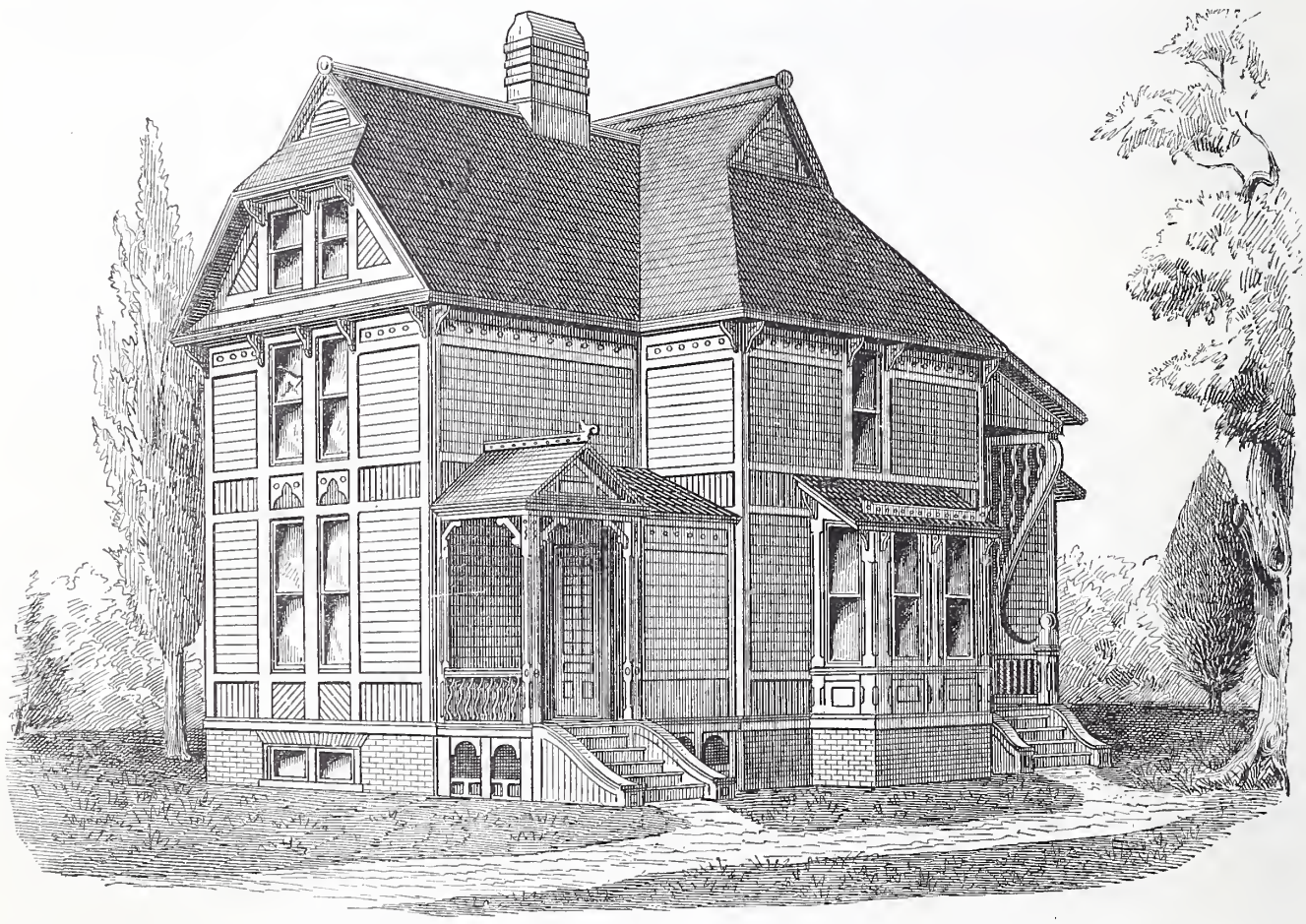
"The demands of the local associations of master plumbers upon dealers in plumbing materials, when critically examined, show in themselves that the plumbers have greatly overshot the mark in this matter. The third resolution reads as follows: 'That no plumber, manufacturer or dealer in patented articles shall sell to others than licensed plumbers, as stipulated in Article 1.' Article 1, here referred to, provides that manufacturers and dealers in materials shall not sell to others than licensed plumbers, who are to exhibit a certificate duly signed by the president and secretary of their respective associations. From this resolution it appears, therefore, that no plumber is allowed to sell his goods to any one except some other plumber, and this plumber in turn must be a licensee of some association and in good standing. A strict interpretation of this remarkable provision, therefore, would deprive the public at large of the valuable services of the plumbers, because they would not be allowed to sell to any one save to plumbers duly licensed. It is hardly to be supposed that householders in order to obtain plumbing fixtures would be willing to qualify and obtain licenses as practical plumbers in addition to paying the high prices that are provided for further along. Should they go to the trouble of becoming plumbers, they would very likely, in protection of their own interests, do their own plumbing. The spectacle of plumbers preying upon each other in the festive manner this resolution provides for is indeed refreshing. On the other hand, the fact that none but plumbers for the future are to be allowed the luxury of plumbing fixtures in their houses is serious in the extreme.

"The fourth article in the remarkable document submitted by the plumbers provides a penalty for any plumber who waives his discount in favor of his customer. The only possible interpretation of this clause is that the plumber is obliged to demand for his goods in all cases the full list price. By the terms of this resolution he is no more allowed to waive a portion of his discount than he is the entire discount. The working of this becomes obvious. On many lines of goods which plumbers buy, the discount is from 50 to 60 per cent. For example, 50 and 10 is a well-known rate on several lines of brass goods. If a plumber buys goods at 60 per cent. discount and sells them at list price he makes a profit of 150 per cent. Such profits, which the plumber is forced under severe penalties to exact, are enough to justify all the newspaper paragraphs that have ever been flung at him. These have been based upon his supposed habit of exorbitant charges. The public have been taking the humor of the press with many grains of allowance, but with such figures as these before them, backed by the formal action of two local associations of master plumbers, they will have reason to believe that the most exaggerated stories of the past have had a strong foundation in truth."

CORRESPONDENCE.

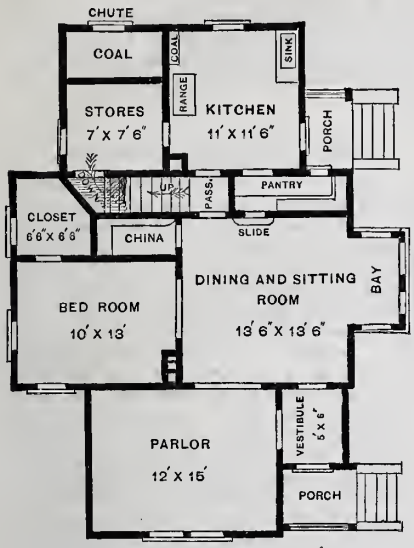
A House for "Carpenter's Wife."

From CHARLES N. CORNELL, *Alpena, Mich.*—Having been called gallant by the editor of *Carpentry and Building* for my contribution in reply to a request for the perspective view of a building to a "Woman's House Plans," some months since, I shall be hardly able to maintain that character unless I do something in response to the request of a "Carpenter's Wife," published in the issue for August. I therefore submit for consideration a perspective view and suggestions as to the modification of the floor plans submitted by the correspondent named. By the plans here shown, it will be noticed that a larger closet, with a window for light and ventilation, is provided in the family room. There is also a larger china closet opening from the dining room. The single stairway is more centrally and more conveniently located. A pantry is also provided, and by means of a slide, which is shown, much passing to and from the kitchen will be avoided. The two doors at the foot of the stairs serve to shut off the noise and odors from the kitchen. The entrance to the cellar is from the storeroom under the stairway. This plan is preferable to going down out of the dining-room, as was originally intended. The coal bin should be covered or floored over about 4½ feet high and be provided with a trap-door in the top. The top of the bin will thus serve as a good receptacle for boxes, &c. The coal should be put in through a chute from the outside of the building. The floor of the coal-bin should be built with an incline, so as to throw the coal to the supply-box, which is arranged something like a slip in the kitchen, with a top to open. By this arrangement there will always be a constant supply of coal convenient to the range. In the plan as I have modified it the chambers are all of good size and well supplied with closets. If desired, by placing a double thimble in the hall partition of the chamber measuring 10 x 13 feet, all the chambers may have access to separate flues in the main chimney, thus giving the opportunity of



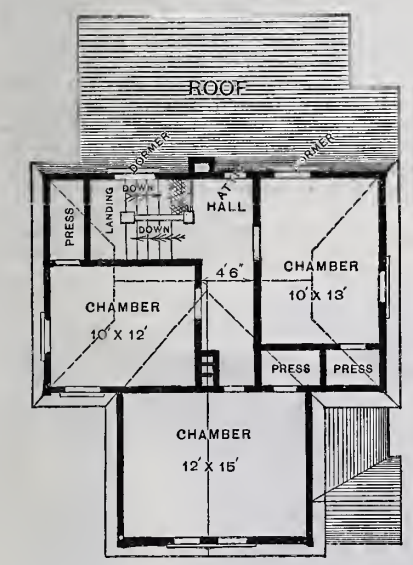
Perspective View of House to Plan Submitted by "Carpenter's Wife." (See page 161, August number). Designed by C. N. Cornell, Alpena, Mich.

thorough warming. The dormer window over the landing lights the stairway and upper hall I would recommend this building to be painted as follows: The body of the building and brackets Venetian red, the panels of brackets, between windows and in frieze to be painted with French ocher deepened with orange chrome. The belts and casings to be painted with Venetian red and black, this combination forming a rich dark brown. Spots and figures in panels,



Arrangement of Rooms on Lower Floor, Suggested by Mr. C. N. Cornell.—Scale, $\frac{1}{16}$ Inch to the Foot.

orackets and moldings to be picked out with red. The roof to be dark slate and the ridge rolls red. The top section of chimney to be brown, the three projecting bands to be yellow, the spaces between them to be brown, and the balance of the chimney to be red. The colors selected may appear to be rather striking or decided, but they will be found to harmonize well with the green surroundings of summer, and in winter the building will have a comfortable warmth and cheeriness in appearance that will be sure to please. I offer these suggestions as to the painting



Second Story Floor Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

of a house, as it has frequently occurred in my practice to have a design entirely spoiled by inharmonious painting.

Note.—We feel sure that our readers generally will appreciate the action of this correspondent in so fully considering the plans submitted by a "Carpenter's Wife," and supplementing her ideas by professional experience, thus laying before our subscribers so desirable a study as is here shown. The floor plans as at present arranged we unbesitatingly pronounce among the best, considering their scope and purpose, that have ever been presented in our columns. The perspective view which our correspondent has given shows a design that is in keeping with the general intent of the building. The roof is high, and some attic chambers or storerooms might be obtained which our correspondent does not mention in his description. By referring to the plan of the second floor it will be seen that access to the attic could be readily obtained by arranging stairs over hose which lead to the second floor.

It would, perhaps, be ungracious to criticise a design which has been so handsomely presented, and, while there is little to which exception need be taken, there is one feature which is hardly in keeping with the others. The rear porch forming the entrance to the dining-room has been supported at its outer end by a bracket of a shape very much reminding one of an inverted harp. Our office boy, when he saw this design, suggested that perhaps the author was getting his barp ready to hang on the willow. Such a suggestion, of course, is not to be considered for a moment, but we do think that when the author comes to work out tbis plan in the way of elevations and details he will probably modify this feature or substitute some other shape for it. The scheme of color which our correspondent suggests is certainly striking, and if carried out literally we think would have a pleasing effect, while at the same time it would produce a house that would command attention upon the part of all who saw it. Contrasts and somewhat loud schemes of color are at present very much the fashion, and should any of our readers build the house here shown and paint it to the scheme laid out, they will have the satisfaction of knowing that they are in the front ranks of the extremists in house coloring. Our own taste would indicate something less pronounced, yet we agree with our contributor that in summer and winter the scheme as he has described it will have some of the advantages named.

Vermont Houses.

From C. W. P., *East Shoreham, Vt.*—Although the house plans published from time to time in *Carpentry and Building* are admirable, no one in this vicinity could be prevailed upon to adopt them entirely. The requirements of houses in this vicinity are almost invariably a large kitchen, two large pantries or storerooms, at least one bedroom (but more often two) of a good size, a dining-room, a living-room, a front hall with stairs, and at least four closets, including china closet in dining-room. There is also required a back stairs out of the kitchen, with stairs to the cellar underneath. There is very seldom required a bathroom or a parlor. No sleeping-room on the first floor is a fatal defect to plans in this section. People in this neighborhood go on year after year building to no plan at all, resulting in eyesores to the otherwise beautiful landscape. The trouble is that owners cannot be made to see their interests, but will inflict countless inconvenience upon themselves and their children for the sake of saving $25 or $50 architect's fees. This is not real saving, for the most of the houses of the character I have described are altered almost as soon as built. Alterations begin at this time and are kept up year after year, until little or no semblance to the original internal arrangement remains. If people could be made to see that it requires more thought to build a successful house than it does to build a rail fence, failures in house planning would be less frequent and the new houses would be superior to the old ones.

Combined Calipers and Dividers.

From A. G. S., *Chattanooga, Tenn.*—In the December number of *Carpentry and Building* attention was directed to a combined caliper and divider. I desire to say that I had the identical tool described in use eight years ago. By examination of the instrument I see it was patented in 1872; accordingly, it would seem that the paper is in error about the tool in question being a "novelty." As to its value, I think also a mistake has been made. Theoretically the tool is a very fine one, but practically it reminds one of an article discovered in one of our Western States, which, tbe geologist decided, looked like coal, felt like coal, and was coal; but, nevertheless, it would not burn. The tool in question looks well in a kit, but for practical work it is not altogether a success. The arc is so near the pivot, and the legs are so long and slender, that it is impossible to strike a large circle with accuracy. The points do not meet by about a ½ inch, which renders the tool unfit for general use in scribing base and fitting doors and the like. As *Carpentry and Building* is published for the good of the trade rather than as an advertising sheet, I presume this correction will be acceptable for publication.

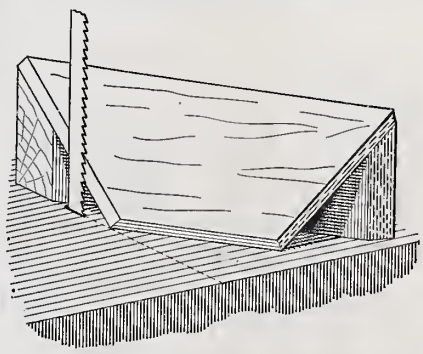
Pitch of Roofs.

From J. H., *Armstrong Mills, Ohio.*—I desire some information with reference to tbe pitch of roofs—how the pitch is calculated and the definition of the different terms used in tbis connection.

Answer.—Our correspondent will find in the January number of *Carpentry and Building* for 1879 an article on tbis subject, which we believe will afford him all the information he requires. If upon examination of this article he is still in doubt, we shall be glad to answer any further questions he may propose.

Hopper Bevels.

From C. M. R., *Wheeling, W. Va.*—If the readers of *Carpentry and Building* are not already tired out on the subject of hopper bevels, I will mention, for the benefit of whom it may concern, that the butt joint



A Mechanical Means of Solving Hopper Bevel Problems.

bevel can be easily obtained, where machinery is used, by simply raising the piece to the inclination at which it is to stand in the hopper or box, and then cutting it off with a plumb-cut circular or band saw. This method will be better understood by examining the accompanying sketch.

Brick Filter.

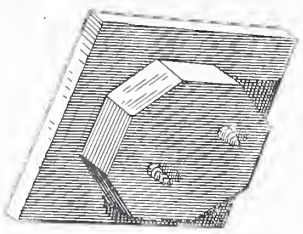
From J. E., *Louisville, Ky.*—In "Jumbo's" specifications, published in the October number of *Carpentry and Building* for 1882, I find the following: "Construct in the bottom of the cistern a brick filter in the form of a pyramid, say 2 feet high, 1 foot wide at bottom and 4 inches wide at the top." I desire to inquire about how much water may be expected to pass in a day's time through a filter constructed to these dimensions, supposing the filter to be covered with water.

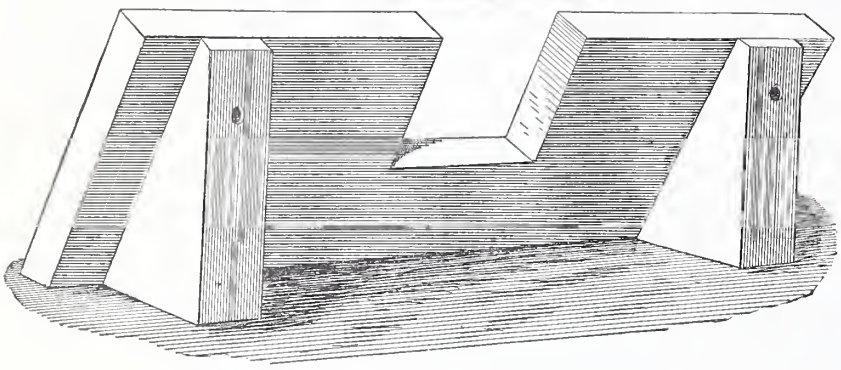
Answer.—The amount of water that would pass through brickwork under the conditions above described would depend in some degree upon the character of the brick and the frequency with which the filter was emptied of water, and the hight of the water in the well or cistern in which it is placed. For example, if the filter was kept partially emptied all the time, and the water stood in the cistern at a considerable hight, the pressure of the water itself would cause the filter to be filled more quickly, or, rather, cause tbe water to penetrate the wall more rapidly than would be the case under other circumstances. From our own experience with brick filters we think there would be no difficulty in obtaining daily, from a filter constructed in this manner, all the water that

would be ordinarily drawn from a cistern for domestic purposes. The supply would probably be in excess of requirements.

Sawed Rosettes.

From C. M. RATHBUN, *Wheeling, W. Va.*—I find that a great many useful ornaments may be produced with an ordinary scroll-saw or band-saw by means of a small contrivance of which I send you a model and drawings herewith. This device may be made to cut any angle. I find 60° about as useful as any. By its use hundreds of designs can be manufactured, the assortment being limited only by the taste and skill of the operator. I send with the model a few specimens of work performed by means of it. In case an ornament of a different number of sides from 4 or 8 is desirable, the gain and block can be made of a different





Mr. Rathbun's Attachment for Sawing Rosettes.

shape from that shown. It is necessary that the block should have as many sides as the ornament, and that the gain be made to fit the block. From the above it is evident that many designs of center ornaments, rosettes, &c., hitherto carved by hand can be readily and expeditiously sawn on either a scroll-saw or band-saw. The size of the device is not material. It should, however, be proportioned to the size of the work to be done. For example, for a 3-inch rosette I would make it about 1 foot long by 4 inches high. The gain in the inclined piece I would make about 2¼ inches square. Referring to the sketch, the block should fit neatly in the gain in the inclined piece. The gain and block can be square or semicircular. The following directions will indicate how this device is to be used: Cut the face figure of the ornament first, then fasten it to the block by means of wood screws, as shown. Drop the block into the gain in the inclined piece, first laying off the edges as they are to be sawn. It will be noticed that in the accompanying sketches of work done by this device the edges are all simply gauged an equal distance from the back. This, however, can be varied with good effect sometimes.

Note.—The accompanying illustrations of what we believe must prove a very desirable "shop kink" in many establishments have been made from the sketches furnished us by Mr. Rathbun, from a model of the device, and from numerous samples of rosettes which he has kindly sent us. The plan explained exhibits considerable ingenuity in the way the details have been worked out and in the wide application which has been made of geometrical forms. It is surprising how large an assortment of desirable figures and designs can be produced in this simple manner.

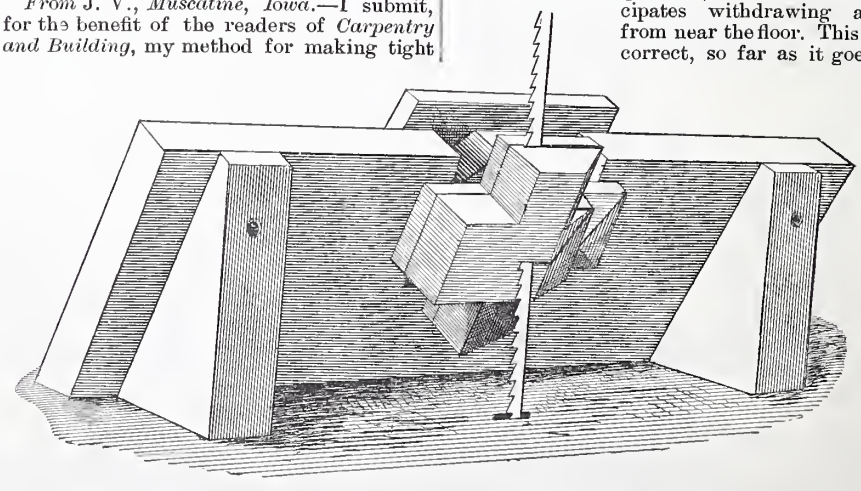
Fire-Proof Paint.

From H. S. DERBY, *East Saginaw, Mich.*—I notice in the July number of *Carpentry and Building* the reply to "E. B. S.," of Nebraska, on the subject of fire-proof paints. I take this opportunity of setting you right on the subject. I send you by this same mail some circulars and also some samples of wood painted with Russel's fire-proof paints. By examination of the circulars you will notice that this paint is used and recommended by at least one-third of the architects of Chicago, and that it is highly commended by several parties who have had a practical test of its merits. My business is to sell this paint, and if I can persuade your correspondent, "E. B. S.," or others who are in need of a similar article, to purchase some of it for trial, I shall be gratified. I know it to be a reliable article, for I have used it myself.

Note.—We have carefully perused the circular of Russel's paint, together with the testimonials printed in connection with the same sent us by the above correspondent. We have failed to find in the pamphlet any description of the composition of the paint beyond the fact that it is prepared with boiled linseed oil and the statement that it contains no silicate of soda or alum. The broad assertion is made that powerful chemical agents are used which unite by affinity, and when applied to woodwork they penetrate the surface and make it hard and durable as well as fire-proof. The testimonials to which our correspondent refers are indeed very flattering, but, like many others, when boiled down they contain little that is of tangible value. Several of the writers have witnessed experimental tests of the fire-resisting qualities of this paint, and give their opinions accordingly. The samples which Mr. Derby has sent us are so small as to render it impossible to make any experiments on our own account, and accordingly we lay his letter before our readers without expressing an opinion either way as to the quality of the paint in which he deals.

Tight-Fitting Sash.

From J. V., *Muscatine, Iowa.*—I submit, for the benefit of the readers of *Carpentry and Building*, my method for making tight joints in fitting sash to windows. The plan also allows the sash to work freely when released from the lock. The sash need not fit very closely in the sash channel, it being desirable that they should run easily. The inside stool and the outside headstock are beveled, and the sash are beveled correspondingly. The upper sash, in closing, crowds the parting strip at the upper end and the lower sash crowds it at the lower end. Now, if a check-rail be fitted so as to have the sash come just to the parting strip, and it is jointed about $\frac{1}{32}$ inch, hollowing, where the sash lock is drawn up, it makes a tight joint all around, with no annoyance of rattle.



The Attachment in Use on a Band Sawing Machine.

Radius of Splayed Jambs.

From J. V. H. S., *New York.*—The wording in explanation of splayed jambs, in the September number, should read thus: "From outside figures to the point F draw lines, crossing face of segment jamb. The lines thus drawn will indicate direction of saw cuts."

Ventilation of Living-Room.

From W. J. R. *Tracy, Minn.*—I desire to inquire how a living-room 14 x 16 feet in size can be ventilated. As I understand the question, ventilation should be at both top and bottom of the room. In the case referred to the chimney starts from the foundation, with flue 8 inches square. The stove-pipe enters the flue 7 feet from the floor. I desire to inquire if a register might not be put in the chimney near the floor, and, if so, would it not have sufficient draft to ventilate the room satisfactorily at that point? Would it have a tendency to diminish the draft of the stove, so as to cause trouble in that direction, or would it be necessary to use an iron pipe in the center of the chimney connected with the stove-pipe at the thimble? For top ventilation is there any better plan than to depend on lowering the top sash of the windows? I would be pleased to hear from some of the craft on these points.

Note.—The ventilation of a living-room in an ordinary dwelling is in some respects one of the most difficult problems that is encountered in this line of work. As a rule, no provision whatever is made for facilitating ventilation, dependence being placed upon the numerous crevices which ordinarily exist in buildings, the lowering of windows and the opening of doors. Were it not for the fresh air supplied in this manner, and the escape which the foul air finds in the same way, we think the life of people who occupy ordinary dwellings would be far less satisfactory than at present. In the main our correspondent is correct in supposing that ventilation should be provided at both top and bottom of the room. If the room is finished in a manner to make it very tight, such provision will be absolutely necessary; but if there are the usual crevices under the base boards and the usual openings under the doors, it is possible that the necessity of this is less than would be supposed from a mere theoretical consideration. Our correspondent, however, anticipates withdrawing air from near the floor. This is correct, so far as it goes. We doubt the expediency, however, of opening a register into the chimney flue, because in some cases, at certain seasons of the year at least, there is a downward draft, and a chimney is not the most desirable avenue through which to pass air that enters a living-room. If the flue has not been used and is entirely clean it might be adapted to the purposes suggested

by means of the inside pipe, as mentioned. Its success if arranged this way will depend somewhat upon the hight of the chimney and the amount of heat derived from the stove-pipe. With the hope that those of our readers who have experimented practically in this direction will answer this correspondent's questions as he desires, we shall not enter into a discussion of the subject at this time, although upon some future occasion we may give it further attention.

Building Paper.

From H. T., *St. Louis, Mo.*—Please inform me if paper is used as a building material, and, if so, with what success.

Answer.—We hardly know in what sense our correspondent proposes this question. Paper is so extensively used in building that it would seem that almost every one must have some information as to its employment in one capacity or another. It is possible that this correspondent anticipates the use of paper as a leading building material rather than as an auxiliary. It is not employed in that sense. Paper is used for deafening under floors. It is also used for the purpose of making houses tighter and warmer by being placed underneath the weatherboarding. It has its use also as an inside finish. It is used in different roof constructions, and is occasionally employed as an outside finish. In the latter case, however, we believe it is not an entire success. Paper gas and water pipes are in use to a limited extent, while paper utensils are very common. What is known as straw lumber is in some respects of the same nature as paper, and this material, we understand, has been successfully employed as a finish for both interior and exterior purposes.

Making an "O. G." Hand-Rail.

From F. S. W., *Cleveland, Ohio.*—A short time since "A. L.," of Perryville, Iowa, asked how long it would take to make a 4-inch "O. G." rail for the plan of stairs shown in Fig. 1, of the XXIIId article on stair-building, published in the December issue for 1882, the work to be done by hand. In reply, I offer it as my opinion that it would not be difficult to complete the work in question in three days. There would be at least two other crooks besides the one shown in the plan, also the straight rail. Much, however, depends on the quality of wood used for the rail. Something also depends upon the skill of the workman.

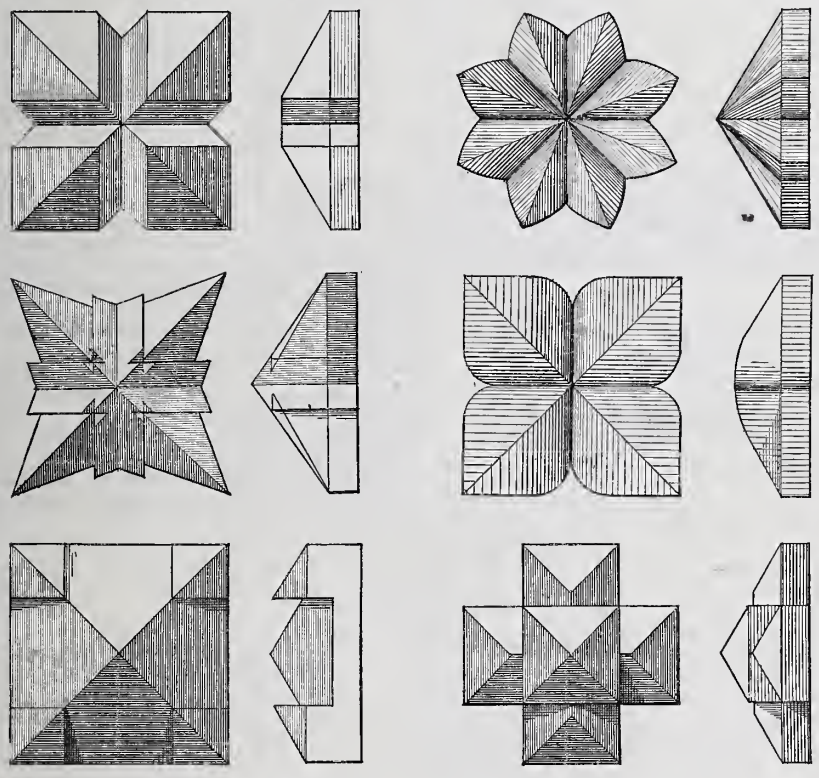
The Steel Square.

From A. S. Colfax.—I desire to learn, through *Carpentry and Building*, if there is a publication devoted to the use of the steel square, and, if so, where it can be procured?

Note.—We do not know of any paper that is devoted to the use of the steel square to the exclusion of other topics. We think that *Carpentry and Building* comes as near being a periodical devoted to an exemplification of the uses of this tool as any that can be found. In all the problems of framing which we have discussed we have taken care to point out how the various lines and cuts could be obtained with the square, as well as by other means, and in our back volumes a number of special articles on the use of the steel square will be found. In short, we do not know where else to refer our correspondent for as full an account of the steel square and its uses as may be obtained by an examination of the articles on this tool which are scattered through our back volumes.

Construction of a Bay Window.

From H. A. B., *De Forest, Wis.*—I would like some information about the construction of a bay window in connection with a house in a country village. I want something that will look well. I desire to ask whether it will be best to employ an octagonal or square form. I also desire to know whether the same size of windows shall be used in this part as in the other portion of the house, or would it be best to vary the size and style of the sash. Plans and details in an early number of the paper would be a favor.



Specimen Rosettes Produced by Mr. Rathbun's Device.

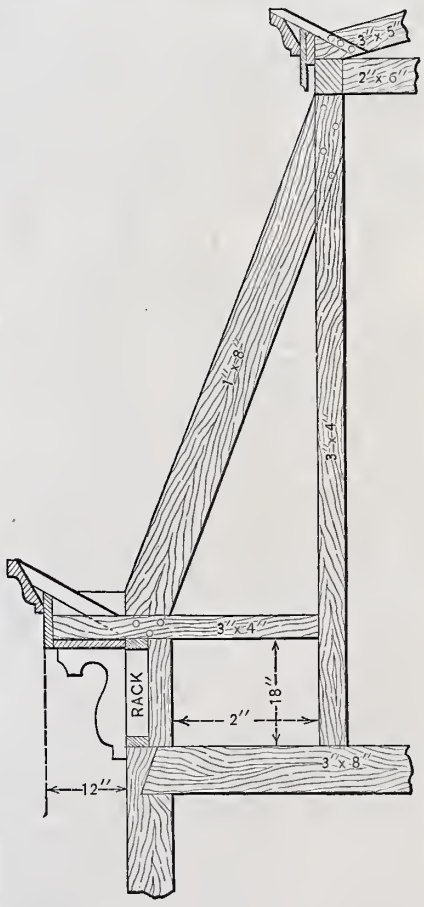
Answer.—It would be impossible to publish special plans and details in answer to this correspondent's request that would be of any advantage to him. The questions which he raises are essentially questions of taste and preference, and for which no definite rule could be given and no advice which it would be particularly to his interest to follow. We have published a great many designs of bay windows in the back numbers of *Carpentry and Building*, and shall undoubtedly give many more in the future, but all of them have been given as parts of the houses which they were designed to accompany. A bay window to suit this correspondent would necessarily be designed to fit the house upon which he proposes to employ it. The character of the building and its surroundings should be taken into account. Otherwise, tacking on a bay window would be very much like mending an old garment with new cloth of another kind and color. We suggest that the only plan to pursue in cases of this kind is to inspect as many designs of bay windows as can conveniently be found, by looking through the back numbers of this journal and by examining any works on architecture at hand, and making a design to meet the case by selecting from these such features as seem most appropriate for employment.

Fastening Newels and Hand-Rails.

From M. W., *Chattanooga, Tenn.*—I desire to say to "E. S.," of East Providence, R I., who inquired about fastening newels, some time since, to use a ⅜-inch rod through cap and newel and through the floor. An extra piece of timber 2 x 4 under the floor should also be used. The rod should be provided with a nut on one or both ends, and by means of it the whole should be bolted down. By this means a strong job, so far as the newel is concerned, will be obtained. The rail in turn should be bolted to the cap.

Construction of Mansard Roofs.

From T. B., *Philadelphia.*—In a recent issue of *Carpentry and Building* a design for a mansard roof was presented. I would like to make some objections to it. In the first place it may be remarked that the floor joists cannot be run out to receive the cornice, as shown in the diagram in question, without making the roof look top heavy or squatty. Another objection is that of having the front lines of the roof projecting beyond the face of the house. I have still another objection which is important to me, although it may not be of equal importance to others. I do not like to have the water from the deck-roof run down over the mansard roof. However carefully the work may be constructed, a dirty rim will extend around the roof, and the slate or tile will be more or less streaked. I have built several hundred houses in this city, and, based upon my experience, I submit the inclosed sketch as indicating good construction. It shows the form which seems to be most popular in this vicinity, and appears to me to be the best, all things con-



Method of Constructing Mansard Roofs Preferred by T. B.

sidered. I say this after having tried a great many different ways and styles. I use boards for the slanting pieces or rafters. I find after the sheeting boards are nailed on the roof is very stiff, and this construction avoids extra weight in the roof. A special advantage of the construction is a good gutter and rooms with vertical walls.

Measuring Earth and Stone Work.

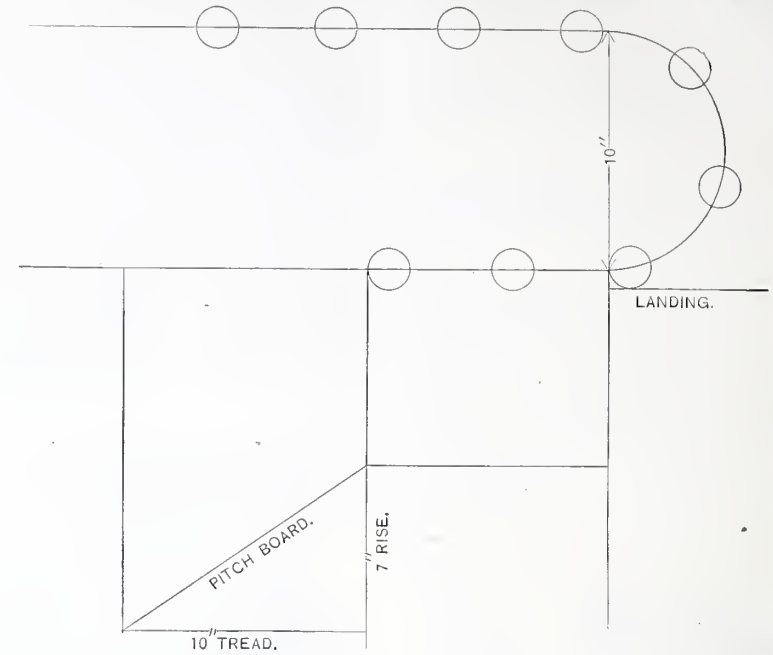
From DEXTER.—I would like to learn, from the practical readers of *Carpentry and Building*, the best method of measuring the number of yards of dirt in a cellar and the best plan for getting the number of perches of stone in a given wall.

Note.—We publish this inquiry without being satisfied in our own mind of its exact intent. The usual plan of figuring earth work is in principle the same as that of calculating cubic contents for any purpose whatever. Thus by multiplying the length, breadth and depth together, if these dimensions are in feet, there will be given the cubic contents of the cellar, or whatever the figures represent, in feet. This may be reduced to yards by dividing by 27, the number of cubic feet in a cubic yard. On the other hand, if the dimensions in the first place are in yards and fractions of a yard, the result of the multiplication will be cubic yards. The same general advice applies to the calculation of masonry. By obtaining the number of cubic feet in a given wall and dividing by the number of feet in a perch, the result in perches will be obtained. If our correspondent refers to the methods for shortening this process, and which, at best, are applicable only in rare cases, our answer as given will not interest him. We shall be glad if those of our readers who are using such plans will write us for the benefit of this correspondent and others. The whole subject of measurement and calculation is carefully discussed in most engineer's and architect's pocket-books. Our correspondent may find it of advantage to examine "Vodges' Architect's and Builder's Companion," and also "Nystrom's Mechanics." Both of these are books that will hardly come amiss in the library of any architect or builder.

Problem in Hand-Railing.

From W. G. M., *Warrensburg, Mo.*—According to my understanding of stair-building, a face-molding cannot be drawn without knowing the hight or riser width of tread, diameter of cylinder and thickness of fillet, if any. I notice that the first articles of the stair-building series, published some time since in *Carpentry and Building*, did not take into consideration the rise, the tread, the cylinder and fillet, if any, in drawing the diagrams. Accordingly, I consider the lessons as presented deficient in this particular. The principles are correct. I inclose a drawing of a straight flight of stairs, with cylinder at top and with ¼-inch fillet long baluster on the return landing. The cylinder is 10 inches in diameter, the rise is 7 inches and the tread 10 inches. The landing riser is placed at the spring of cylinder; accordingly, the crook has two pitches. My purpose in submitting this diagram is to request the author of the series of papers above referred to to draw a face-mold according to his system. If the articles are explained in this particular they will be about right, according to my reasoning.

Answer.—The first of the accompanying illustrations is a duplicate of the drawing inclosed by this correspondent. He does not seem to find fault with the stair-building articles as we have published them, except that some of them were not specifically applied to examples of stair-building. In reply to this we would say that this was done purposely, so as not to burden the learner's mind with too many things at once. In the case presented, we suggest cutting off ¼ inch from the long baluster on the landing. It is not necessary to have two pitches in the crook. In the second engraving submitted herewith we show how such a crook may be taken out the plank. The ground plan is shown in the lower part of the diagram, and shows the method of drawing the face-mold. To the pattern is added some straight wood at the lower end for convenience in holding the piece in the vise. The line A *b* of the pattern is drawn with the pitch-board of the stairs, extending over A B of the ground plan, while *b c* of the pattern corresponds with and extends level over B C of the ground plan. This pattern of face-mold is marked on the plank and the lines cut square therewith. The diagram in the upper portion of the engraving shows this block as placed in position and the lines of the rail as it is cut out of the wood. The lower end of the piece has no bevel, but it is taken out at the center of the block and parallel with the face of the plank. The pitch bevel at the upper end is the angle formed by the rise and rake lines of the pitch-board. The hight gained by the raking tangent A *b*, after passing the center of the short baluster, is found to be not quite half a rise, which makes it necessary to cut about ¼ inch off from the landing balusters.



Problem in Hand-Railing Proposed by W. G. M.—Scale, ⅛ Inch to the Foot.

The author of the series of papers to which our correspondent refers, and who has favored us with the above explanation, adds that he is in the habit of making working diagrams of this character to a scale of ⅛ inch to the foot, the same as the engravings. He says that he finds this more convenient than other scales and he also finds it an advantage, as shown in the present instance, to use cross-points to represent the balusters. He adds that he never uses a complete drawing when it is possible to do the work in some easier way. If this reply does not fully meet our correspondent's requirements we shall be glad to hear from him further.

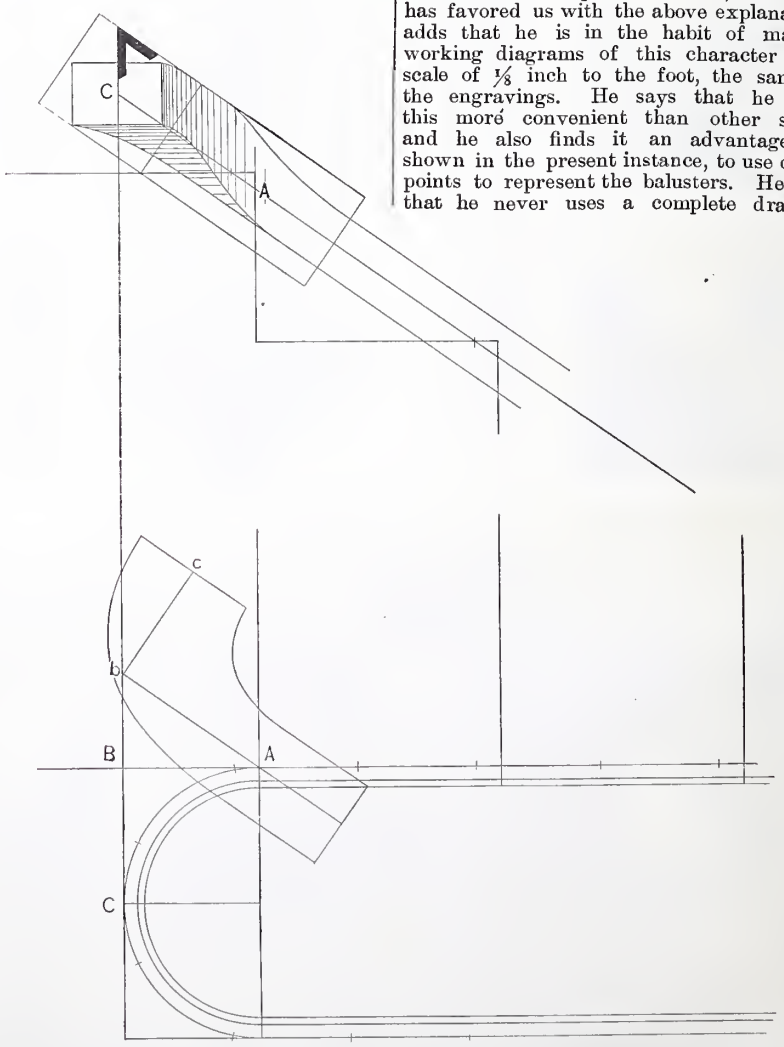
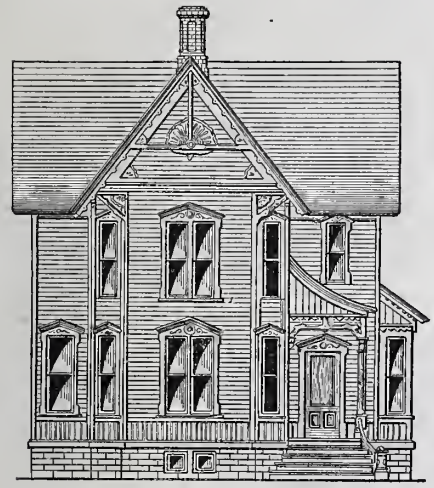


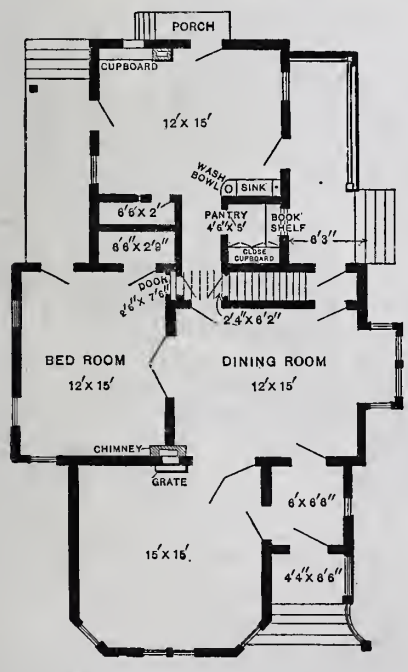
Diagram Illustrating Reply to W. G. M.

Frame House.

From E. B. Fox, *Kalamazoo, Mich.*—I was much interested in the floor plans submitted by "Carpenter's Wife," and published not long since in *Carpentry and Building*. The fact of this plan being published has induced me to send the inclosed plans, which represent a house which I built for myself last season, and which on occupation meets the wants of my family very satisfactorily. I lay but little claim to being an architect or designer. On the other hand, I claim that the floor plans here shown originated with my wife and myself. I give my wife the credit of most of the arrangement. In this instance, as well as in most other cases of a similar character, some features were suggested by the arrangement of other houses. The outside finish is of a character that has been employed in other instances. The arrangement of rooms was the best we could devise for the amount of money we wished to expend. At the time this house was built there was not another dwelling in the city that had corner windows as shown. Now there are several, which indicates the popularity of this feature. The house fronts the west, thus bringing the bay window on the south. The measurements given in the floor plans are inside of finish. The front chimney was located so as to permit the use of a grate in the front room. A door occurs between the bedroom and the lobby leading to kitchen, which we find a great convenience. The house is heated by a furnace, and wood and coal bins are located in the cellar. On the north side and back of the bedroom an open porch or platform is used. We thought to roof it over would make the kitchen too dark. The chambers are plentifully provided with closets, a feature which housekeepers generally will appreciate. In the finish of the outside we varied in the matter of the front door from the drawing. Instead of the large glass which the front door shows in the drawing, we used two smaller lights of stained glass. In case this house were occupied by a family who did not care for a bedroom downstairs, that room would make a convenient dining-room, leaving the present dining-room for a sitting-room. The hight of stories is 10 feet in the first floor, and 9 feet in the second floor. The lower rooms, with the exception of the kitchen, are furnished in butternut.



Front Elevation of House Built by E. B. Fox, Kalamazoo, Mich.—Scale, $\frac{1}{16}$ Inch to the Foot.



First Floor Plan.— Scale, $\frac{1}{16}$ Inch to the Foot.

Problem in Board Measure.

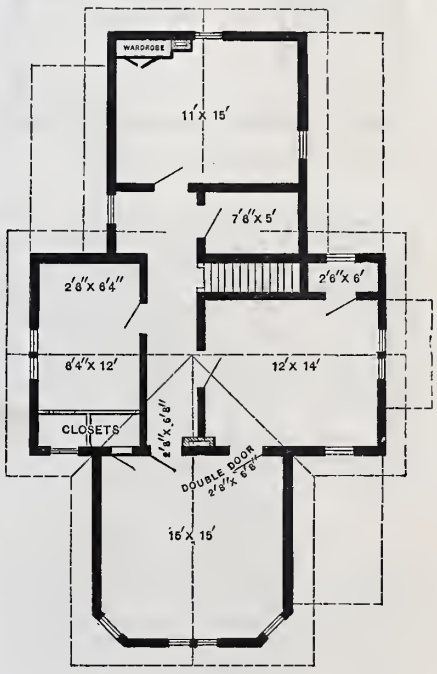
From H. J. R., *Buffalo, N. Y.*—I happened a short time since to pick up an old copy of *Carpentry and Building*, and my attention was drawn to a problem in board measure there presented. The problem was stated in the following terms: Given a board 12 feet long running to a point at one end and 14 inches wide at the other, of even thickness throughout. Required the exact distance of a line parallel to the broad end which shall cut the board so as to leave the same amount of lumber in each end. I have not been able to find any solution of this problem in subsequent issues, and therefore it may not be without interest to call it up at this time. As nearly as I can figure it, the line would come 42¾ inches from the large end. Is this correct? I know of no rule by which to work out the problem exactly.

Note.—We submit this problem and the answer proposed by our correspondent above for the consideration of our readers. Similar problems have been discussed advantageously to all concerned in the past, and the one which this correspondent brings to notice at this time grew out of another, but similar, one, stated in somewhat different terms, which was discussed in our columns shortly before the date named. We should be glad to have this correspondent indicate the method by which he reached the conclusion above, and this leads us to request those who may write to us on this subject in the future to explain in every case the methods by which their results are reached. There are different methods by which this problem may be solved, and we shall be glad to have as many as possible of them for publication. Here is a nut for our mathematically inclined readers to crack. We prefer the discussion here invited to answering our correspondent's question direct. It will be of greater interest.

Trade vs. Profession.

From SHIRLEY DARE.—I presume many of the readers of *Carpentry and Building* have noticed what Mrs. Van Rennselaer has written in the August issue of *The Century Magazine* on the subject of recent American architecture. On page 512 the statement is made that "it is only recently that such works have been confided to hands more skillful than ordinary builders"—that is, without architectural interference. It is hard for me to see anything in the pseudo-classic warehouse illustrated in that article which any common carpenter might not have planned and built. It would be for the benefit and dignity of building if the so-called trade and the profession of architecture were combined in one person. Will not *Carpentry and Building* make this felt? The absurd distinction between trade and profession has lasted long enough. For 50 years the aim has been to push the trades into professions, to lift men out of the trades into the ranks of designers, artists, &c. The true way is to bring information and taste into the trades and make them as much at home in the shop as in the studio. This was the way of the great ages when art set copies for the world to follow. We never will have art again until the same hand wields both the pencil and the working tool.

Note.—Our correspondent raises a question about which it will be well for all thinking men in both the trades and professions connected with building to ponder carefully. While it is true that the tendency of the past has been to separate the trades and professions, in some cases elevating the latter to the disparagement of the former, it is also true that at the present time many agencies are at work calculated in some measure to counteract this. Every school of design which mechanics attend, and every system of practical instruction which is introduced into our common schools gives the artisan more knowledge of art and also greater familiarity with the higher branches of his craft. We are not prepared, by any means, to advocate the abolishment of the professions, but we do advocate the best possible education for mechanics and artisans. If by this means mechanics are enabled to do what heretofore professional men have done, there will still remain higher planes on which the professional man may stand, and where his usefulness will be found greater than at present. He will simply be required to step up. We publish in another portion of this issue an extract from an article in a recent number of the *Contemporary Review* which in some measure discusses the same point. It contrasts mechanics and architects in a way to afford thought for all who are interested in this subject. We commend it to the careful attention of our readers.



Second Floor Plan, with Indications of Roof Lines.—Scale, $\frac{1}{16}$ Inch to the Foot.

In Wind and Out of Wind.

From O. L. C., *Newton, Mass.*—In answer to the inquiry proposed by "S. F. G." in the July number, I would say that when a door strikes the jamb at all points it is "out of wind;" otherwise it is "in wind" or "winding."

Grinding Tools.

From E. C. N., *St. Catherines, Ontario.*—In reference to grinding tools, I would say I was always taught to revolve the stone toward the edge of the tool. My experience is that this plan makes a truer and better cutting edge.

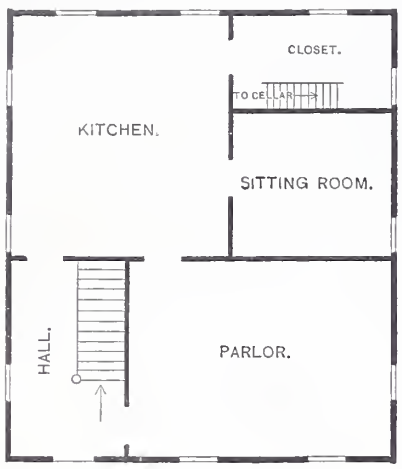
From S. G. F., *Nantucket, Mass.*—An emery-wheel will draw the temper from a plane iron, owing to the friction, unless the person grinding the tool is very careful and is accustomed to grinding with an emery-wheel, and accordingly knows how to manage his work. In using a grindstone turning from you there is less water on the tool than when used in the opposite direction; accordingly, there is danger in this case of the temper being drawn. There is much less danger if the stone is used so that the water runs up on the tool.

REFERRED TO OUR READERS.

Planning a House.

From J. H. L., *Zion's Grove, Pa.*—I inclose a plan of a house for the inspection of readers of *Carpentry and Building*. I would like to learn through the paper a convenient size adapted to this plan—all constructed under one roof.

Note.—We take it from our correspondent's question above that he has devised the arrangement of rooms indicated in the ac-

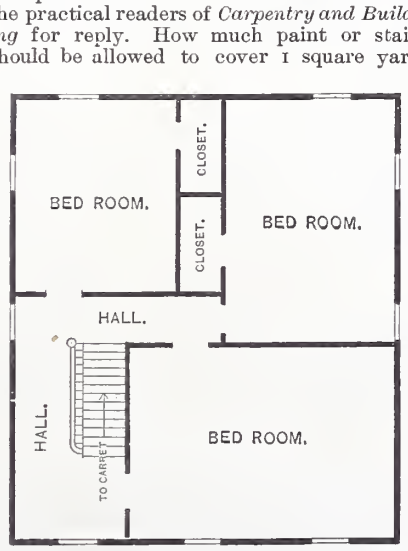


J H. L.'s House Plan.—First Floor.—No Scale.

companying plan without much regard to dimensions. What he desires now is to see this general arrangement maintained, the rooms properly proportioned, and the whole got under a single roof. The problem thus presented is one somewhat different from those ordinarily submitted to builders, although it is not unlike what architects occasionally encounter in dealing with their clients. We shall be glad to have our practical readers consider this question and forward such suggestions as to them may seem likely to be of service to the correspondent.

Floor Stains and Paints

From S. D. P., *Walnut Hills, Mass.*—I have several questions relating to floor stains and paints which I would like to submit to the practical readers of *Carpentry and Building* for reply. How much paint or stain should be allowed to cover 1 square yard



Second Floor.—No Scale.

of woodwork? How is the walnut-brown, glossy finish given to modern flooring, such as is frequently seen in hotel corridors? I know that these are painted, yet they look well with constant wear and cleaning. I had a kitchen floor once so finished, and it wore better than any other I ever saw. The material of the floor was a poor grade of spruce at that. I would like to learn what the ingredients of this finish are, and how it is applied.

I have a kitchen floor, the material of which is said to be of hard pine, which greatly interferes with my usefulness. It takes endless time and strength to keep it in good condition. It is too much slavery for a servant to keep it scoured white, and it disturbs my comfort in the library to know that things are not speckless and trim in the furthest corner of my dominions. I set out to have a stained walnut-brown floor like the one just described above. I bought cans of walnut stain and polish from the best Boston dealers. I put on coat after coat, dried carefully, and then all I had to do was to wait with what patience I could until it would wear off enough to paint over again. One time we tried yellow, thick, ready-mixed paint. We have tried it in oil and in varnish, three and four coats. They last as long as it takes the painter to put them on. It will not clean, and soil clings to the surface; nothing less than a solution of potash and water will clean it. Soap and water are of no use. The weak potash seemed to harden and fix the paint where the least wear came, but in the middle of the floor there was a bare place in a fortnight. An old painter says the floor is of hard pine, and, accordingly, will not take paint; that nothing can be done with it but to oil it. I hate an oiled floor as something that always looks between clean and dirty. It is neither the white boards scoured in good old-fashioned style with soap and sand, nor the comfortable yellow of old kitchens that wore three years at a time. Neither is it the dark-brown polish of modern kitchens, easy to keep clean and pleasing to see. My question is: What can be done with the floor I have described? The painters in this vicinity give it up. The floor was used for three years without paint of any kind before we occupied the house. At that time it was in excellent condition.

Another question I also desire to propose. Is there any method of darkening the color of mahogany, say, 20 to 50 years old? I want some tables repolished and would like the tone of the wood very much darker than the new surface will be. How can a true mahogany color be given to an old maple secretary? The only mahogany stain with which I am acquainted is too red for the purpose.

TRADE PUBLICATIONS.

J. G. & J. F. Low,

of Chelsea, Mass., manufacturers of the famous Chelsea tiles, which have of late taken so prominent a place in stove decoration and for so many other ornamental purposes, send us a very beautiful catalogue, probably the handsomest thing of the kind ever issued. The cover is simply charming, being an artotype reproduction of a modeled panel in which every detail of the sketch in clay has been preserved with more than photographic fidelity. There are 30 artotype plates, including the frontispiece, which represents a tile mantel in the store of Wellington & Burridge, of Boston. The other 29 pages of plates are devoted to illustrations in red, black, blue, green and brown of the varied products of the Chelsea Tile Works, including everything from the smallest size of tiles up to the most ambitious pieces ever attempted in dust. It would be impossible to describe these tiles in detail. They relate very largely to mantel-work, and are probably far superior to anything of their kind ever before produced. Plate 17 show a tile mantel complete from floor to ceiling, and is a piece of surprising beauty. The book is one over which an appreciative person could spend many pleasant hours, and as every piece shown is up to the very highest standard of art in design and finish, according to the use for which it is intended, there is no room for critical remark. The book itself is a work of art from beginning to end. Mr. Caryl Coleman, of No. 9 East Seventeenth street, represents the Chelsea tiles in New York, and we know of no place in the city which better repays a visit than his charming rooms and those of Mr. De Forest Lockwood, on the floor above.

Wood-Working Machinery.

We have received from the S. A. Woods Machine Company, whose New York office is at 91 Liberty street, with works at South Boston, Mass., a copy of their new catalogue of improved planing and molding machinery. In addition to the New York office above mentioned, this company maintain machinery warerooms at 172 High street, Boston, and 61 South Canal street, Boston. The catalogue is a quarto in size and contains 56 pages of highly-calendered tinted paper, on which the designs and letter-press of the work are neatly printed in a dark-blue ink. The opening chapter is devoted to an explanation of the methods of construction employed by this company, with explanatory diagrams. Various parts of the machines shown in the latter portion of the book are here illustrated and explained, and the reader is made so familiar with them as to be able to detect their presence and recognize other advantages when combined in the machines. The principal portion of the book is devoted to large and very clear illustrations of the various machines made by this company. Each design is accompanied by full particulars requisite for reading, and brief descriptive letter-press. Page 23 is devoted to an illustration of an improved method of working moldings by which an important saving of stock is effected. The machines shown in this work are arranged in classes, and so carefully has the letter-press been prepared that it is really a treatise on the construction and management of modern wood-working machinery. Several pages at the close of the book are devoted to a list of persons and firms who have purchased and are using machinery made by this company.

TRADE NOTES.

Messrs. Knisely & Miller, 129 and 131 South Clinton st., Chicago, have recently issued a catalogue of galvanized-iron cornices and other architectural sheet-metal trimmings, fire-proof floors, iron lath, tin, iron and slate roofing and other specialties, which is of great interest to builders generally. It is addressed to the building trade of the Northwest. The book contains 112 pages, exclusive of cover, and some 23 full-page plates of prominent buildings in the vicinity of Chicago and elsewhere on which work of this firm has been placed. The catalogue is by far the most important addition to the literature of this line of manufacture that has recently appeared. Builders will serve their own interest by obtaining it.

Messrs. Bakewell & Mullins, of Salem, Ohio, have recently issued the fourth edition of their book entitled "Designs of Architectural Ornaments." The work contains 148 pages, and presents the most complete assortment of architectural sheet-metal ornaments ever gathered within the covers of a single volume. Almost every variety of ornamentation that is adapted for manufacturing out of sheet metal is shown in it. Allegorical and emblematic signs, sheet-metal statuary, capitals, finials and conventional ornaments of various kinds are included in it. No builder or architect should fail to have this work in his library. It is sent free to all applicants.

Messrs. J. B. Shannon & Sons, 1020 Market street, Philadelphia, have issued a new edition of their illustrated catalogue of art metal work and builders' hardware of their own manufacture. This catalogue is No. 28 of the pamphlets for popular distribution which this firm have published. Its contents are fully indicated by the title. It contains no less than 168 pages measuring 7 x 11 inches in size. The designs of cabinet hardware, art metal work and various other goods shown in it are such as are not ordinarily encountered in catalogues issued for builders' use, and include goods not commonly kept by the regular hardware stores. The book accordingly becomes of value to all who desire to be thoroughly posted upon what is available in the way of goods of this character. It is sent free to all applicants, and forms a desirable volume for reference, both for architects and builders.

The total production of the marble quarries of Carrara last year was 173,593 tons of which 115,644 tons were rough blocks and 57,949 tons sawn or worked.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

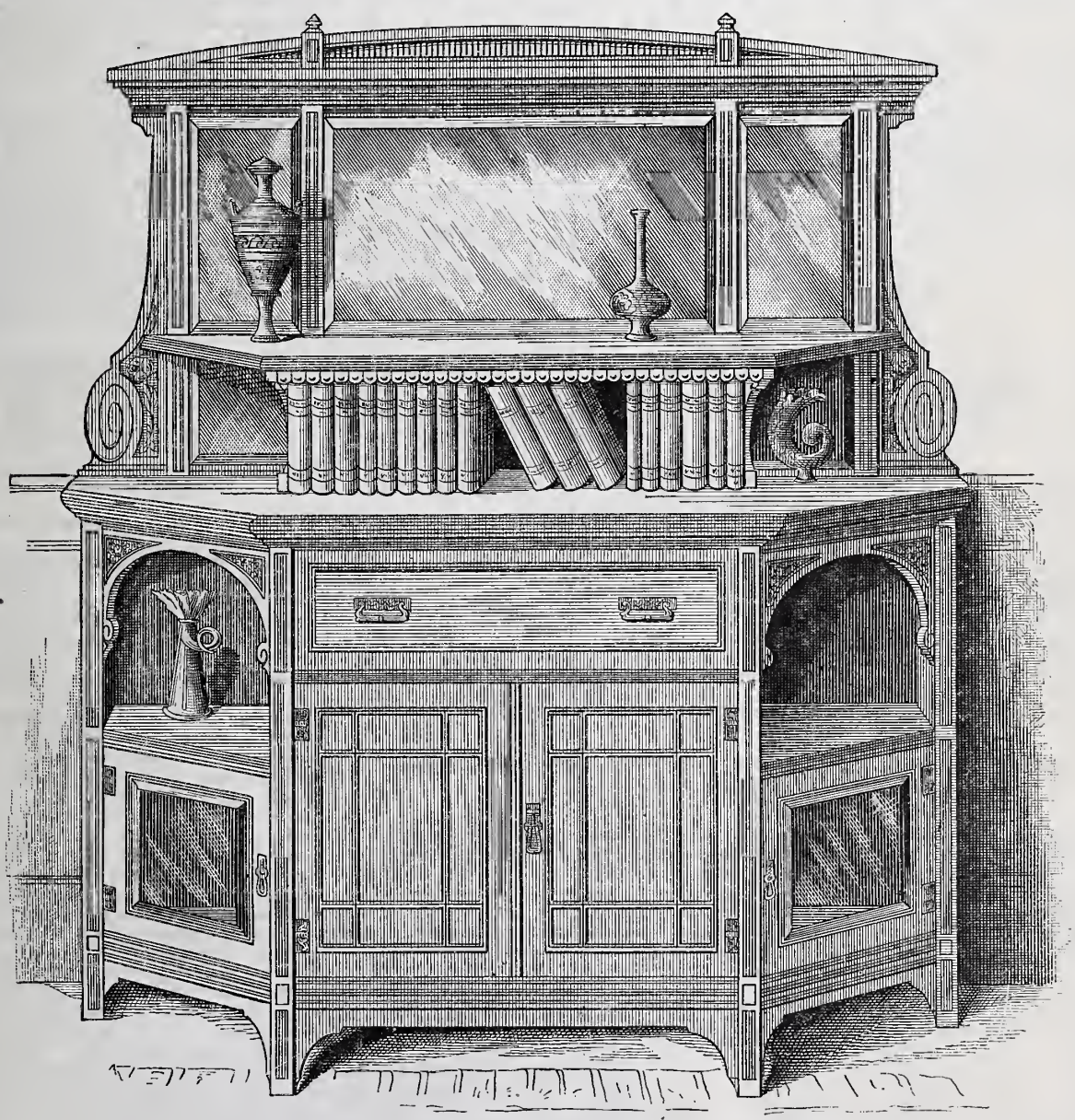
VOLUME VI. NEW YORK—NOVEMBER, 1884. NUMBER 11

Secretary Sideboard.

The amateur cabinet-makers among our readers, we think, will be pleased with the accompanying design and details of a secretary sideboard in the Queen Anne style. In houses where there is no library, most of the writing is transacted in the dining-room, upon a writing-table inconveniently placed. It frequently happens that when the purse of the householder will permit the addition of a writing-table the small dimensions of his dining-room prohibit the introduction of extra furniture. The design herewith is just the article to meet the wants of such a case, for it will be readily seen that it combines more useful attributes than a mere sideboard. The secretary drawer and shelf above add to the uses and conveniences of both a bookcase and an escritoire, while the present taste for the display of bric-à-brac is equally considered. Having introduced the design, let us explain how to make it:

Before proceeding even to select the wood, the workman should prepare his full-sized drawings, and fairly consider and understand the job he is about to construct. In some shops this is done by the working foreman, but every competent man should be able to strike out his job from such sketches as are annexed. It will be seen that there is very little carving about our secretary sideboard, but what there is should be sketched out upon a separate piece of paper, along with the pattern for the turned knobs on the top.

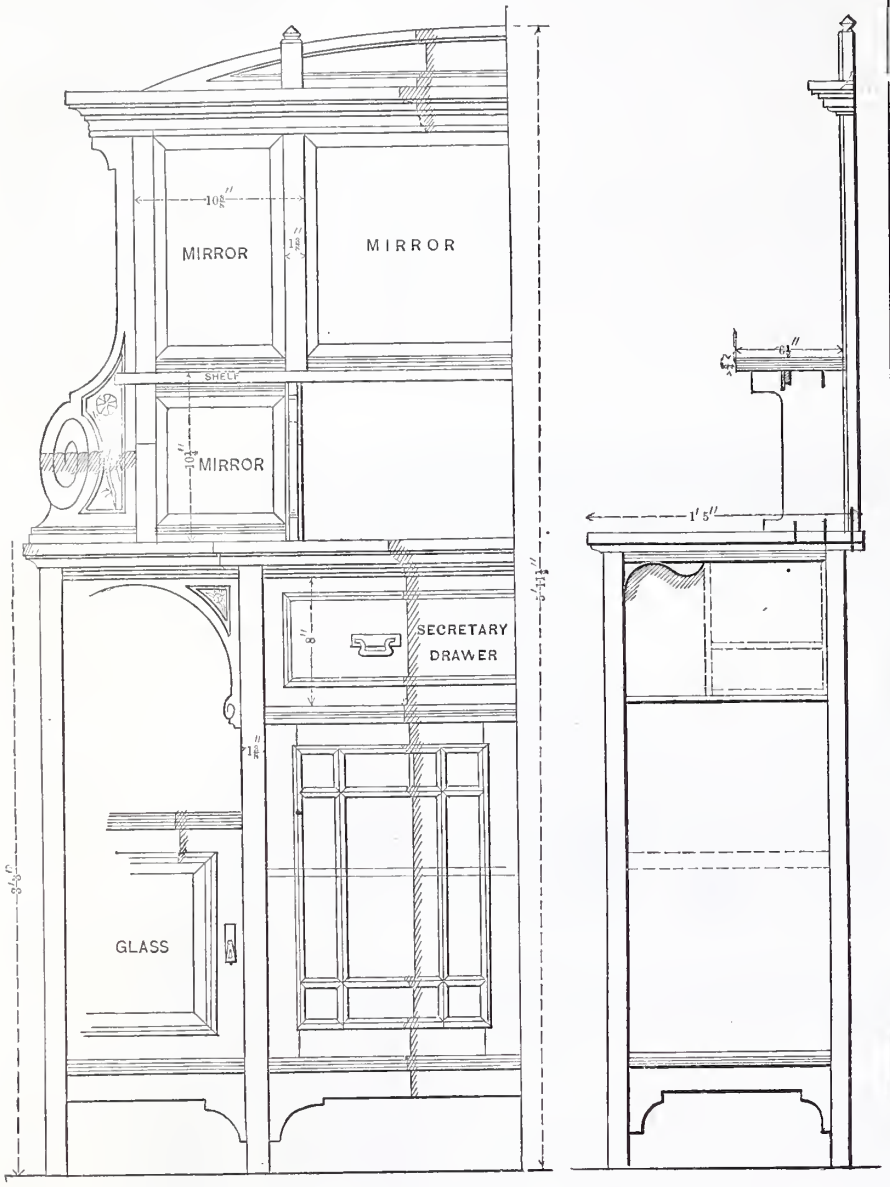
The cabinet-maker should now carefully take the measurements from his working drawings and proceed to select the wood. The top, door framing, shelves, drawer-front and top pediment, the end scroll brackets, bracket over doors at end, plinth lining and bottom carcass should be out of 1-inch stuff before being worked. The uprights 1½-inch, "to hold" 1⅜-inch when finished. Partition ends ¾ inch, and moldings for drawer fronts and doors ⅜ inch, to hold ¼ inch when worked. The facings for the top uprights will also be out of ⅜-inch stuff, to hold ¼ inch when finished. Pine may be used for drawer bottom and back framing. Now cut up the wood to the desired lengths, care being taken to be exact to the working drawings. In cutting the bottom carcass and top, the two should be marked out upon the same board and the pattern reversed, so as to save wood. Now prepare the bottom uprights to receive the partition rail under the secretary drawer, which being done, the two ends should be



SECRETARY SIDEBOARD IN THE QUEEN ANNE STYLE.

(*For Elevations and Sections, See Next Page.*)

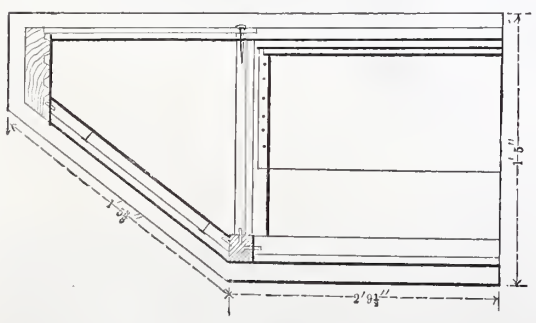
got ready to receive shelf over end cup boards. Then dowel the partition ends to uprights and fix the brackets and plinth lining. As far as the job has proceeded, fit it together with the top and bottom carcass, and get the doors and door framings ready. Now put on the top and mark it round for the molding, leaving 1 inch over-



Secretary Sideboard.—Half Elevation and Vertical Cross-Section.—Scale, 1 Inch to the Foot.

hanging at the back to screw the top to, as shown in the sectional view. After working the moldings of the top and lining, screw it on and finish.

The drawer is the next thing to be made. First of all, get out the sides, fit them in, and work rabbets to receive the top and bottom. After having fitted these, cut the



Half Plan of Top of Sideboard.

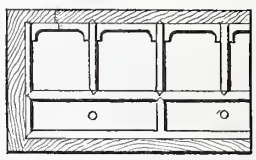
partitions for secretary drawer, as shown in the horizontal section, and fit them. It is presumed that the top part has meanwhile been gradually proceeded with, the frame being of pine, tenoned together, and faced with ½-inch hardwood to form uprights, and ⅜ inch between uprights in order to leave a slight recess. The cornice, made of three separate lengths, should be glued on to the facings; and the pediment, made in three pieces, should be screwed into the framing, as shown in the sectional sketch. The side scroll brackets, which will end under the cornice, must be doweled into the ends of the uprights and screwed into position from under the top. The shelf rests upon two brackets, which are doweled into the uprights and top, and the facings must be cut away to admit of the shelf, which will be screwed from the back.

When everything has proceeded thus far, a general inspection is advisable before finishing. After fitting the locks and hinges and adding the other brasswork, the job will be ready for the polisher. The sizes marked upon the drawing will guide the workman in making his full-size working drawings. The selection of wood for such an article is practically unlimited. Black walnut or mahogany stained dark are, perhaps, most suitable; but there is no reason why oak or ash should not be employed. We need hardly say that a little carving inserted in the small panels of the doors would be an improvement, and the drawer front also affords opportunity for enrichment. We have purposely omitted such additions in order to make the article strictly economical.

The Best Paint for Iron Roofs.

Since iron roofs depend for their durability upon the paint with which they are coated, the question of the best paint for them becames a matter of great importance. Few experiments have been recorded which have been undertaken with special reference to roofing made of thin plates, but the results of tests made with iron-bridge work and in other similar places show the direction in which the best coating for roofing is to be obtained,

The value of red lead as a preservative for iron has been generally accepted. Wrought iron requires a hard and elastic paint, which will hold itself together even if the scale beneath gives way. The following experiments, made under the auspices of the Dutch State railroads, may be instructive. Iron plates were prepared for painting as follows: Sixteen plates pickled in acid (hydrochloric), then neutralized with lime (slaked), rinsed in hot water, and, while warm, rubbed with oil. The same number of plates were cleared of scale, so far as it could be removed by brushing and scraping. Four plates from each set were then painted alike—namely, four plates with coal tar and four plates with iron oxide A, another set with iron oxide B, and the remaining set with red lead. They were then exposed three years, and the results observed were as follows: The coal-tar on the scrubbed plates were quite gone, that put on the pickled plates was inferior to the others. The iron oxide A on the scrubbed plates was inferior to the other two, while on the pickeled plate it held well; the oxide B was found superior to that of A, but inferior to red led, while the plates covered with red lead stood equally well on both prepared plates, and were superior to all others. From these results it is evident that pickling the iron removes all



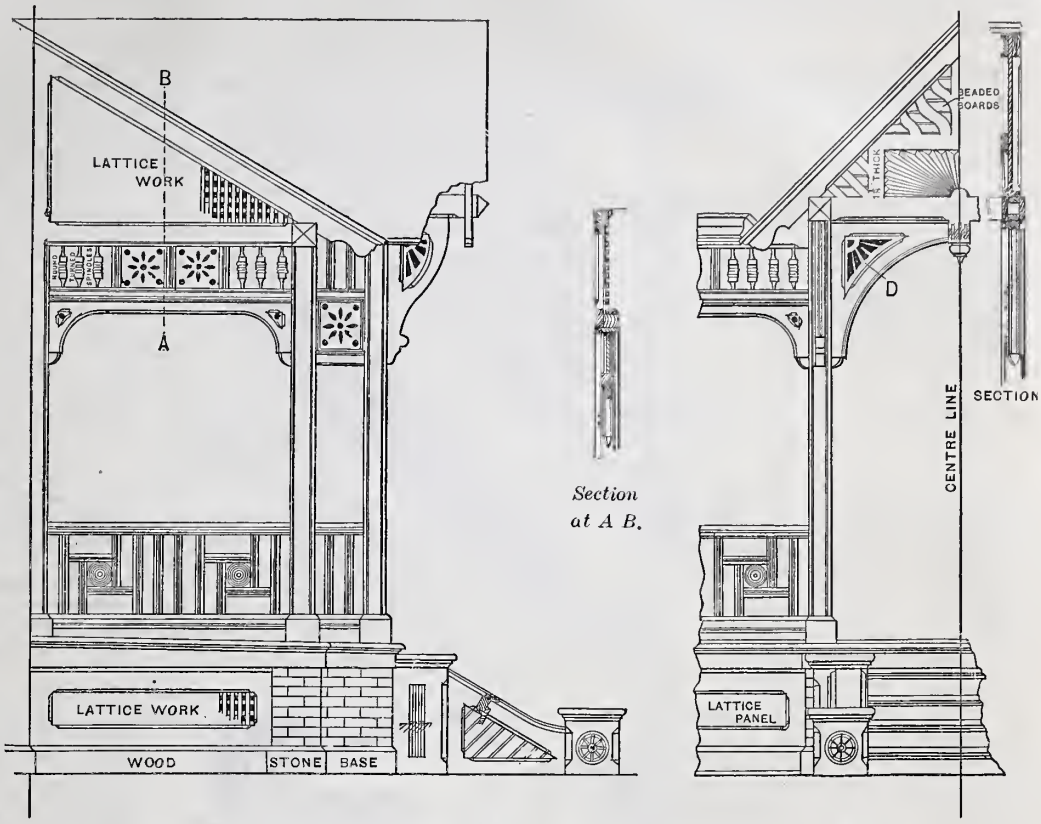
Details of Pigeon Holes in Secretary Drawer.

the black oxide, while scrubbing does not. It is also shown that the red lead unites with oil to form a hard oxy-linseed-oil acid soap—a harder soap than that given by any other combination. The red lead is shown by these experiments not to give way under the scaling; it is more adherent to the surface, more elastic and cohesive.

On the Cincinnati Southern Railroad, experience extending over some years has shown that red lead has proved the most durable paint in the many miles of iron trestle and bridge work. It is found that the iron oxide is washed away by the rain, and perishes in spots, although a valuable paint if frequently renewed. Red lead, on the other hand, is more expensive than iron oxide, and is difficult to be obtained pure. It is adulterated with brick dust, colcothar and other substances, and has lost its high repute. Referring to white lead as a material for painting iron, one authority observes that "white lead should not, if possible, be used in priming iron nor in any priming coat; moreover, it is a less desirable overcoat than iron oxide." The class of iron paints compounded of ores of natural iron rust combined with clay or some other form of silica are very useful, as they contain no water nor sulphuric acid. Magnetic oxide or pure iron oxide is an excellent protection for iron, says one writer; it is impossible to scrape it off. It is also of value in woodwork, and resists the action of salt water and sulphurous gases, so destructive to most paints. There is no doubt the great protective element in paint is the oil, and the conditions required for success are stated to be to prevent the drying part of the oil from becoming hard and dry; the soft-keeping, non-drying acids must be kept from flying away in such a quantity as to reduce the oil to a brittle mass. In other words, the elastic qualities of the oil must be protected from the action of the oxygen.

To Clean Marble.

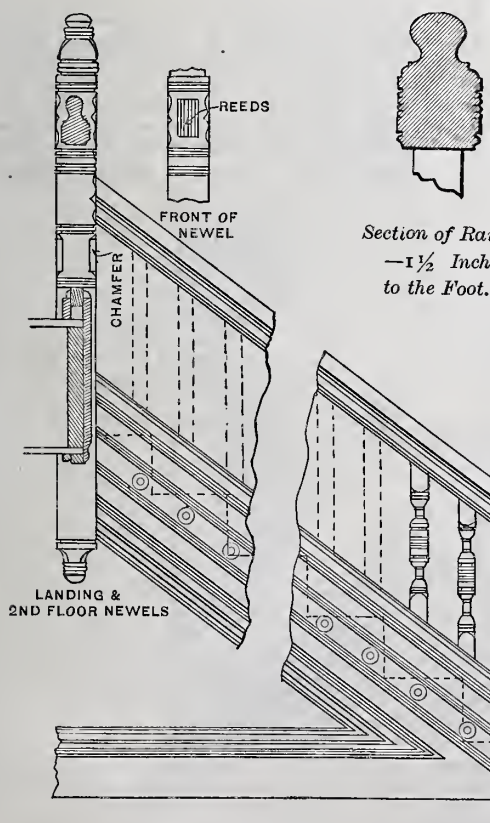
Brush the dust off with a piece of chamois, then apply with a brush a good coat of gum arabic, about the consistency of thick mucilage; expose it to the sun or wind to dry. In a short time it will peel off. If all the gum should not peel of, wash it with clean water and a clean cloth. If the first application does not have the desired effect it should be tried again. Another method is to rub the marble with the following solution: One-quarter of a pound of soft soap, one-quarter of a pound of whiting, and one ounce of soda and a piece of stone-blue the size of a walnut; rub it over the marble with a piece of flannel, and leave it on for 24 hours, then wash it off with clean water, and polish the marble with a piece of flannel or an old piece of felt; or take two parts of common soda, one part of pumice-stone, and one part of finely-powdered chalk, sift it through a fine sieve and mix it with water, then rub it well over the marble, then wash the marble over with soap and water. To take stains out of white marble, take one ounce of ox-gall, one gill of lye, one and one-half tablespoonfuls of turpentine; mix and make into a paste with pipe-clay; put on the paste over the stain and let it remain for several days. To remove oil stains apply common clay saturated with benzine. If the grease has remained in long the polish will be injured, but the stain will be removed. Iron-mold or ink spots may be taken out in the following manner: Take half an ounce of butter of antimony and one ounce of oxalic acid and dissolve them in one pint of rain-water; add enough flour to bring the mixture to a proper consistency. Lay it evenly on the stained part with a brush, and, after it has remained for a few days, wash it off and repeat the process if the stain be not wholly removed.



Seven-Room House in Brick.—Front Porch.—Scale, ¼ Inch to the Foot.

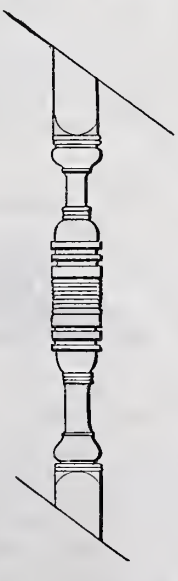
Seven-Room House in Brick.

In our issue for last month we presented the perspective view, elevations and a part of the details of the design submitted by Mr. H. L. Campbell, of Buffalo, N. Y., in our Twelfth Competition, and to which was awarded the third prize. We now complete the publication of Mr. Campbell's details. Those which are shown herewith relate for the most part to wood finish, both interior and exterior. The ones that were published last month had to do more particularly with the brickwork. As we remarked at that time, the design has been carefully considered in all its parts, and will no doubt be found very valuable to many of our readers.



Elevation of Stairs, Newel, &c.—Scale, ½ Inch to the Foot.

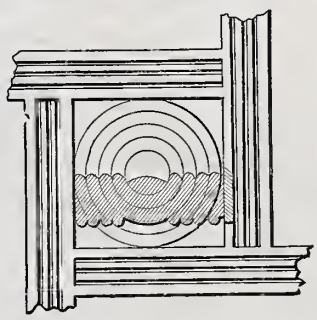
Section of Rail.—1½ Inches to the Foot.



Baluster.—1½ Inches to the Foot.

Fallacies in Regard to Ventilation.

A recent paper by Prof. Charles R. Dryer, of the Fort Wayne College of Medicine, gives some attention to popular fallacies with regard to ventilation. The paper, though addressed to the medical profession, is of interest to all who have anything to do with construction relating to ventilation, or who desire to properly arrange their own houses. We present it as it reaches us, without comment:

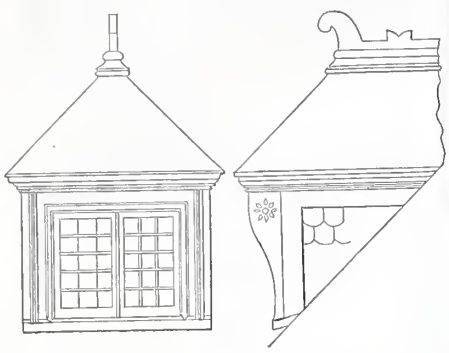


Section of Rosettes in Balustrade of Front Porch.—Scale, 1½ Inches to the Foot.

The first and great popular fallacy in regard to ventilation is that it needs no special attention.—This is a more serious error among the well-to-do than among the poorer classes, inasmuch as the houses of the former are more nearly air-tight. With solid brick walls, double sashed windows, weather-stripped doors, and a base-burning coal stove, the exclusion of pure air is carried to the utmost extent. This condition is happily somewhat relieved by the use of open coal grates. But how many fine houses does the physician enter without noticing the close, foul odor and the stifling air which come from overheating and poor ventilation? In such rooms he finds nervous, headachy women and pale, irritable children suffering

Sections of Rails.—Front Porch.—1½-Inch Scale.

from colds the winter through. Such families need judicious instruction that respired air contains one of the most virulent poisons known, and that dry and overheated air is de-



Seven-Room House in Brick.—Details of Dormer.—Scale, ¼ Inch to the Foot.

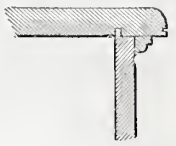
bilitating and irritating, leaving the mucous membranes sensitive, to be inflamed by every breath of the natural atmosphere.

The second popular fallacy is that the poison of respired air is carbonic acid.—This is an example of superstition, or the "survival" in science of an idea long after it has been proved to be false. It is perpetuated in school text-books and popular treatises innumerable. Indeed, correctness of statement upon the subject is the rare exception, gross error the rule. Carbonic-acid gas is no more poisonous than water; animals immersed in it die just as they do if immersed in water, and for the same reason, viz., want of oxygen. Birds have been made to live in an atmosphere containing 35 to 40 per cent. of pure carbonic acid and about an equal per cent. of oxygen. Yet when the carbonic acid of respired air rises to 1 per cent., that air is a very dangerous poison.

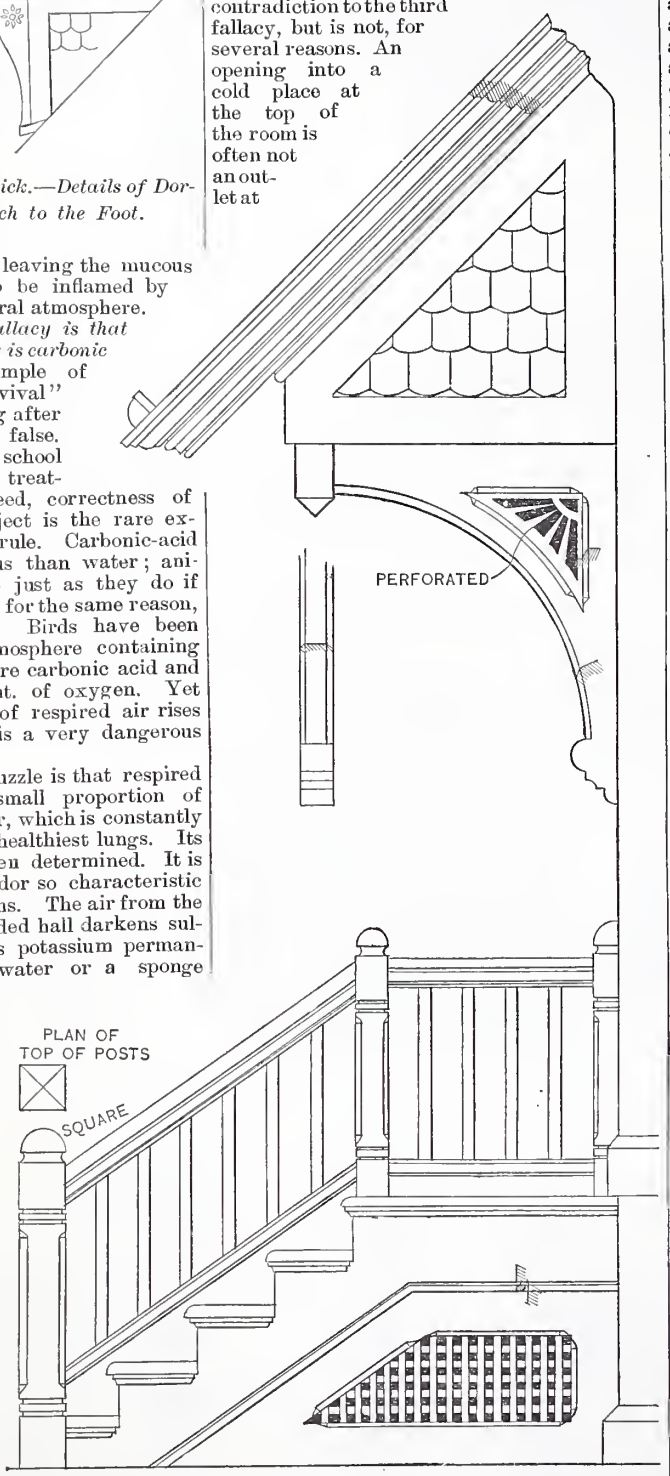
The solution of this puzzle is that respired air contains a very small proportion of poisonous organic matter, which is constantly exhaled from even the healthiest lungs. Its exact nature has not been determined. It is the source of the foul odor so characteristic of badly-ventilated rooms. The air from the exit of pipes of a crowded hall darkens sulphuric acid, decolorizes potassium permanganate, and causes water or a sponge saturated with it to putrefy. This poisonous matter is produced in quantities proportionate to the amount of carbonic acid; hence the quantity of the latter is an indicator of the relative quantity of the power, and carbonic acid should never be allowed to accumulate in occupied rooms to the extent of $\frac{7}{10}$ of 1 per cent.

The third popular fallacy is that the most impure air accumulates near the floor of the room.—This false idea has probably arisen from the fact that carbonic acid is more than half as heavy again as air, and can be poured from one dish to another like water. Although this is true when both gases are at the same temperature, a very little difference of temperature is sufficient to reverse these conditions. Respired air issues from the nostrils at a temperature of nearly 100° F., and is lighter than the outer air at 70° or at 80°. Again, the temperature of the body is nearly 100°, usually much above that of the surrounding air. This is sufficient to create an upward current, rising from the body of every person in the room, just as the heated air rises above a hot stove. If to these influences be added the more powerful action of a stove, register or other heating apparatus, it will be understood how the impure air rises and accumulates very rapidly near the ceiling. This can be easily proved by experiment, such as placing candles at various hights; the upper one will burn much more dimly than the lower. At the same time the cooler air on the floor moves toward the stove to enter it or to join the current rising from it.

The fourth popular fallacy is that the outlet for impure air is best placed at the top of the room, and the inlet for pure air at the bottom.—This may seem a contradiction to the third fallacy, but is not, for several reasons. An opening into a cold place at the top of the room is often not an outlet at all, but simply allows cold air to drop down into the room. If it be an outlet, it is very wasteful of heat. The air of the room is heated at some expense and then turned out of doors as soon as possible. If the inlet be near the floor, there will be a cold draft upon the feet of the occupants of the room, and, although such an arrangement may ventilate, it will be attended with such disadvantages as to render it highly objectionable. Wherever possible, there should be an outlet near the floor into a heated flue, in which the upward draft is sufficient to constantly draw the cooler air of the floor. An open-fire flue is the most efficient outlet that can be devised. Instead of that, a direct-draft stove in which a door above the fire may be opened answers the purpose admirably. The inlet may be for pure heated air through a register near the floor on the opposite side of the room from the outlet, or for pure cold air by an opening directed upward behind the stove and above the heads of the occupants of the room. Thus all cold drafts will be avoided, the pure cold air will mingle immediately with the impure air near the ceiling, and the room will be equably and economically warmed and efficiently ventilated. June air may be had in January, and the children will be as merry and rosy as the street children, who have nothing but oxygen to make them merry.

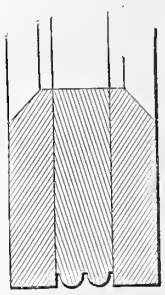


Nosing of Stairs.—(See Preceding Page.) Scale, 1½ Inches to the Foot.



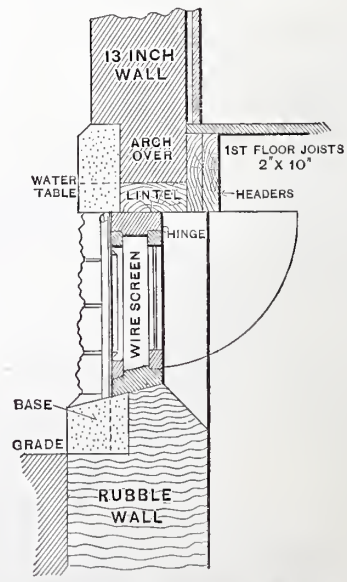
Details of Rear Steps and Hood.—Scale, ½ Inch to the Foot.

The first paper floor ever laid has recently been completed in the new rink on North Pennsylvania street, in Indianapolis. This floor is made by pasting and pressing straw boards together under a powerful hydraulic press in the same way as the disks of the paper car-wheels are made. When these blocks are perfectly seasoned and dried, they are sawed up into flooring boards, and laid with the edge of the paper forming the surface of the floor. This surface is sandpapered until it is as smooth as one vast sheet of ice, and the adhesive quality of the paper prevents any slipping of the roller upon the floor. The floor is without joints, perfectly smooth and comparatively noiseless.



Section of Bracket at D, Front Porch. (See Preceding Page.)—Scale, 1½ Inches to the Foot.

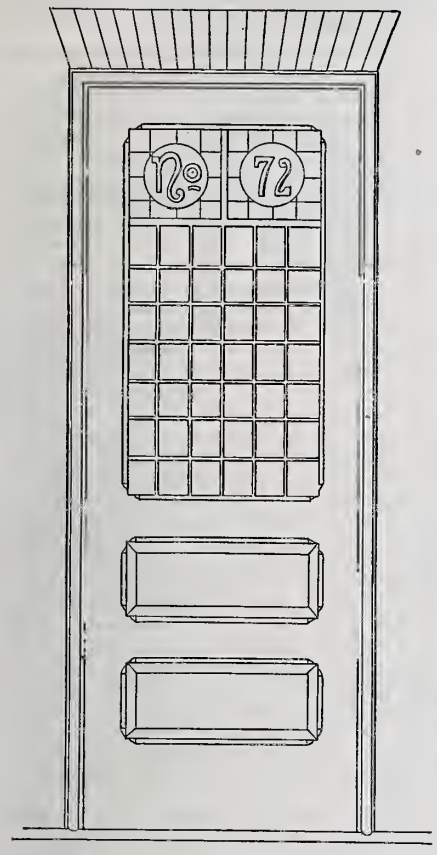
A recent writer, in comparing native cherry with some of the imported fancy woods, remarks that cherry wood filled and not varnished has a soft glow not possessed by any other, and has none of those distortions of grain that are so unpleasant in mahogany. The wild cherry of the New England States does not usually obtain a growth of more than 20 inches girt. In some of the Western States, however, and also in the South, it frequently obtains a diameter of 24 inches. The domestic fruit cherry gives some good specimens of timber, but as this tree is rarely sacrificed until it is past bearing and has become decayed, the source of supply is precarious.



Section Through Foundation Wall.—Scale, ½ Inch to the Foot.

Sound-Proof Construction.

The qualities which contribute toward making a fire-proof building, says an English exchange, are usually those which are best to prevent the passage of sound. A hollow floor of wood, for instance, is a very combustible as well as sound-making structure. If we ceil it we make it impervious to both to a certain degree; hence the value of

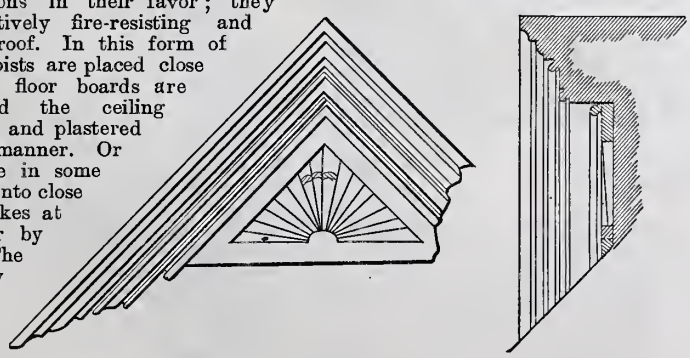


Seven-Room House in Brick.—Elevation of Front Door.—Scale, ½ Inch to the Foot.

plastering of some thickness if it can be executed without risk of cracking. For lodging-houses the absolute importance of both fire-proof and sound-proof floors and partitions need hardly be asserted, though it is unfortunate to admit that the class of property which is let in this way is the worst built and the most vulnerable, both as to the passage of fire and sound. Fire-proof floors are necessarily very costly unless constructed in the following simple manner—the complete immersion of iron bars of small section in concrete, the bars forming a kind of netting for the latter, which is laid upon a centering of boards at the ceiling level. It is not so generally known that solid wood floors have strong recommendations in their favor; they are comparatively fire-resisting and quite sound-proof. In this form of flooring the joists are placed close together, the floor boards are tongued, and the ceiling filleted, lathed and plastered in the usual manner. Or the joists are in some cases brought into close contact by spikes at intervals or by screw bolts. The spikes or screw bolts are placed about 18 inches apart and fixed alternately. Angular grooves run along the bottom edges of each joist, forming, when they are put together, a series of dovetail grooves, which provide a key to the plaster ceiling. Staircases are made in the same manner; the joists are, of course, cut to the triangular section of the steps and are in contact. These are spiked or screwed together, and, as each joist is cut square at the bottom and grooved, a good key is given to the plaster. They are fixed into walls in the same manner as stone staircases. For laborers' dwellings and hospitals a solid wood floor would combine all the necessary qualities of health and safety. There being no hollow spaces between the joists, into which all kinds of dust and filth often fall, one of the fruitful causes of infection would be removed. The occupants in lower rooms would not be disturbed by noisy tenants over them; while, if an infectious disease breaks out in one of the lower apartments, it would not be carried so easily to the dwellers above. Fire also would be arrested materially in its progress upward, if not entirely subdued by the solid floor. Here we have, therefore, (1) greater cleanliness, (2) freedom from noise, (3) less risk of infection spreading, (4) less risk of fire—four direct advantages of the solid floor which we do not obtain in the ordinary hollow construction. But architects have another, and in some cases simpler, method of rendering floors and partitions fire and sound proof. The application of silicate cotton or slag-wool is less general than its merits deserve. Silicate cotton is a pure mineral fiber manufactured from the slag of blast furnaces, and it can be made into sheets or packed into the spaces between the timbers, thus deadening sound and rendering floors and partitions fire and sound proof. Asbestos felt is also prepared for the purpose of fire-proofing and in checking the conduction of heat

Inside Finish of Windows in Parlor Hall and Dining-Room.

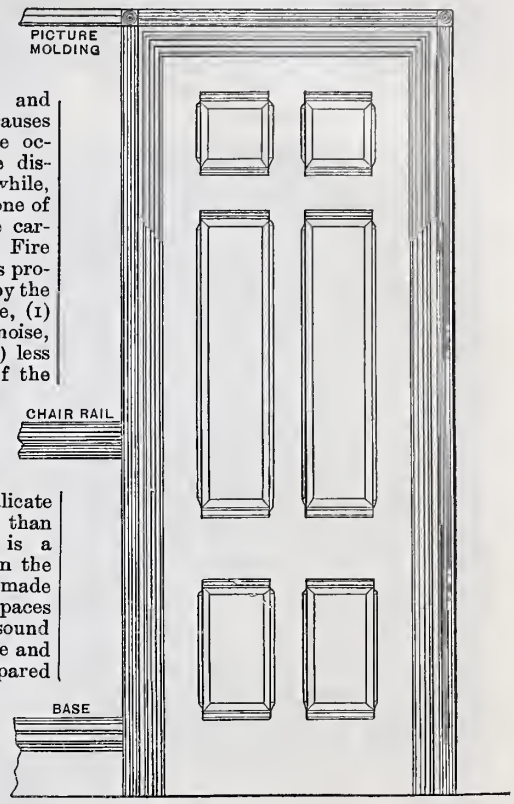
and cold. The felt can be laid between the flooring boards or studs,



Detail of Upper Front Gable.—Scale, ½ Inch to the Foot.

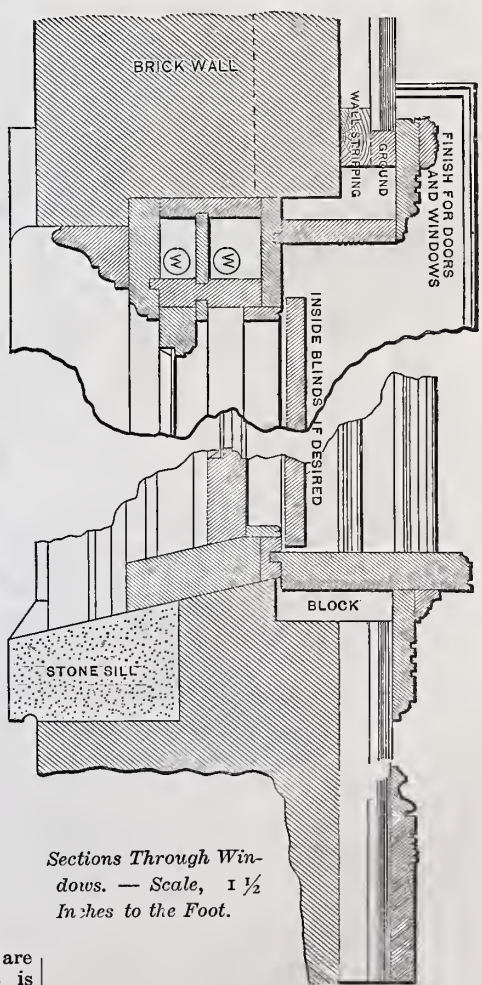
or on the ceiling or walls before they are plastered. Asbestos flooring and felt is manufactured for these purposes.

Of still more recent modes of deadening sound we may mention the use of reeds for ceilings instead of laths. The reeds are secured to strong wires in the shape of webbing, which is fixed to the underside of the joists. The reeds are close, or nearly so, just sufficient space between them being allowed to form a key for the plaster. The plaster



Doors in First Story.—Scale, ½ Inch to the Foot.

is then put on in the usual coats. These ceilings are said not to crack, as in the case of shrinkage of laths; they are easily and



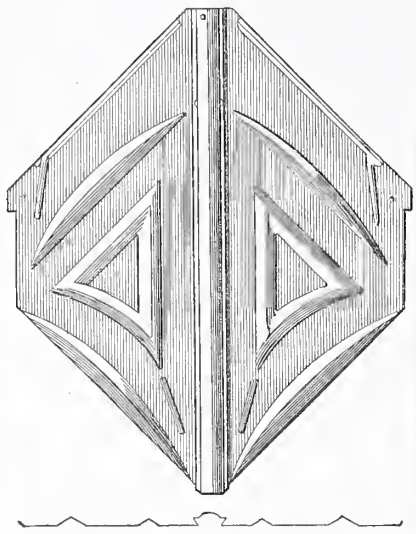
Sections Through Windows. — Scale, 1 ½ Inches to the Foot.

rapidly fixed, and are recommended for floors subject to vibration. Then we have felt and the excellent "Willesden" paper,

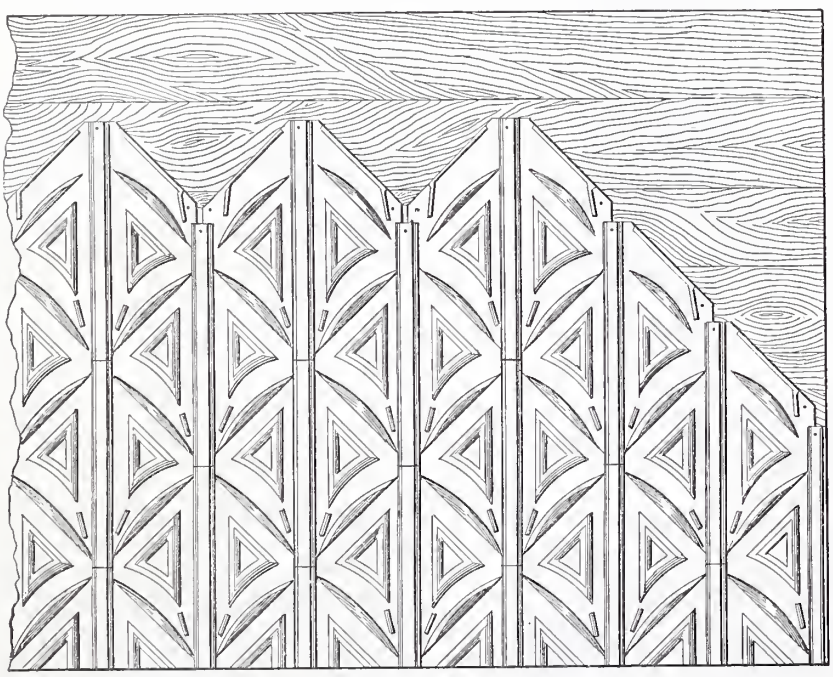
both admirable layers for floors and partitions, serving to deaden sound, and both non-conductors of heat and cold. We have here touched upon methods and materials which serve to arrest the passage of sound; but there are other modes of accomplishing the purpose by the judicious laying of timbers, their embedding in the walls, and the preparation of mortar with non-conducting substances like slag-wool or sawdust.

New Form of Tin Roofing.

We have already alluded to the importance of the fact that new forms of tin roofing are continually being brought to the attention of builders and roofers, and have remarked that for the future it will not do to speak of standing-seam and flat-seam tin roofs as the only distinctive kinds in the market. There is at least one other general kind now in very common use, and of this several different forms are before the public. It may be described as being composed of plates or shingles, in contradistinction to those coverings the parts constituting which are joined by soldering or double-seaming. The Anglo-American Roofing Company, whose office is at No. 22 Cliff street, New York City, are now offering a new form of this variety of tin roofing, which they designate as the "best tin roofing in the world." It is another candidate for favor among the so-called metallic shingles or tile. It possesses certain advantages over some of the forms that have preceded it, and is undoubtedly worthy of more than passing attention upon the part of all who are interested in roofing-work. The essential features of this roof may be gained from an inspection of the accompanying engravings. The first shows a single tile or shingle ⅛ full size. The shingle is struck up from 15 x 15 tin plate, and lays 12 x 12 inches to the weather. Accordingly, a hundred plates or shingles are sufficient to lay a square of 10 x 10 feet, or 100 square feet. This fact alone, inasmuch as it facilitates calculation of the amount of material required to cover a given space, will recommend this form of roofing in many directions. The second engraving shows the manner of laying these roofing plates. By reference to the section shown below Fig. 1, it will be seen that the central longitudinal rib is so formed as to present grooves at the sides. It is also tapering, the lower end measuring fully ⅛ inch in width more than the upper one. The plates are laid flat upon sheeting boards or upon lath, as the case may be, and are nailed through the flanges, as shown in the upper part of the second engraving. As each succeeding course is laid, the flanges through which the nails are driven are completely covered, while the ribs to which we have already referred slip down over the ends of those below, lapping them some 3 inches. Each of these ribs is nailed at the upper end, as shown in the engraving. The side flanges of the adjacent shingles come under the projecting edges of the center rib, and, therefore, as each course of shingles is put in place, by the lapping or dovetailing as above mentioned, the plates are held firmly together, and yet in such a way as to permit expansion and contraction freely in all directions. These plates are known to the trade as the D. T. Roofing Plates. The reason for calling them by that name is that the center rib of each plate is made as we have described, so that the one above laps over the one below, forming a dovetailed joint. By this means the plates are firmly held together, the under and over lapping plates being nailed to the roofing boards, as shown in the engraving. We understand from the manufacturers that these plates are being made from the best charcoal iron and coated with pure tin. The company are putting them upon the market made of bright instead of terne or leaded, plate, in the belief that pure tin coating provides a better protecting against oxidation than a lead coating. The same style of roofing plates is also manufactured in iron and finished by painting, also by kalameiniug. The Anglo-American Roofing Company are now establishing agencies for these shingles, and are arranging with but one party in place, thus making this form of roofing a leading specialty with those who take holdof it.



Elevation and Section of the D. T. Roofing Plate, ⅛ Full Size.



Section of a Roof Covered with the D. T. Roofing Plate, Made by the Anglo-American Roofing Company, New York.

NEW PUBLICATIONS.

LEFFEL'S HOUSE PLANS. Containing Elevations, Plans and Descriptions of Houses Costing from $500 to $3000, and Adapted to Families Having Good Taste and Moderate Means. Oblong, 12 x 8 inches, 224 pages, bound in cloth. Published by James Leffell & Co. Price, $2.

This, the latest additiou to the literature of cheap houses, has been issued by the publishers of the *Mechanical News*, a paper devoted to mechanical topics in general, and which discusses architectural subjects occasionally, by way of variety. In this volume are included the six prize plans received in a competition conducted by this journal a short time since. While there are many excellent features to commend in some of the other plans presented, the book, taken as a whole, cannot be considered as a very important addition to the large number of works of the same general character now before the public. There are numerous crudities about it that an experienced builder would at once detect, and the presence of which detracts greatly from the value of those portions which are of merit. The plates are accompanied by a brief description of the houses shown, with some particulars of the nature of specifications. The names of the authors for the most part are given, and in all cases the attempt is made to indicate the cost of the structure. Front and side elevations and floor plans comprise the usual assortment of drawings presented, although a few perspectives are introduced. With one or two exceptions, no attempt is made at details. Some of the designs in this work are of a character, we regret to say, that should have condemned their publication, and the building public should have been saved their infliction. Among these may be mentioned a two-story house supposed to cost $1250, and which appears on Plate 103 and following. In this design there is shown neither good architecture nor good construction, while the drawing of the different views is very bad indeed. The same remark will apply to the succeeding set of plates, representing a country house costing $1500, and to one or two others. The presence of such efforts indicates careless or incompetent editing, and throws distrust upon the book as a whole. It would seem that schoolboys should be able to do better than this without any special instruction, and why such plates are used to fill up the book, which would be far more satisfactory without them, is a question that we shall not attempt to answer. We might criticise several of the designs presented as being in styles that are long out of date, and which, were any one to try to build to them at the present time, would call upon him the ridicule of his neighbors. With these defects aside, the book contains some good plans aud elevations that will no doubt prove useful.

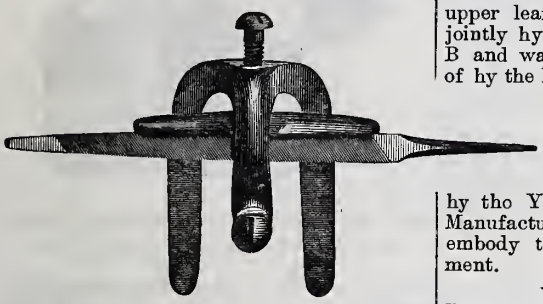
MODERN REPRODUCTIVE GRAPHIC PROCESSES. By Jas. S. Pettit. Size, 3¾ x 5¾ inches; 127 pages. Published by D. Van Nostrand. Price, 50 cents.

In view of the interest attached to the above subject and the rapid development which has characterized it within the last few years, Lieutenant Pettit's little work will prove a most welcome source of information. It was prepared for the use of the Department of Drawing of the United States Military Academy, as a basis for elementary instruction in, and with a view to the imparting of, some analytical knowledge of the means employed for the production of the numerous prints constantly brought before the public either in the publications of the day or in more artistic shape. Each subject could be expanded into a separate volume. Those within the reach of amateurs the author has endeavored to explain at length. The others can be learned only by long experience, and text-books would conseqently be of little assistance. The blue-print process, carbon prints, the various applications of photography, &c., are treated of at some length, aud we commend a careful perusal of the book to those in any way interested in this line of work.

NOVELTIES.

Rappleye's Saw Jointer.

We show in Fig. 1 a device known as Rappleye's improved saw jointer, which is made by F. A. Rappleye, Farmer Village, N. Y. The jointer is made of gray iron and japanned. Its general arrangement is easily understood from the illustration; it is very simple in construction, there being hut four parts in all, including screws. It is claimed to use equally well files of almost any shape—flat, square, triangular, round, half-round,



Novelties.—Fig. 1.—Rappleye's Saw Jointer.

&c. The adjustable cap is to hold the file so that it cannot be turned off to one side. As this article is hut 3 inches long, it occupies but little room in the tool-chest. Another point made in its favor is its cheapness. A larger size is made on suhstantially the same principle for jointing cross-cut and mill saws, with which a long, flat file is to he used.

A Steel-Bushed Loose-Joint Butt.

The Yale & Towne Manufacturing Company, of Stamford, Conn., and 62 Reade street, New York, have lately put on the market a loose-joint hutt of improved construction which they designate as "douhle steel-bushed," and which we illustrate in Fig. 2, The improvement consists in providing two bearing points in a loose-joint butt (which is as many as fast-joint butts of the usual sizes have), and also

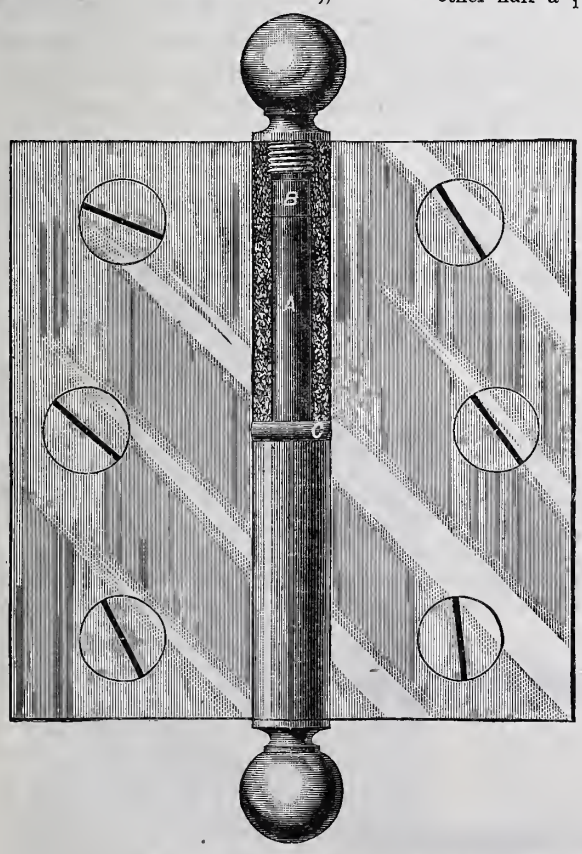


Fig. 2.—Yale & Towne Mfg. Co.'s Double Steel-Bushed Loose-Joint Butt.

in facing hoth of these with steel, thus making its durahility equal, if not superior, to that of the best fast-joint butt. The following is a description of its construction: A is a steel hinge-pin rigidly inserted in the lower leaf of the hutt or hinge, and hearing at its upper end against the block B. C is a steel washer surrounding the pin A and interposed between the ahutting faces of the two knuckles. B is a steel hlock inserted tightly in the pin-hole of the upper leaf of the hinge and bearing against a shoulder or collar projecting into the hole above it. The weight of the door attached to the upper leaf is thus borne jointly hy the steel block B and washer, C, instead of hy the latter only, as in other hutts. All loose-joint hutts manufactured hereafter hy tho Yale & Towne Manufacturing Co. will embody this improvement.

Improved Door Locks.

The Nashua Lock Company, whose factory is at Nashua, N. H., and whose general offices are at 36 Pearl street, Boston, and 148 Lake street, Chicago, are introducing a front door lock containing important improvements, a general view of which is afforded by Fig. 3 of the engravings. Figs. 4, 5 and 6 are details of the working parts. In directing attention to these goods the company refer particularly to the reversible swivel-spindle hub, which is the leading feature. The hub, a detail of which is shown in Fig. 5, is made with one-half containing a $\frac{3}{8}$-inch hole, and the other half a $\frac{5}{16}$-inch hole. The spindle is made of corresponding dimensions, and is of the form shown in Fig. 4. The jaws by which the outside knob is kept from operating the door are on the part of the hub having the $\frac{3}{8}$-inch hole. Since the lock is reversihle, the part having the $\frac{3}{8}$-inch hole is to be on the side of the lock nearest the street, ready to receive the $\frac{3}{8}$-inch end of the spindle, on which is placed the outside knob. An objection to the ordinary style of swivel-spindle locks and latches is that they require the services of very competent joiners in order to adjust them to the door. In some cases a locksmith is required, and in many instances where the work has heen well done they have failed to give satisfaction from the fact of their liability to get out of order by use. The shoulder formed hy the $\frac{3}{8}$-inch and $\frac{5}{16}$-inch spindle employed in the lock here illustrated forces an adjustment of the joint in the spindle to the center of the lock. The same shoulder also prevents the pushing of the spindle through the hub from the outside after removing the outside knoh. This, of course, prevents the opening of the door from the outside, which it is asserted can he easily done with other forms of swivel-spindle locks now in the market. To reverse a lock of this kind only requires that the latch and hub shall he turned over, always keeping the $\frac{3}{8}$-inch part on the outside. The $\frac{5}{16}$ part of the huh being on tho inside and adapted to the $\frac{5}{16}$-inch part of the spindle enables the joiner to trim the inside of tho door with any style of knob that may he desired. Nearly all kinds of knobs carried in stock by the general hardware trado are provided with $\frac{5}{16}$-inch holes. The

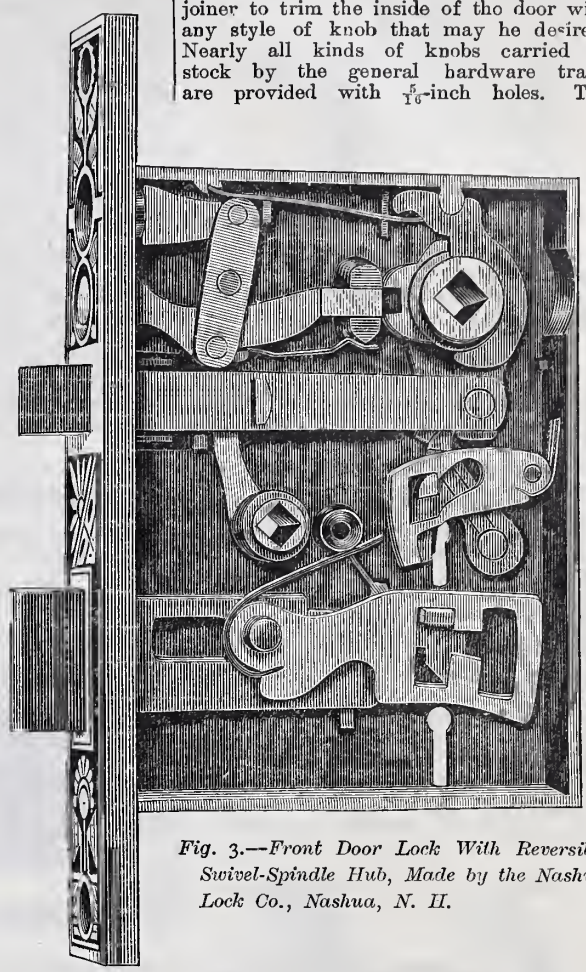


Fig. 3.—Front Door Lock With Reversible Swivel-Spindle Hub, Made by the Nashua Lock Co., Nashua, N. H.

company further direct attention to tho fact that their swivel-spindle locks and latches are the only ones in the market which are reversible. Another feature to which they direct special attention is an anti-friction device applied to the latches of these locks, a detail of which is shown in Fig. 6. This de-

Fig. 4.—Detail of Swivel Spindle.

vice is also of a character to permit the ready reversing of a lock. It is simple in character and very effective in use. It differs from other anti-friction devices from the fact that it is located inside the case of the lock, and hence does not deface the front of the lock or latch. As indicating in some measure the amount of wear that may he obtained from a latch furnished with this device, it may he mentioned that in a test case a latch was moved 111,600 times, and yet no wear was visihle in the parts liable to be affected. There are still other interesting features about this lock which will he appreciated hy all careful huilders upon examination. We shall not stop to mention them, save only that which relates to rahheted fronts. The company claim for their locks having rahheted fronts special advantages over others, in that they can be used for any width of rahhet and aay thickness of door, and at the same time are reversible. This is an important departure

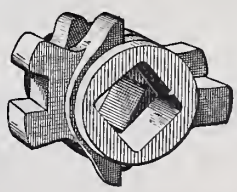
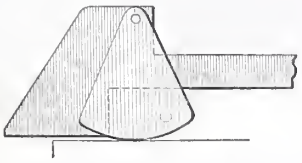


Fig. 5.—Detail of Divided Hub.

from the old method of constructing goods of this kind, and makes it possible to place these locks upon doors satisfactorily with far less skill than would otherwise be demanded. At the same time it makes it possible for a



Novelties.—Fig. 6.—Anti-Friction Device Applied to Latches of Locks, Made by the Nashua Lock Co.

hardware dealer to maintain his assortment with less stock than would otherwise be required.

A New Scraper.

The cut below illustrates a new Scraper, manufactured by the Eclipse Plane Company, of Coshocton, Ohio. The invention consists in the combination of a metallic plane stock, with the usual handles, with a scraping bit, and is so constructed that the bit can be placed at any desired angle or incliuation with the plane throat. The devices for adjusting and securing the bit are very simple, and the various changes in inclination, as well as the removal and replacing bit, can be done or made in a moment. To the inner side of each cheek or side piece, as shown in the illustration, is cut a semicircular shoulder in a radius with the throat from which the circle is struck. These cheeks are connected with a threaded bolt, as shown, by which they may be slightly sprung together and thus clamp together tho bracket or sliding segment holding the bit. This segment rests upon the shoulders and is held in place in the semicircle mentioned, in which it travels, by a flange which forms the

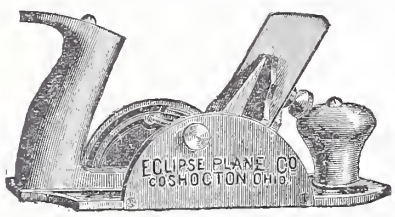


Fig. 7.—Wood Scrapers Made by the Eclipse Plane Co, Coshocton, Ohio.

outer edge of the cheeks. The bit is inserted in the sliding segment and firmly held in position by a set-screw, as is shown. The depth of the cut can be gauged by the eye or by placing the scraper on a flat surface and gently pressing the bit against it; then tighten the bit set-screw, place bit at desired angle and secure the set-screw on the side, and the scraper is ready for work. For finishing all kinds of wood on which a scraper is used, finishing and trueing surfaces for the application of veneer, and for dressing the veneering after it has been applied, the manufacturers claim that this scraper cannot be excelled, and that it will do far more work in a given time with less labor than other scrapers. They call attention to the combination of the scraper with a stock similar to that used in the ordinary plane, as giving the operator all the advantages in getting at the work to be done that are found in the common plane, while,

Duplex Rabbet Plane and Filletster.

The Stanley Rule and Level Company, with office at 29 Chambers street, New York, and factory at New Britain, Conn., have added to the large assortment of special planes which they manufacture the device shown in Fig. 9 of the engravings. It is known to the hardware trade as plane No 78. In placing this plane upon the market they direct attention to the following special features, which are of interest to all who enjoy well-designed and thoroughly-made tools: By removing the arm to which the fence is secured, a handled rabbet plane is obtained. The plane is provided with two seats for the cutter, so that the tool can be used as a bull-nose rabbet if desired. The construction of the stock is such that the plane will lie perfectly flat on either side, and can be used with right or left hand equally well while planing into corners or up against perpendicular surfaces. The arm to which the fence is secured can be screwed into either side of the stock, thus making a superior right or left hand filletster, with adjustable spur and depth gauge.

In our issue for May we presented another tool belonging to the same general family, but perhaps did not give as much attention to one feature as its merits demanded. We refer to the slitting device, which is better shown in Fig. 10 than in

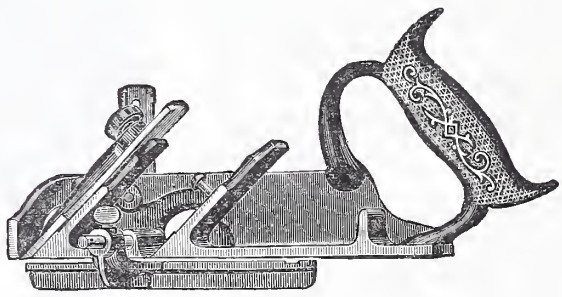


Fig. 9.—Duplex Rabbet Plane, Made by the Stanley Rule and Level Co.

the engraving which appeared on page 93. This cut will enable the reader to comprehend the position and uses of this attachment, which is a new feature in tools of this class. The improvement is an important one, as carpenters who have not the convenient use of circular saws, can with this slitting tool rapidly slit up their stuff for fitting up doors and windows or kindred work. The slitting tool is inserted into a slot on the right side of the main stock of the plane, and just in front of the handle; a steel depth gauge is placed over it on the same spindle, and both are fastened down by a brass thumb-screw. The position of the slitting tool being right under the hand of the workman, his full strength can be exerted, while the construction of the plane renders it stiff enough to insure perfect accuracy in working.

The Eureka Extension Holder.

This article, which is represented in the accompanying illustration, is made by P. Lowentraut, Newark, N. J., for whom John H. Graham & Co., 113 Chambers street, New York City, are agents. It is, as will readily be perceived, a contrivance for extending the shank of a bit, and is intended for the use of car-builders, millwrights, carpenters, plumbers, &c. It consists of sec-

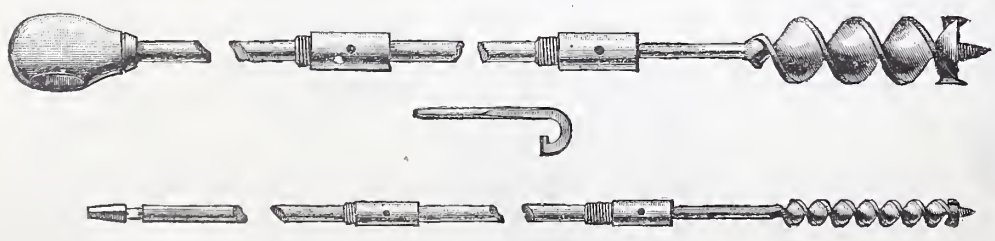


Fig. 8.—The Eureka Extension Holder.

having no handles at the side, the mechanic is enabled to work with one or both hands, as he may desire. It is finished in two styles japanned and full-nickeled.

tions 12 inches in length, each section being a steel rod, one end of which is square, resembling the shank of an ordinary bit, and the other end having a square socket which fits over the square shank of the bit which it is designed to lengthen. The outside of this socket is slightly raised, and threaded to receive the thimble, which is screwed to its

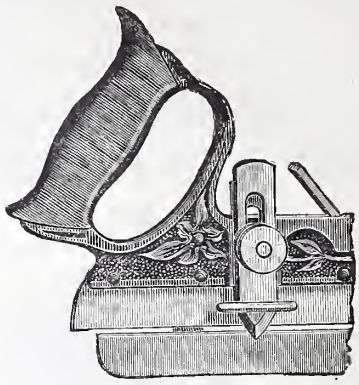


Fig. 10.—Slitting Device Applied to Various Planes, Made by Stanley Rule and Level Co.

place by a spanner or key, represented separately in the cut. In order to put the tool together the thimble is first placed over the shank of the bit, and a jointed ring which fits inside the thimble is placed on the shank against the square portion of the same. When the joint is made this ring serves the double purpose of preventing the bit from coming out and also centoring it truly. The thimble is then screwed up by the spanner or key, making the joint complete. The other end of the section is made in the shape of the end of an auger bit, and by a similar operation is attached to the next joint. This process of attaching different sections can be repeated until the desired length is obtained. This holder is made of two sizes, Nos. 1 and 2. Size No. 1 will take any bit from $\frac{10}{16}$ to $\frac{16}{16}$ inches, and is made in two sections, each section being 12 inches long. Size No. 2 will take any bit from $\frac{16}{16}$ to 2 inches and over, and is also made in two sections of 12 inches in length each. The cut of this larger size represents an attachment which, instead of being used with brace, as the smaller size is, is made to receive an auger handle, by which it may be operated.

Fastening for Window Beads.

A novel article of builders' hardware, which will no doubt be greatly appreciated

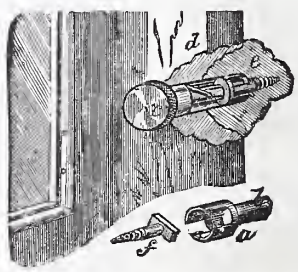


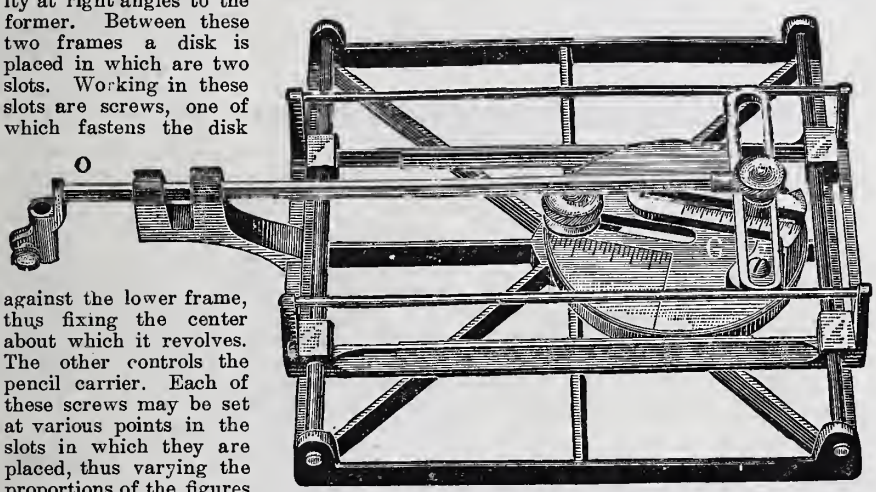
Fig. 11.—Fastening for Window Beads, Made by Brobst & Neumeyer, Macungie, Pa.

by all who have occasion to use such a device, is shown in Fig. 11 of the engravings. It is a fastening for window beads, so constructed as to render the bead readily detachable for the purpose of removing the sash for cleaning or for any other purpose. The view in the upper portion of the cut shows the device as it is placed upon the window, while the detached sections at the bottom show the parts of which the fastening is composed. For the purpose of putting this fastener in place, holes about $\frac{3}{8}$ inch in diameter are bored through the bead and a short distance into the frame. Into the holes bored in the frame the screw part *f*, shown in the cut, is inserted. The outer end of the fastening is placed in the hole in the bead, and is securely held there by means of

a small brad driven through the edge of the bead from the inside. The shape of the parts and the general arrangement is such that the projecting end locks on to the screw part *f* upon the former being turned. A milled end or a modified thumb-screw end is provided for this purpose. A bead may be very readily removed when fastened by this means, while the fastening itself is, to say the least, far more ornamental in appearance than the unsightly projecting nails which are frequently employed in the same position. This article is made by Messrs. Brobst & Neumeyer, Macungie, Pa.

Ellipsograph.

The ellipsograph shown in Fig. 12 is known as Abbot's practical ellipsograph, and is made by Stevens & Snow, Boston, Mass. The device consists of a light metallic frame, upon which, by means of cross slots, a second frame is made to move readily. Upon this second frame the holder, which carries the pencil, is made to slide with equal facility at right angles to the former. Between these two frames a disk is placed in which are two slots. Working in these slots are screws, one of which fastens the disk against the lower frame, thus fixing the center about which it revolves. The other controls the pencil carrier. Each of these screws may be set at various points in the slots in which they are placed, thus varying the proportions of the figures produced. The two slots are graduated for the purpose of facilitating adjustment. The pencil is carried in the holder O. The method of using this device will be understood by brief directions. The pencil is allowed to extend through the holder far enough when screwed to raise the arm O off the bottom of the slot through which it slides, and to allow the weight of the arm to be supported by the end of the pencil on the paper. A plainer mark can be made by pressing on the arm with the finger. In adjusting the instrument to produce an ellipse of a certain size the disk G is to be moved on the stud from the center one-half the width of the ellipse. To elongate



Novelties.—Fig. 12.—Abbott's Practical Ellipsograph, Made by Stevens & Snow, Boston, Mass.

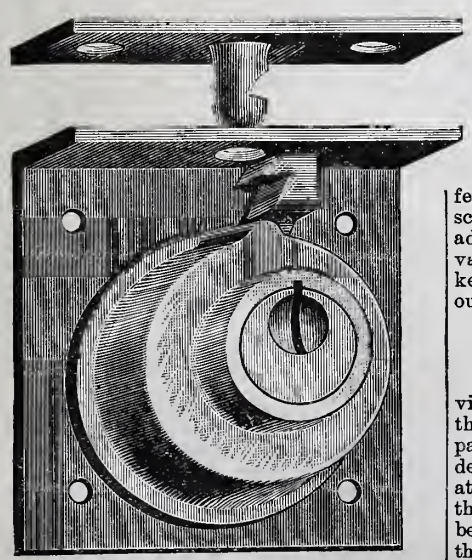


Fig. 13.—Chest Lock Made by the D. K. Miller Lock Co., Philadelphia.

the ellipse the pencil arm is moved back from the center of the disk G one-half of the length required. Ellipses of various sizes may be drawn by this device, and oval figures may also be produced by drawing the large end first in the form of a semicircle, and then setting the pencil arm in the manner above described for the remaining portion. This device is well adapted to the use of draftsmen, engravers, pattern-makers, engineers, marble-workers and others.

The Crescent Wrought-Iron Door Hanger.

E. R. Saxton, of 31 Lloyd street, Buffalo, N. Y., is introducing a wrought-iron door hanger for use on a wood track, which he has named the "Crescent." This hanger in its general appearance is not very different from many others which are manufactured. It has, however, some advantages peculiar to itself, and features of construction which have been recently patented. The maker directs attention to the following advantages: The hanger is simple, durable and strong. All the rollers are drilled and heavy wrought iron is used for the strap. A heavy roller with broad tread and flange is used, and the arrangement of parts is such that the door cannot get off of the track under any circumstances. The goods are said to be the handsomest and best finished in the market. Inasmuch as there is no special track to lay, there is less trouble in putting up this hanger than others. The same reasons make it cheaper than iron-track hangers.

Improved Form of Chest Lock.

In our "Novelties" for last month we presented one engraving and a general description of a line of cabinet locks now being introduced by the D. K. Miller Lock Company, of Philadelphia. We show another of the series in Fig. 13 of our engraving this month, and refer to these goods a second time because of the interest which this particular device possesses for all who desire neat and secure fastenings for their tool chests. The lock in its leading features is the same as we have already described, being modified only as is necessary to adapt it to the special use indicated. The advantage of a chest lock having a small, flat key will, we think, be greatly appreciated by our readers generally.

The Swan Expansive Bit.

In Fig. 14 we present front and back views of the Swan expansive bit, offered by the Russell & Erwin Manufacturing Company, with offices at New York and Philadelphia. The special advantages to which attention is directed are its rapid boring and the secure and exact adjustment which can be obtained. It is claimed for this device that it is the only adjustable bit made with a twist, and that it takes out a clean and continuous chip. How this is accomplished will be readily understood by examination of the engraving. The adjustable portion is held in place by a set-screw, shown in the front view. Three of these adjustable cutters accompany each bit, being of different lengths. The shorter one is approximately of the same length as the diameter of the bit, and, when it is in place and pushed entirely in, the bit in its appearance very closely resembles one of the ordinary type. We allude to this fact as the best plan of

Fig. 14.—Front and Back Views of the Swan Expansive Bit.

indicating the relation of the parts. With the long cutters inserted the appearance is the same, as shown in the engraving. The adjustable cutter takes its chip a very little higher up in the hole than the cutting edge of the bit proper, as shown in the rear view. The spur on the outer edge of the cutter cuts very nearly as deep as the one on the bit proper. The adjustable cutters are of a shape to be readily sharpened when necessary, and, as indicated in the engraving, are graduated so as to facilitate adjustment for holes of specified diameters.

The Hayward Hand Grenade.

A device coming into very general notice for extinguishing fires when in an incipient state, and which is of special interest to carpenters and builders, as well as house-owners generally, is known as the hand grenade. The special advantages of this grenade, a general view of which is shown in Fig. 15 of the engravings, are that it may be used by those who are not expert in matters of this kind, and even by women and children. The article here illustrated is made by the Hayward Hand Grenade Fire Extinguishing Company, with office at 407 Broadway, New York. It consists essentially of a closed globe about 4 inches in diameter, having a capacity of

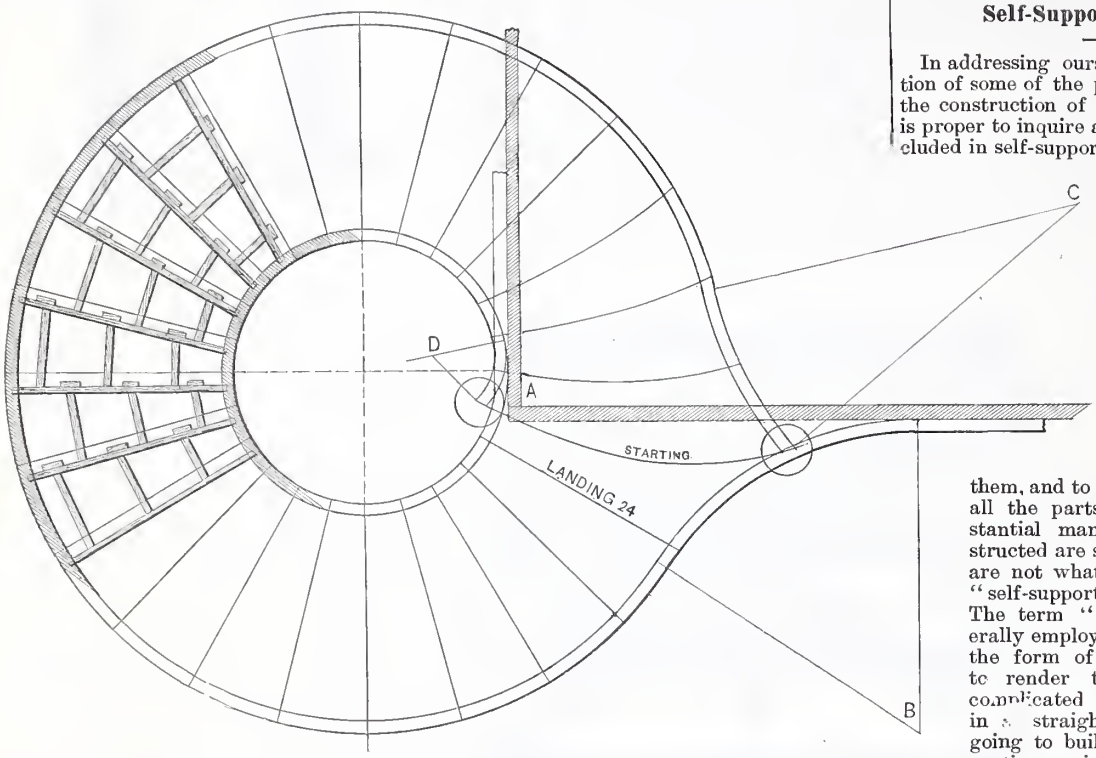
Fig. 15.—The Hayward Hand Grenade.

one pint. It is filled with a fluid of such a chemical composition that, when the grenade is broken and the liquid is allowed to come in contact with the fire and the atmosphere, immense volumes of chlorine and carbonic-acid gas are generated, which have the effect of immediately extinguishing the flame. The general shape of the grenade is spherical, flattened at the bottom to prevent it from rolling when set down. A number of wedge-shaped scores are formed in the surface, which tend to weaken the glass and cause it to be readily broken. This is an essential feature in an article of this kind. The grenades are filled through a rather long neck which also serves as a handle by which to grasp them for throwing. The opening in the neck is closed with Rosendale cement, which hardens to a stone-like consistency and which effectually prevents any loss of the fluid by evaporation or otherwise. Pend-

ing their use, the grenades may be kept suspended on hooks or pegs by a wire which encircles the neck, as shown in the engraving, or they may be placed, two or more together, in neat wire racks which the company provide for the purpose. The grenades are to be located at points where fires are most likely to occur and where they can be conveniently snatched from their position and broken upon the fire on the shortest notice. This device is of special interest to all wood-working establishments, and also to builders who are required to guard against fire in the structures upon which they are engaged. The tests to which the makers subject this device in bringing it before the public are in character not unlike the fires which frequently occur in wood-working establishments, and the fact that they act satisfactorily under these conditions is evidence of their usefulness in the directions named. We have seen one or two such fires very effectually subdued by them, demonstrating that they are useful wherever fires are liable to occur among shavings or fine wood. The only limit to the use of this article is where fire has obtained such headway as to form a considerable bed of coals. Nothing short of a thorough drenching with water will subdue a fire at such a stage. The fluid with which these grenades are filled is said to be of such a character that it remains unaltered by time, and whose freezing point is many degrees below zero. It is asserted that the fluid remains uncongealed at a temperature at which mercury freezes.

Brick Without Burning.

Brick without burning at the present day may at first thought seem to be a revival of processes of manufacture which, however venerable by reason of years, are scarcely appropriate to this day of modern improvements. Notwithstanding the fact that thoroughly-burnt brick are the usual material specified by careful architects, Messrs. Bare & Douglass, of Columbiana, Ohio, have recently patented and are now introducing to the public a process of manufacturing brick without burning. Unlike the old method of sun-dried brick, however, this process brings into use certain chemicals which, by the action of the sun and the atmosphere after the brick have been made, greatly facilitate their hardening. The patentees claim that by their plan a brick is produced which is far superior in strength and durability to the ordinary kiln-burnt article, and are said to equal the best building stone. The remarkable statement is made by the patentees that brick of this kind can be made one day and laid in the walls the next, although they advise allowing two or three days to elapse. Any desirable color can be imparted to the brick. Various shapes can be produced with the greatest facility. We have inspected two samples made by the plan here referred to. One of these, we regret to say, did not show satisfactory results, being so soft as to become badly broken in passing through Uncle Sam's mail bags. The other specimen, which, it is represented, is only of average quality, on examination proved to be far harder than ordinary hard burnt brick. We have had no opportunity of judging of the ultimate durability of this material, but the strong claims made for it by the patentees would seem to be sufficient warrant for an investigation of its merits upon the part of enterprising builders.



Self-Supporting Stairs.—Fig. 1.—Plan of Stairs with 24 Risers, Making One Revolution.

The outside string finishes at top against beam at right angles to that of the front string. A, angle of framing; B, the center from which the segment on outside string at the top is described. The other curves in both strings are struck similarly from centers outside of the plan. The shaded portion at the left shows a plan section of framing for the stairs, with the mode of securing the string to the same..

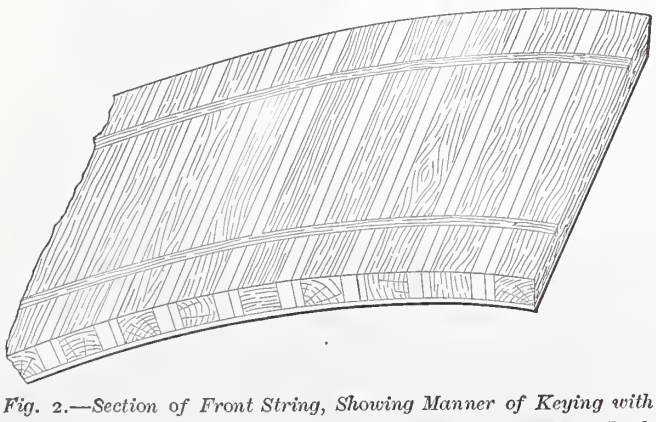


Fig. 2.—Section of Front String, Showing Manner of Keying with Wedges Driven in Opposite Directions; also Straps in Back to Bind it Firmly Together.

Self-Supporting Stairs.

In addressing ourselves to the consideration of some of the problems which underlie the construction of self-supporting stairs, it is proper to inquire at the outset what is included in self-supporting. To this we reply that stairs are self-supporting when they have two resting points, no matter whether they are circular or elliptical in form, leaving their sides and soffit clear or open. If the stairs are straight, all that is necessary is to use sufficient materials to carry all the weight which is likely at any time to come upon them, and to properly fasten together all the parts in a good and substantial manner. Stairs thus constructed are self-supporting, yet they are not what is meant by the word "self-supporting" as commonly used. The term "self-supporting" is generally employed in those cases where the form of the stairs is such as to render the construction more complicated than is ever necessary in a straight flight. If we were going to build stairs of the self-supporting variety, and we should adopt a semicircle as the plan, it is very evident that considerable skill would be required were we to construct the stairs properly. The bearings would be entirely at the side, and the whole width of the stairs must be supported from the side, since they overhang the bearings. The moment we pass the center or make more than a semicircle, we begin to counteract the strain on the first half, and, accordingly, if we should continue the stairs until they make a complete revolution, we should have stairs of a character easily supported. Such stairs take the form of a screw, and all parts help to sustain the weight. Stairs of this kind are the most desirable for use, they are graceful in appearance as well, and, accordingly, they are the most used.

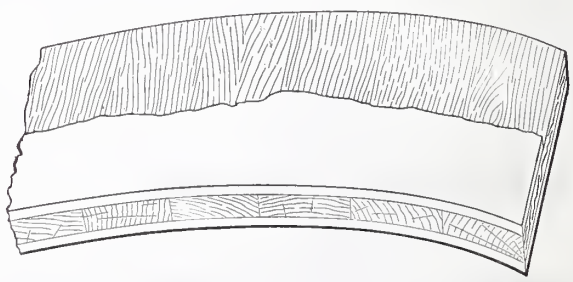
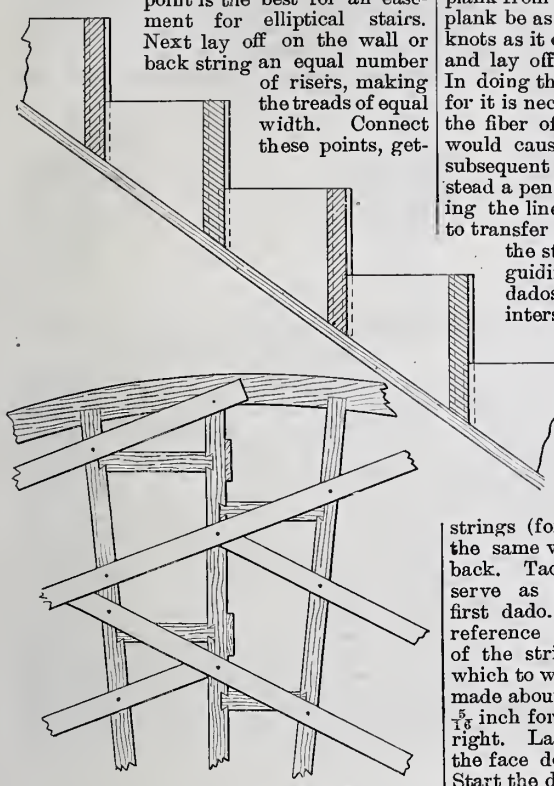


Fig. 3.—Section of String Composed of 5-Inch Staves Between Two Veneers.

Stairs to an elliptical plan may be constructed in the same way, but it is evident they would require a great deal more labor to build than those semicircular in plan. This becomes evident when it is remembered that all of the steps are different in shape, and that the drum about which they are built is more cumbersome and more difficult to construct than that of a true circle. Further, all panels, moldings and trimmings, as well as the rail, are far more difficult to get out. Without giving full particulars with reference to the construction of self-supporting elliptical stairs, we will present directions for the graduation of elliptical stairs. Space off on the line of front string the

number of risers in the flight, increasing the two bottom and the two top steps in width so as to conform to the easements in the rail. Do not make more than 1½ treads past the transverse axis at the landing, if it can be avoided, since it is desirable to make a joint in the rail on the third rise from the top. Experience has shown that this point is the best for an easement for elliptical stairs. Next lay off on the wall or back string an equal number of risers, making the treads of equal width. Connect these points, getting the rise line. This plan will be found to work well, and stairs laid off in this manner have a pleasing appearance as viewed from the front door, but, inasmuch as they are far more expensive of construction than circular stairs, they have gone almost, if not entirely, out of use. There is also the objection of greater space occupied which may be urged against them.



Self-Supporting Stairs.—Fig. 4.

The lower portion of the cut represents a section of the framing, looking upward; also the furring, indicating how it is to be fastened for securing strength. The dots represent nails. Size of furring, 1½ to 3 inches. The upper portion of the cut shows a section taken through the center of the framing in position.

In order to discuss the problems pertaining to the construction of self-supporting stairs, we will consider stairs built to a circular plan. First we will give attention to the methods of building the outside and inside strings. In this respect our remarks will apply in part to elliptical as well as to circular stairs. In the first place, select the plank from 1¼ to 1½ inches thick. Let the plank be as straight-grained and free from knots as it can be obtained. Smooth it off and lay off the treads and risers. In doing this do not use a knife, for it is necessary to avoid cutting the fiber of the wood, since that would cause it to kink or break in subsequent operations. Use instead a pencil on the rise, extending the line across the plank, so as to transfer the line to the back of the string, for the purpose of guiding and regulating the dados in the back. At the intersection of rise and tread use a scratch-awl, pricking at these points, so that when the string is taken from the drum a straight-edge may be used for marking the tread line with a knife to plane it out to receive the treads. Having laid out the strings (for both of them are obtained in the same way), transfer the rise lines to the back. Tack a strip in such a position as to serve as a guide for constructing the first dado. Judgment must be used with reference to the distance from the face of the string to run a gauge line against which to work the dados. If the distance is made about ¼ inch for the front string, and $\frac{5}{16}$ inch for the back string, it will be about right. Lay the string upon a bench with the face down and the joint edge to you. Start the dados at the right end and work to the left, using a bit about 1 inch wide, and making the dados about 1 inch apart on the front string and 1½ inches apart on the back string. Do not cut the string to the length, but dado it about 5 inches past where the joint will come, in order to insure a true face, so that when the string is put together it will follow the curve. Having the string ready to put over the drum, commence to make it fast by holding up one end so as to secure the other in place by putting in two 2½-inch screws, locating them in that part which will be cut off. Draw the string tight and gradually let it down to the drum. To keep it firm, put in screws one to each tread, keeping them below the tread so as not to have the holes show in the face. Having the string in place in this manner, and having keys already prepared, by making them in the form of wedges, put them in point and heel, as shown in Fig. 2. Put glue in the dado and use it plentifully, so as to fill tho pores of the end wood. With one hand upon the center of the keys to keep them down drive them home, taking care not to part or break the string, and driving them so as to make it firm. After having all the keys in place the next thing to do is to bind the work firmly together. This may be accomplished by putting in two dados the entire length of the string, keeping them about 3 inches from the edges of back or mortise string, and below the gauging on the front string, so as not to cut through. These dados should be about ½ inch deep. The pieces for filling should be prepared from good, dry, straight-grained ash or oak. They should be made so as to fill the groove snugly. To this end they should be slightly beveled at the lower edge, so that they may be driven home in a way not to tear the wood. It is desirable to warm them before inserting, if the necessary facilities are at hand. Apply glue in the groove. Holding the pieces in place, drive the end down. Keep it in place by using a hand screw or a wood screw turned in. Keep the other end up and drive as you go. Do not let the piece kink by driving it in too fast. This is what is called "strapping," and is one of the important features in the construction of the string. It gives great strength. Having made the string secure, let it remain on the drum at least 12 hours, so that the glue may get dry and firm, after which the work can be nailed as may be necessary, requiring no bracing to keep it in shape. The intent of the strap is to keep the string firm and in shape.

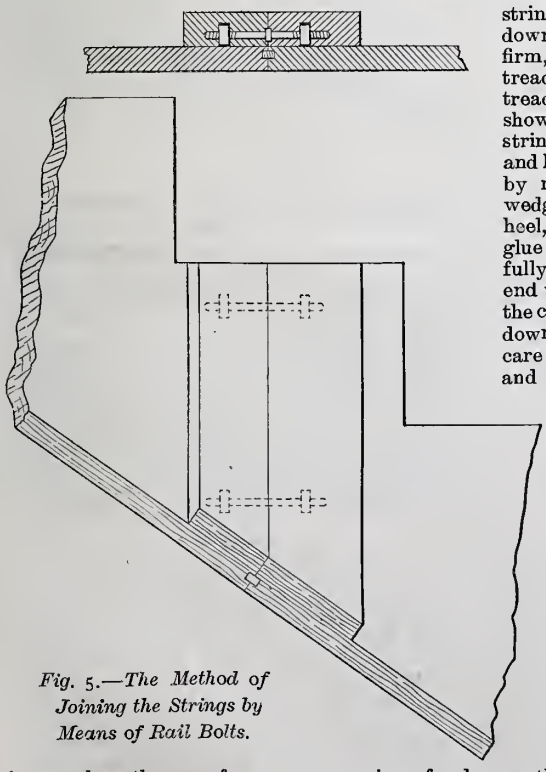


Fig. 5.—*The Method of Joining the Strings by Means of Rail Bolts.*

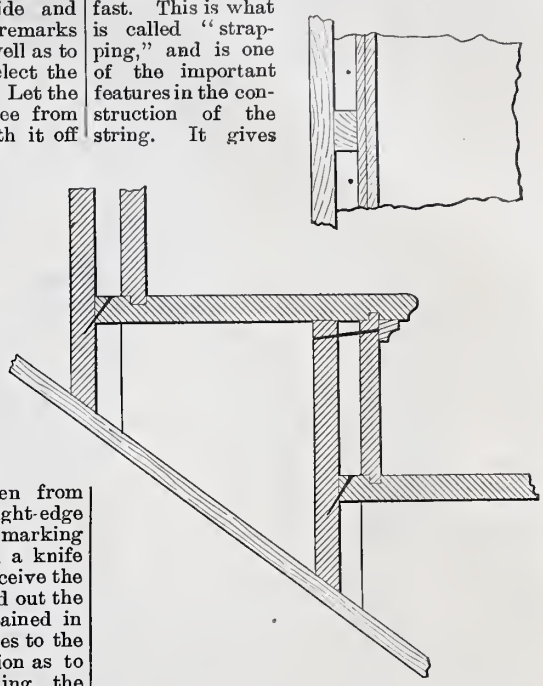


Fig. 6.—*Section Through the Steps and Rise, Showing How They Are to be Secured in Position.*

The view at the upper right-hand corner shows the back edge of the step cut out for the vertical ties.

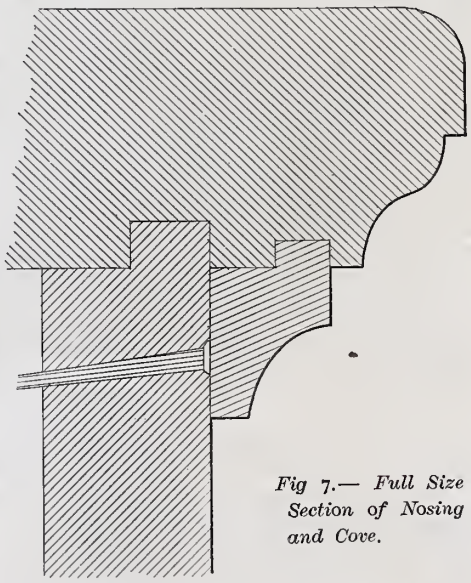


Fig 7.— *Full Size Section of Nosing and Cove.*

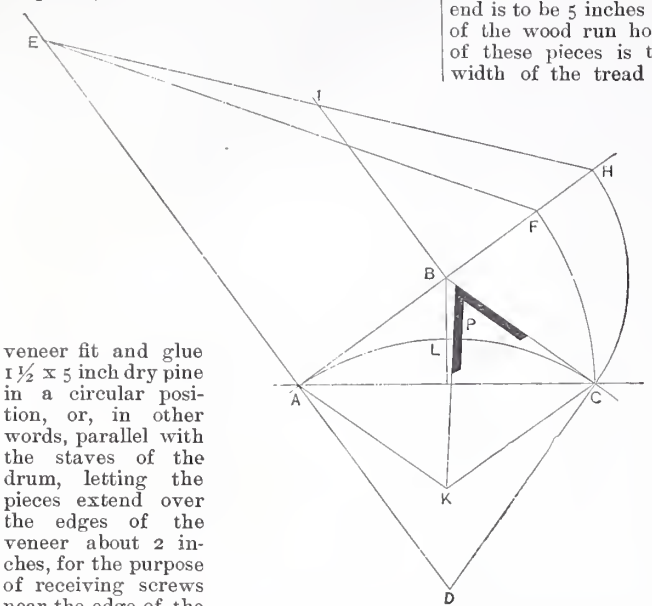
The next matter to be considered is that of jointing and putting the string together. We will saw it off and joint it square, and in the end of each string we will sink a center groove by means of a plow about ½ inch down by ½ inch wide. In this groove we will fit a tongue made from end wood. Glue it fast in one string. To fasten the strings together we will use two rail-bolts in each joint. We must glue upon the back of each string a piece of hardwood, 4 inches wide, through which to put our bolts. Keep down near the lower edge with the first bolt, so as to give leverage. This bolt must keep the joint tight at the bottom. The top will be sure to be in place. These directions will better be understood by reference to Fig. 5 of the accompanying cuts.

Another way to build up a string is to place upon the drum a veneer as thick as

can be nicely bent, making it fast at different places, so that it will be firm. Upon this veneer fit and glue 1½ x 5 inch dry pine in a circular position, or, in other words, parallel with the staves of the drum, letting the pieces extend over the edges of the veneer about 2 inches, for the purpose of receiving screws near the edge of the veneer, to insure a good joint. For the front or inside string use strips upon the back, in the same manner as already described. For the outside string put ¼-inch veneer in the place of straps. This veneer is to be laid down, when glued, by usual cauls, in the same manner as those of the front string, but keeping them about 2 inches apart, and having them as hot as they can be used without burning. Let them remain in place until the glue becomes hard. The next part of the subject to be considered is how are stairs of this description to be timbered. We will frame a carriage to the strings on which to put the steps and risers. Lay down on a large drawing-board or upon the floor the full size of the stairs. A scale drawing 1½ inches to the foot is more desirable for use, except in such cases as this, where it is best to have a drawing full size. In that case we are sure to get all lengths correctly and to make joints better. Take 2-inch dry pine about 12 inches wide, or, say, 5 inches wider than the risers, for the stairs. Cut the piece 1½ inches longer than the distance between strings. The ends of the pieces are to enter each string ¾ inch. These pieces we will place 1¼ inches through the back of the finish rise, keeping the top edge on a line with the under side of the finish step. We will then frame cross-pieces of the same material, putting the end pieces 6 inches from the back of the string, making the spaces between them 16 to 18 inches, as the case may be. These pieces must be the same width on the front end as the pieces which are framed in the strings. The other end is to be 5 inches wide, letting the grain of the wood run horizontally. The length of these pieces is to be governed by the width of the tread at the point where the piece will be framed. The length is determined by allowing 1 inch on each end of the piece. Each end is to have a dovetail cut upon it running the full width of the piece. This is to be fitted in the groove on the back of the rise running the whole width. All this will be better understood by referring to Fig. 1 and Fig. 4 of the engravings. On the narrow end there will be a dovetail in the same manner. It is put in from the bottom of the rise at the front. It is not best to put these pieces opposite each other, as it would cut the rise through. It is necessary to break joints. These pieces should fit snugly, so as to get all the strength possible. Commencing at the bottom, put the end of the rise in the front string, making it fast, then put in another in the same way. Afterward put the crosspieces in place, which must be done from the bottom. Use glue in the grooves. After the parts are driven in place, put in some 12d. nails, and so continue to work until they are all in place. Then slip the back string in, securing the ends of the risers either by screws or nails. At this point we will strengthen them still further by taking some strips 1¼ x 2, cut 12 inches long, which we will nail with 10d. nails upon the face of the risers. This will then be the back of the finish rise, and will keep the frame from splitting. We will next nail some pieces on the soffit of the stairs, running them lengthwise. Let them be 1½ by 3 inches wide; fit them to the framing and securely fasten. This will finish the carriage ready to receive the finish steps and risers. A carriage constructed in this manner will support itself with whatever weight may be put upon it. We will next consider putting on the finish steps. We will make the steps the full width, so as to receive the rise in the groove on the back edge. We must commence at the bottom. Nail the back of the step behind the groove, so that the nails will not show through, letting the tongue on the bottom edge of the rise set in this groove. We will leave the coves off until after the steps are in place, as we want to nail under the cove to secure the front of the step as well as the riser. This plan will make a better finish than if the nails were exposed, and at the same time it will secure the necessary strength. If it is necessary to use a close string with capping for the balusters to set on, we must use a scribe string on the back to be put in place after the steps are on. This string will be made in the same manner as the front, using keys and straps.

We will next consider how to obtain the shape of molding, in case the strings are paneled. First we may draw the pattern and square the moldings up the same as we would the rail, using material thick enough so that we can saw it in two after it is squared up, making the molding for one panel, or we may use thinner material and fit it to the face of string over the panel. If we fit it in place where it is to go, we must cut the ends on a bevel and to a length which would be no easy matter to mold up. So by fitting above and below the panels we have length to work on. This, then, is the better way. In sinking for the panels rout out ¼ inch more than the finish will be. Then finish the panel from ¼-inch stuff and glue in place. This done, the work is ready for the moldings.

In paneling the soffit of the stairs it is necessary to draw the moldings and square up the outside and inside stiles as well as the muntons. The rails will also be squared up. The panels can be sprung in if thin stuff is used, say, not exceeding ½ inch thick, letting the grain run to the center the same as with the steps, and diminish everything as we draw toward the center, except the panel molding, which, of course, will be the same width throughout. Make the paneling in sections of about three treads in space, so as to be easily handled, adopting some design which will be in accordance with sectional work. This will necessarily require great skill to execute, but if properly done it will present a pleasing appearance. The several operations above described will be better understood by reference to the accompanying illustrations, with their explanations.



Self-Supporting Stairs.—Fig. 8.—Ground Plan and Elevation of Section of String, with Panel; Moldings to be Fitted.

A C, length of ground; A B, B C, the tangents; D, the center; A to E, the hight. Get length of base line from A to C and place it from A to F. Then E F is the length of mold from center. Make B H equal to B C. Connect E H with the pitch, giving the lengths of tangents E I and H I, and also L, the center of curve.

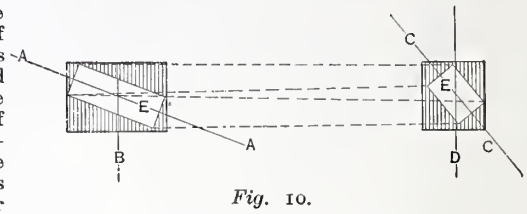


Fig. 10.

A A, Outside End of Cross-Rail, with Rake of String; B, plumb line; E, section of rail.

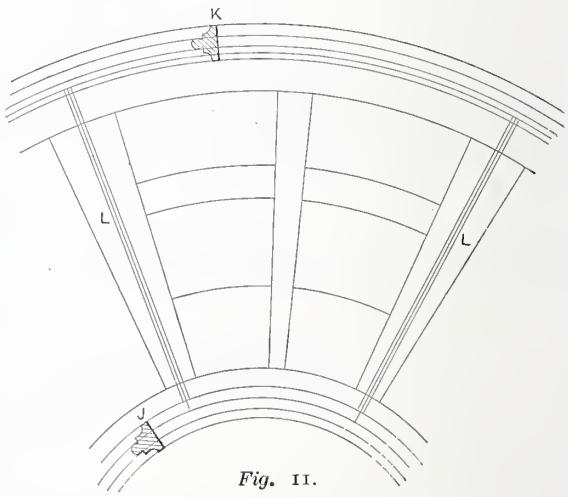


Fig. 11.

Section of Panel Soffit; J and K, soffit molding; L L, molding over joint between panels.

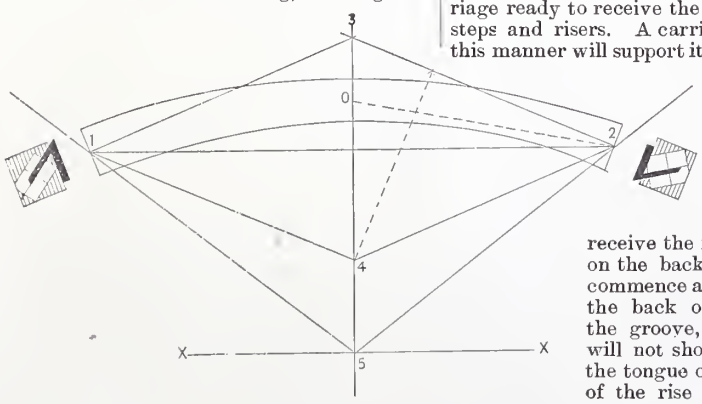


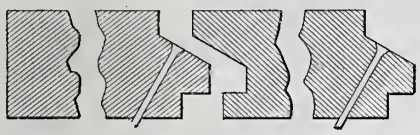
Fig. 9.—Mold Produced from Lines in Preceding Figure.

Let 1 2 equal E F; 2 3 equal E H and 1 3 equal E I. Make 3 4 equal B K and 3 5 equal B D. Let 4 O equal K L. From 5 through 1 2 gives the chord line. For the bevel, square from 2 3, touching 4. Take this length with the compasses and place it on the ground plan at K, touching the tangent B C. The angle formed at P is the bevel for both ends. At right angles to 3 5 draw X X, which is the transverse axis. The curve may be drawn by using a flexible strip or by the use of trammels. This also applies to all pieces such as the stiles, soffit molding and hand-rail.

We have recently had brought under our notice, says a foreign exchange, a new material for building purposes in the shape of cork bricks. The material used in these is a mixture of cork, silica and lime. It is stated to be a perfectly durable material, guaranteed not to rot. It has the advantage of keeping out heat and cold. It is light in weight and easily applied. An interior wall might be built of it where an ordinary brick wall would be too heavy, whilst it would be equally durable and substantial. It is nailed up to laths as a covering under roofs or for ceilings, for wall linings and under floors. It is said to be a good damp-preventer.

Nailless Flooring.

A new nailless flooring, the invention of a Mr. Putney, has, according to the London *Timber Trades Journal*, attracted considerable attention in England. As likely to be of interest to American readers, we have had engravings made from the illustrations which appeared in our exchange, and submit them herewith. The flooring is formed by a novel arrangement of the grooves and tongues of the boards. As may be seen by the cuts, the course of the nail is through the tongue, the groove fitting compactly over this, effectually hiding all traces of the nail. The joint thus formed, it is claimed, is air-tight, dust-proof, and provides thoroughly against drafts and the penetration of unpleasant odors. With seasoned lumber and with the joints so closed and perfectly free from indentations, as in this case, it is evident that all dust and dirt are impossible. The joint is solid and renders the floor in a large measure self-supporting. This form of flooring is specially intended for the



Nailess Flooring.—Fig. 1.—Joint Used in Ordinary Floors.

better class of work, and is laid of stuff in narrow widths. The flooring is made in two forms. The section shown in Fig. 2 indicates an acute angle touching the surface. This is preferable for hardwoods, but the right-angled shoulder shown in Fig. 1 is the form commonly employed with pine. By the peculiar character of the work shown, the shrinkage and buckling, which are so great a drawback in parquette and other ornamental work of the same kind, are prevented. The same process employed in dados or wainscoting gives an appearance of durability that is very desirable. Another advantage to which our English contemporary directs attention is that work laid upon this plan can be taken up and relaid without damage. This is often desirable where valuable floors of hardwood are laid in buildings which require to be demolished, or where temporary use is required, as is sometimes the case. In addition to the illustrations shown here, our English contemporary pre-

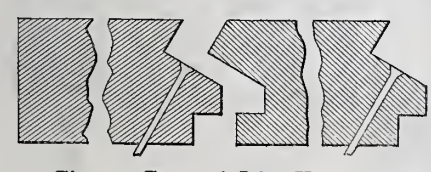


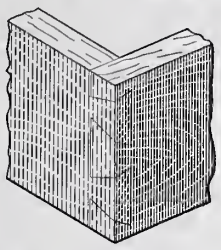
Fig. 2.—Form of Joint Used With Hardwood Floors.

sents a third engraving showing a floor and wainscoting in combination, both laid in the manner here indicated.

Curiosities in Dovetailing.

Those who are at all interested in woodwork and the principles by which the different parts of a piece of framework are connected will find the process of joining one piece of woodwork with another to be a very instructive study. The carpenter often exercises a great deal of ingenuity and skill in the simple matter of splicing one beam with another, for beams are seldom found of sufficient length for building purpose, and the variety of joints of this kind are as varied as the woods they have to work with.

So in the matter of connecting the sides of a chest with the ends, or the front of tills and drawers in furniture; the methods adopted are only equal to the oddity of the workman. Every one who has any interest in this class of work has some peculiar notions of his own which he prefers above all others, and, if we were to make notes of the different methods of mitering, notching and dovetailing, we should find a variety that would fill quite a shop with curiosities. In the matter of dovetailing alone there are at least a dozen ways of accomplishing the simple requirements of joining the ends of two pieces that meet together at an angle. We hear of the blind dovetail, the half-blind, the straight and square, rectangular and undercut, and many others that no name has yet fallen to their lot. Generally, however,



Curiosities in Dovetailing.—Fig. 1.—A Piece of Work Very Deceptive in Appearance.

these joints are arranged for the wedge-shaped projection to resist the thrust only in one direction. A real dovetail joint only holds the sides from pulling off from their ends, and it would seem almost impossible to have the projections beveled both ways so as to hold them both in their places, but it is accomplished, however, in the manner shown in the accompanying engravings.

If we were to examine the piece of work shown in Fig. 1 we should find it to be very deceptive in appearance; the end and side are locked together both ways. There is a reaches through the thickness of the side, bevel on the projection of the ends that

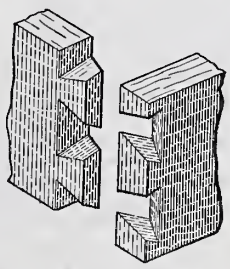


Fig. 2.—How the Work Shown in the Preceding Cut is Done.

that holds the side from ever being forced out of position from any strain that may be brought upon it from within the chest. It will also be noticed that these dovetail-shaped projections have another bevel in the direction of their thickness, to hold the ends from being drawn off from the sides. Taking these both together, the two pieces are completely locked with a smooth, even joint on both inside and out, with no notches or cavities to be filled with inlaid work of any kind. Simple as this may appear in the engraving, we have seen many a workman study on this principle for hours when a chest was to be interlocked in this manner, and then declare that nothing short of a thorough steaming would ever allow the halves to come together.

It will be noticed that the width of the projections of the ends, as they appear on the sides of the box, are not so thick as the

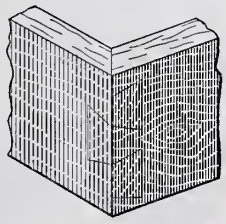


Fig. 3.—The Same Principle Carried Further.

ends are themselves. It would be impossible to have them show as deep on one side as on the other without leaving a cavity on the inside to mar the appearance of the joint; to remove an interlocking of this kind the side must slide off from the end over the projection in a direction of a miter, or half way between that of a direct end and side motion. This joint is shown separated in this manner in Fig. 2.

Wedging as it may appear, the back face of each projection of the ends and the corresponding parts of the nothches to receive them are no wider in one place than in another, and it is on account of this bevel on the back that enables the surface to have an inclination in the direction of both the length and breadth of the parts to be connected. Work of this kind must be carefully laid out, as in blind dovetailing, and finished to the mark, if you wish the work to come together without any of that troublesome behavior that is so good for a vexful spirit. There is no room for the cut-and-try principle that is often relied upon in that class of work that leaves both edges alike. When the sides have been connected, and all is ready for the baseboard, this double manner of dove-dovetailing may be carried to the full extent of the thickness of the stock we have

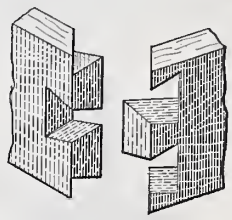


Fig. 4.—Details of the Joint Shown in Fig. 3.

to work with, as the inner surface is to be covered by the base being driven on to the chest as if it were a hoop. Besides this, the principle is carried still further. The trimming is fitted with a miter to the first projection from each edge, as shown in Fig. 3, which shows the interlocking with two dovetailed projections on the side and one on the end. These are easily spaced off by giving equal divisions for the extreme edge or corner, and adding a like amount for the draft of each projection, and the work will drive together without any trouble unless it is from the splitting down of the feathered edge where the sides meet with the ends, and it is well to bevel them a trifle to give them more of a surface of contact.

This work is shown separated in Fig. 4, that its internal structure may be more readily understood, and the thin edges that are

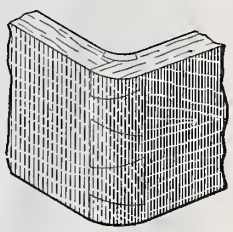
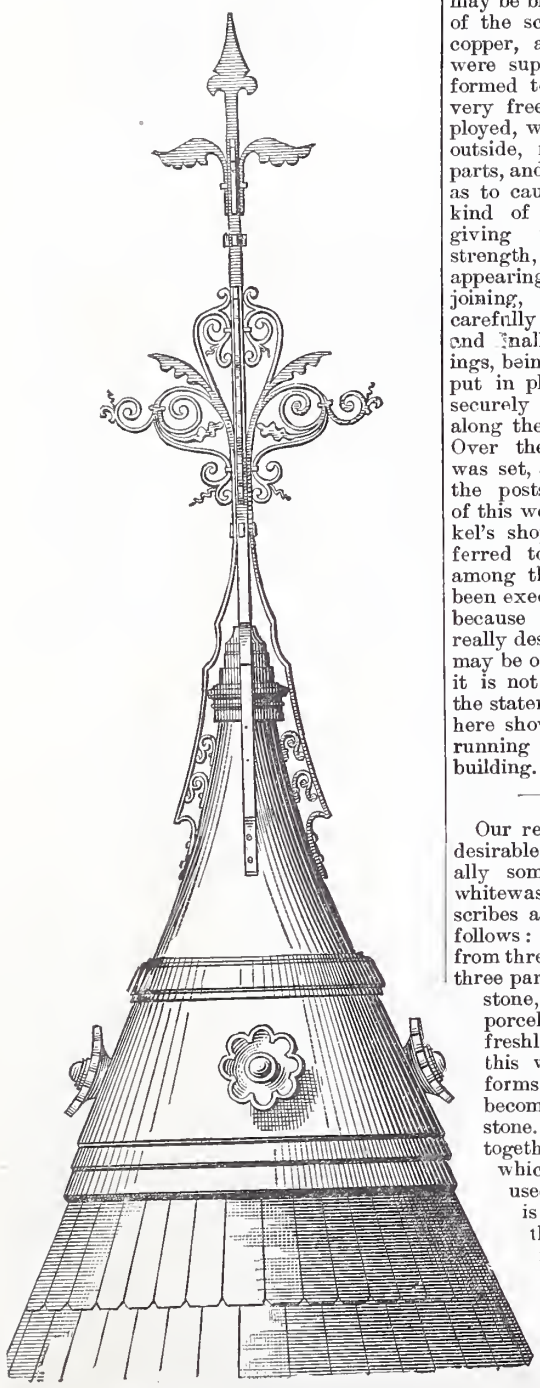


Fig. 5.—Application of the Same Principle Where the Corner is Rounded.

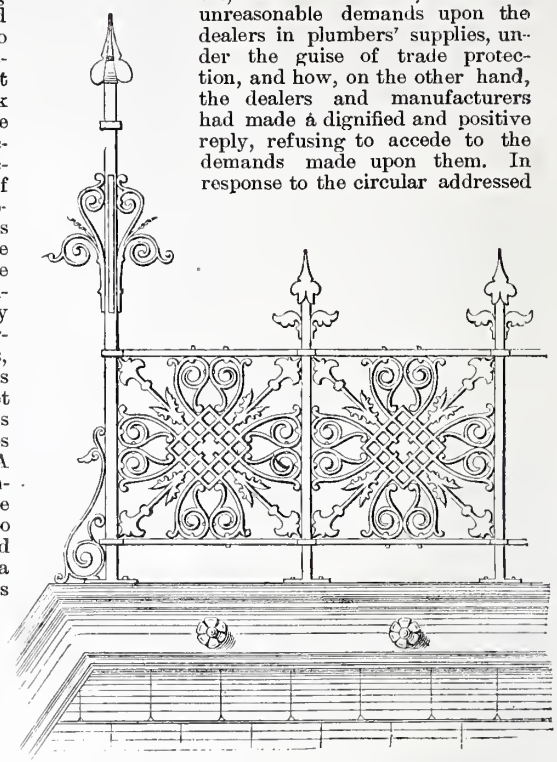
likely to be interfered with while the work is being driven together. Should any one be tempted to try such a principle in dovetailing, it would be well for them to cut out a sample joint to make sure how the parts go together, even if you have a specimen of this kind to work from, for we cannot always judge the character of a piece of work from the outside appearances. This same principle is made use of Fig. 5, where the corners are left rounded with a full quarter of a circle, and a key driven across the inner corner, not only to cover up the enlargements that were made to allow of the interlocking of the parts, but to strengthen and fill in the corner, and to keep the work from splitting. The trimming for which the principle was applied was inlaid just far enough to cover up the cross-piece that would otherwise be injurious to the appearance of this circular dovetailing, and so it will be seen that by taking the advantage of giving the parts that are exposed the appearance of strength and solidity, by laying out the work on some interlocking principle and by undercutting to make room for their connection in those parts that are shut out from view, we shall accomplish what might be considered impossibilities, as long as the varnish is not to be meddled with or the glistening polish to be disturbed.

Modern Copper-Work.

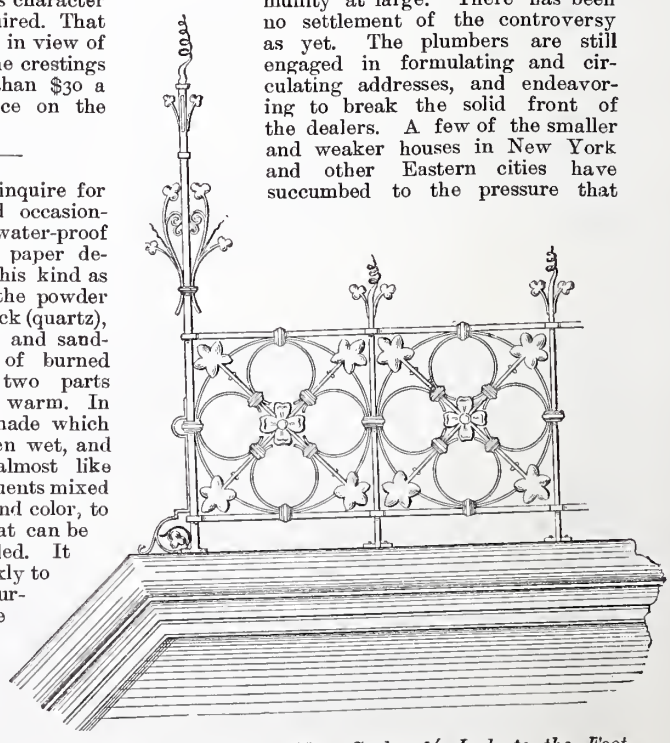
Architects and builders generally are very familiar with the use of sheet metal for architectural trimmings of various kinds. Galvanized iron has been in extensive employment for cornices and other similar work for many years past, and occasionally zinc and some other of the sheet metals are employed for the same purpose. In some of the Eastern cities, notably Boston, the use of copper for work of this general character is becoming quite common. Some very elaborate work of this same kind has been done the last two or three years in New York City. Among the more conspicuous jobs employing work of this general character are the Vanderbilt houses on Fifth avenue. Our illustrations are of work on two of the houses recently built by members of the Vanderbilt family, and which are located on the corner of Fifty-fourth street. The designs were prepared by John B. Snook, architect, of this city. We illustrate the finials of two towers and also sections of the several crestings. The execution of this work was intrusted to Mr. John Borkel, of Nos. 79 and 81 Elm street, New York City, and to his credit it is to be said that the work has been thoroughly done and to the entire satisfaction of the architect. In the finial shown on page 219 the copper base extends as far down as shown in the engraving, the lower portion of it being worked into courses like slate, and so cleverly has it been made to imitate slate that in the examination of the work on the building it is hard to detect from the sidewalk where the copper-work ends and the slatework begins. This construction was made necessary on account of the great difficulty of slating a circular tower the diameter of which is as small as in this case. The finial shown on page 218 indicates the point of juncture of copper and slate work. The construction of this work, which really constituted the distinguishing difference between it and other designs, may be briefly described: The sides of the scrolls were cut from sheet copper, and the backs and faces were supplied by bands or strips formed to the required shape. A very free-flowing solder was employed, which, when applied to the outside, flowed between the two parts, and the work was so managed as to cause the solder to form a kind of fillet on the inside, thus giving the joints sufficient strength, without the solder appearing on the exterior. After joining, the work was very carefully dressed up with files and finally bronzed. The crestings, being hollow, were readily put in place by means of rods securely fastened at intervals along the ridges of the roofs. Over these rods the cresting was set, allowing the rods to run up into the posts. We have examined sections of this work very critically, both in Mr. Borkel's shop and in place on the buildings referred to, and we believe that it ranks among the finest of its kind that has ever been executed. It is of interest to architects, because it shows a plan whereby really desirable work of this character may be obtained when required. That it is not cheap is evident in view of the statement that one of the crestings here shown cost no less than $30 a running foot when in place on the building.



Modern Copper-Work.—Finial of Tower on North House of the Vanderbilt Residences, Fifth Ave. and 54th St., New York City.—Jno. B. Snook, Architect.—Scale, ½ Inch to the Foot.



Main Cresting on North House.—Scale, ½ Inch to the Foot.



Main Cresting on South Side.—Scale, ½ Inch to the Foot.

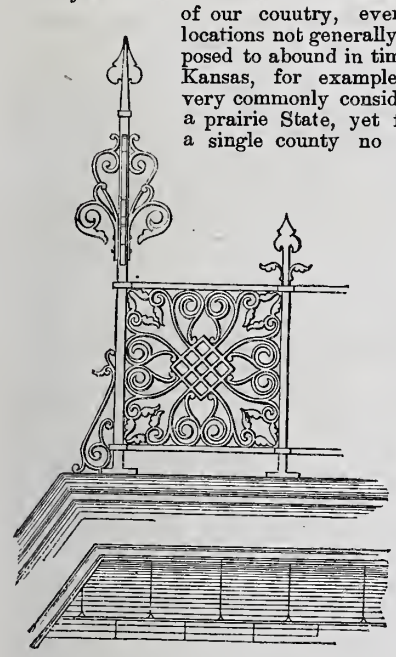
Our readers frequently inquire for desirable whitewashes, and occasionally some one asks for water-proof whitewashes. A German paper describes a preparation of this kind as follows: "Mix together the powder from three parts silicious rock (quartz), three parts broken marble and sandstone, also two parts of burned porcelain clay, with two parts freshly-slaked lime, still warm. In this way a wash is made which forms a silicate, if often wet, and becomes after a time almost like stone. The four constituents mixed together give the ground color, to which any pigment that can be used with lime is added. It is applied quite thickly to the wall or other surface, let dry one day, and the next day frequently covered with water, which makes it water-proof. This wash can be cleaned with water without losing any of its color; on the contrary, each time it can even be brushed, while its porosity makes it look soft. The wash or kalsomine can be used for ordinary purposes as well as for the finest painting. A so-called fresco surface can be prepared with it in the dry way." This would seem to be an excellent preparation, and useful for many purposes.

NOTES AND COMMENTS.

In our last issue we devoted considerable space to a presentation of the situation in the plumbing trade, showing how the plumbers, on the one hand, had made unreasonable demands upon the dealers in plumbers' supplies, under the guise of trade protection, and how, on the other hand, the dealers and manufacturers had made a dignified and positive reply, refusing to accede to the demands made upon them. In response to the circular addressed to the architects by the dealers, numerous replies have been received showing that a very large number of the architectural fraternity, in protecting the interests of their clients, recognize the correctness of the position of the dealers, and indicating the general distrust of plumbers and their ways which exist in the community at large. There has been no settlement of the controversy as yet. The plumbers are still engaged in formulating and circulating addresses, and endeavoring to break the solid front of the dealers. A few of the smaller and weaker houses in New York and other Eastern cities have succumbed to the pressure that has been brought to bear upon them, but the leading houses stand firmly in the position assumed at the outset. In St. Louis and some of the other Western cities the plumbers have carried their point, so far as local dealers are concerned. In these cities it is impossible for a house owner or builder to buy his own plumbing materials. The result is to divert orders to New York, where, after all, a better market is afforded.

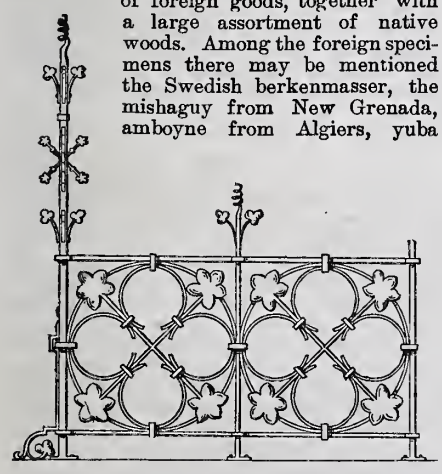
St. Louis plumbers, however, can be found who will put in place the goods bought by builders and owners, notwithstanding these associations. This fairly indicates the situation as we go to press. The plumbers are undoubtedly causing some annoyance to the building trades, but that they can ultimately succeed on the unreasonable plane on which the war is being fought seems impossible.

One of the most interesting features of the St. Louis Exposition, which will have closed before this number of the paper reaches our readers, is the large collection of samples of natural woods, both home and foreign. Every observer must be surprised at the variety and extent of the lumber resources of our country, even in locations not generally supposed to abound in timber. Kansas, for example, is very commonly considered a prairie State, yet from a single county no less



Modern Copper-Work.—Cresting on North House—Scale, ½ Inch to the Foot.

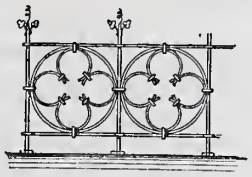
than 64 specimens of native woods are exhibited. Among these may be mentioned six varieties of oak, three kinds of elm, four kinds of cherry, three kinds of willow and two kinds each of cottonwood, locust, walnut, hickory, ash, maple, mulberry, poplar and pine. There is also a long list of single varieties. The Yocum Lumber Company, of St. Louis, show a very extensive collection of foreign goods, together with a large assortment of native woods. Among the foreign specimens there may be mentioned the Swedish berkenmasser, the mishaguy from New Grenada, amboyne from Algiers, yuba



Cresting on South House.—Scale, ½ Inch to the Foot.

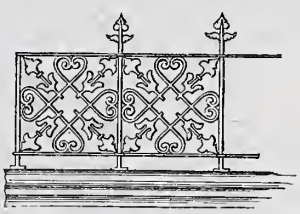
from the West Indies, tulip from Brazil, prima vera and brasalila from Mexico, toa from the South Sea Islands, mottled mahogany from Mexico, tamano from the Sandwich Islands, amaranth from South America, gamino and zebra wood from the West Indies and camphor wood from China. There is also an admirable sample of figured ash from Circassia. This wood has an exquisite richness of grain, somewhat like the curly maple of this country, but with a long, woolly fiber quite unlike that of any other wood. The color is nearly the same as our white oak, but a little darker.

The reckless destruction of forests in this country for the purpose of obtaining timber to be reduced to lumber seems to characterize the mahogany interest of Mexico and Central America also. Very little regard is paid to the value of the trees and timber destroyed. A writer in one of our exchanges



Cresting on South House.—Scale, ½ Inch to the Foot.

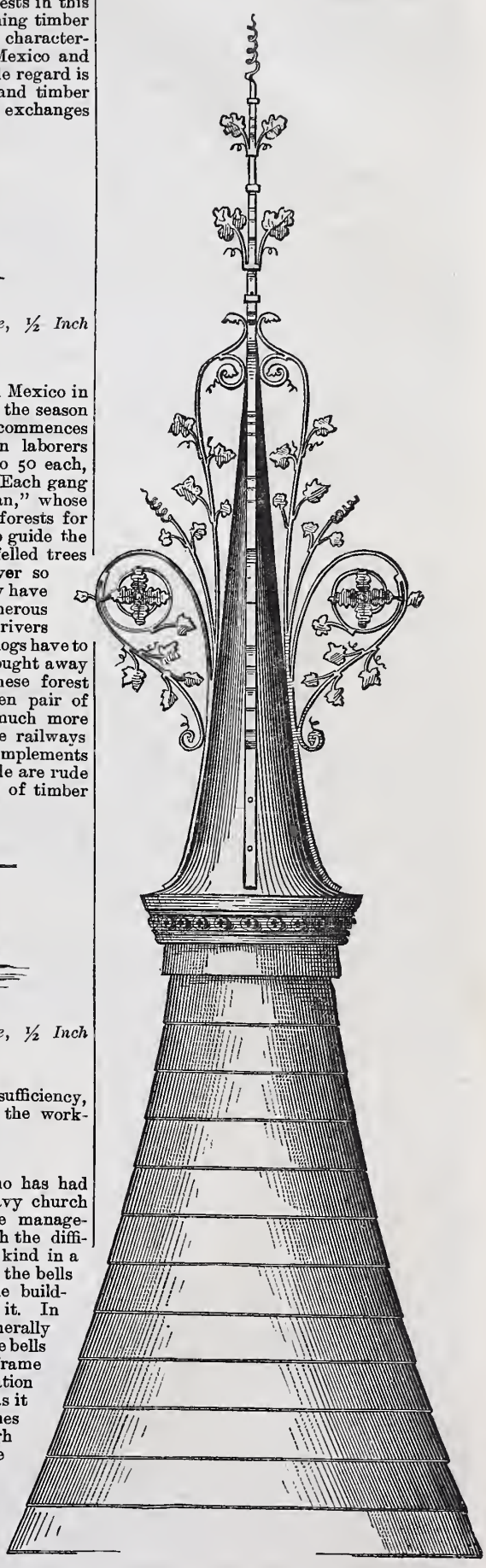
describes lumbering operations in Mexico in the following terms: "In Mexico the season for cutting the mahogany usually commences about August. Gangs of Indian laborers are employed, consisting of 20 to 50 each, under the direction of a *capitan*. Each gang has also a *cazador*, or "huntsman," whose duty it is to search the trackless forests for suitable trees to be felled, and to guide the woodcutters to the places. The felled trees of a single season are scattered over so wide a space that miles of roadway have to be made to reach them, and numerous rude bridges constructed over the rivers that lie in the way. All the larger logs have to be "squared" before they are brought away on rude wheeled trucks along these forest roads. Each truck requires seven pair of oxen, and the work could be much more expeditiously done by our portable railways and plantation engines. The implements used by the Mexicans in this trade are rude and insufficient, large quantities of timber



Cresting on North House.— Scale, ½ Inch to the Foot.

being often spoiled by their insufficiency, combined with the ignorance of the workmen."

Every architect and builder who has had anything to do with hanging heavy church bells, and more particularly in the management of chimes, is acquainted with the difficulty of arranging work of this kind in a way to prevent the vibration of the bells from acting on the masonry of the building and gradually shattering it. In Europe, cathedral bells are generally hung on high wooden frames. The bells are placed at the top, and the frame acts as a spring, so that the vibration at the bottom is not so serious as it would otherwise be. The chimes of Grace Church, New York, weigh about 18,000 pounds. They were put in the tower several years after the church was completed, in 1846. The constant jar of many years began to make almost imperceptible fissures in the masonry at the junction with the timbers. The problem was to obviate this by some new method, as the tower was not sufficiently high to admit of the use of a tall frame. Mr. Renwick hit upon the plan of building the bell frame in two sections. The lower frame is 8 feet high, and on the top of that 28 car springs are placed, supporting an upper frame, on which the bells are hung. This not only obviates the difficulty of the vibration of the frame, but adds greatly to the mellowness of the tone.



Finial on Large Tower of South House, Vanderbilt Residences, Fifth Av. and 54th St., New York City. —Scale, ½ Inch to the Foot.

It is an idea that other architects will no doubt act upon, and is unquestionably an important improvement in this line of work.

CORRESPONDENCE.

Appreciation of Carpentry and Building.

From D., *Sullivan, Ind.*—I have read with disgust the letter from a "Jack Plane 40 years old," published in a recent issue. For one, I am not at all pleased that the Editor should expose the fact that we have some such fellows in the craft as the writer of the letter in question. I am not as old as "Jack Plane," but served my time in Newark, N. J., from 1853 to 1858. I take this opportunity of saying I would not part with a single number of *Carpentry and Building* for double the price of the annual subscription.

Note.—We take this opportunity of stating that the publication of the *fac simile* letter in our September number, to which the above refers, has called out a very large number of letters from our subscribers all over the country. It would be impossible to publish even a small portion of what we have received. We present this lettor, which is typical of the entire lot, as showing the current of opinion. We are much gratified to know that the conduct of this journal is so satisfactory to our subscribers, notwithstanding the disparaging remarks indulged in by the correspondent whose letter we published.

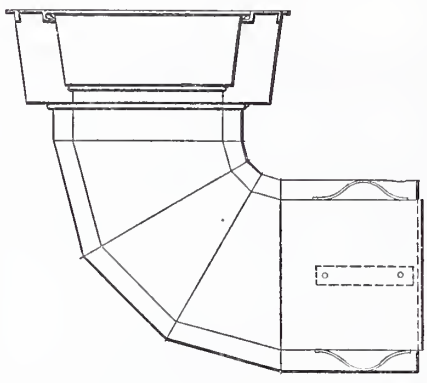
Ebonizing.

From C. N. M., *Lackawack, N. Y.*—Will you please explain the process of ebonizing wood. I desire to know what kinds of wood are used, what preparation is necessary and what materials are used. In short, I would like to have the process described in dotail from beginning to end.

Answer.—We have described the process of ebonizing at different times in our back volumes, but the question is one of such general interest that our readers will probably be pleased by a repetition of what has already appeared. For a very fine black ebony staiu, apple, pear and hazel wood are probably the best for use. When stained black they are the most complete imitations of ebony. Beach, pear tree and oak are also sometimes treated in this manner. Cherry is probably the most common wood in use in this country that is finisbed in imitation of ebony. The following directious, according to Smither, are of general application. Special recipes are in use where special results are desired and where different woods are employed: Boil 1 pound logwood chips one hour in 2 quarts water; brush the hot liquor over the work to be stained; lay aside to dry; when dry give another coat, still using it hot. When the second coat is dry, brush the following liquor over the work: 1 ounce green copperas to 1 quart hot water, to be used when the copperas is all dissolved. It will bring out an intense black when dry. For staining, the work must not be dried by fire, but in the sunshine, if possible; if not, in a warm room away from the fire. To polish this work, first give a coating of very thin glue size, and, when quite dry, paper off very lightly with No. 0 paper, only just enough to render smooth, but not to remove the black stain. Then make a rubber of wadding about the size of a walnut, moisten the rubber with French polish, cover the whole tightly with a double linen rag, put one drop of oil on the surface and rub the work with a circular motion. Should the rubber stick, it requires more polish. Previous to putting the French polish on the wadding pledget it ought to be mixed with the best drop black, in the proportion of ¼ ounce drop black to a gill of French polish. When the work has received one coat set it aside to dry for about an hour. After the first coat, is laid on and thoroughly dry it should be partly papered off with No. 0 paper. This brings the surface even, and at the same time fills up the grain. Now give a second coat, as before. Allow 24 hours to elapse; again paper off, and give a final coat, as before. Now comes "spiriting off." Great care must be used here or the work will be dull instead of bright. A clean rubber must be made, as previously described, but instead of being moistened with polish it must be wetted with spirits of wine placed in a linen rag screwed into a tight, even-surfaced ball, just touched on the face with a drop of oil and then rubbed lightly and quickly in circular sweeps all over the work from top to bottom. One application of spirits is usually enough if sufficient has been placed on the rubber at the outset, but it is better to use rather too little than too much at a time, as an excess will entirely remove the polish, when the work will have to be polished again. Should this be the case, paper off at once, and commence as at first. It is the best way in the end.

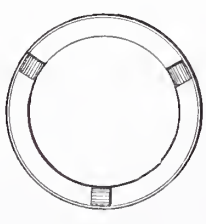
Construction of Register Boxes.

From W. T. HOLLAND, *New York City.*—My attention has been called to the question of construction of register boxes and pipes for use in frame buildings and in places where more or less wood work is encountered. I inclose a diagram showing a method which I would suggest for the



Construction of Register Boxes.—Section Illustrating Method Proposed by W. T. Holland.

purpose. The construction I would employ, it will be noticed, is not unlike that used in making double thimbles. The pipe and elbow are made double, and the same principle is extended to the register boxes. Accordingly, there is an air space between the two shells which is sufficient to overcome all danger from heat that might proceed from a single pipe alone. With reference to the register boxes, I would say that the inside part is constructed in the usual manner, the flanges of the box coming directly underneath the register. The outside box finishes against the edge of the



Cross-Section Through Pipes, Showing Stays for Keeping Inner Pipe in Center.

frame, the flanges of the tin extending under it and against the edge of the woodwork upon which the frame rests. My drawing, I think, is sufficiently clear to enable any one to comprehend the scheme of constructiou.

A Woman's House Plans.

From CARPENTER'S WIFE, *Fonda, N. Y.*—I am delighted with the perspective view furnished by Mr. Charles M. Cornell in answer to my request, and I desire to thank him, through the columns of *Carpentry and Building*, for his courtesy. His suggestions as to modifications are excellent. In defense of the original plan, I have to say that it was drawn with a view to strict economy as well as convenience. We have a certain amount with which to build, and when drawing the plans my husband sat by me, with pencil and paper, making calculations of cost and endeavoring to keep me within bounds. This, I can assure you, was no easy task. Until then I had no idea how much two or three extra doors and a few windows, with their molded finishings, would add to the cost. It was not till after many erasures that I succeeded in getting the number satisfactory from both standpoints. We do not aspire to a furnace in our modest story and three-quarter house. On the score of economy we located the chimney as we did, so that in mild weather one stove might heat three rooms. Mr. Cornell in his modifications has added to tbe size of the original, thereby increasing the cost somewhat. His arrangement is so nearly perfect, however, in our estimation, that we shall follow out his suggestions, so far as we are able.

Practical Suggestions on the Organization of Mechanics' Clubs.

From T. P. PEMBERTON, *Brooklyn, N. Y.*—The season has arrived when educational activities and philanthropic enterprises for the improvement and amelioration of the industrial classes are put into operation. Among these special attention should be called to the organizations of mechanics' and workingmen's clubs, which within the last two or three years have been brought to public notice, and which are, and promise to be, productive of so much real benefit to communities as well as to those immediately interested in them. My object is to show bow such organizations can be mado more general, how they may be conducted advantageously, and how they may be maintained in their usefulness. Let me consider some facts familiar to all and pertinent to the subject in hand. Throughout the country there are cities and towns in which thousands of workmen are employed for 10 or 12 hours each day in various industrial pursuits. In many of these avocations both physical and mental exertion are required, drawing heavily upon the nervous system, which, when the strain is over, needs recuperation and relaxation—wants change. The working population naturally seek for this relaxtion, which is found in either completc quiet or rational amusements or scenes of excitement. The institutions especially organized and conducted for the mental improvement and rational amusement of mechanics and workmen are exceedingly few. Civil authorities, philanthropists and generous men can never meet sufficiently the general requirements in providing institutions for the mental improvement and elevation of the working classes. Here and there a millionaire may erect a mechanics' institute, "but what are they among so many."

It follows, after careful consideration of these facts, tbat movements having for their special object improvement, instruction, amusement, rational recreation, congenial associations and agreeable surroundings for workmen must be made by workmen themselves. Now, what has been already accomplished in this direction? In Boston, Philadelphia and Brooklyn and a few other prominent cities there have been organized mechanics' and workingmen's clubs under some special name. The club-rooms are neatly furnished. A piano, a reading-room and library, an apartment for games of chess, checkers and dominoes, talks by competent speakers on the scienco of familiar things, lectures by professors, musical and literary entertainments by both professionals aud amateurs, a mutual aid socicty, &c., are among the attractions. The club-room becomes a pleasant and cheerful resort for many intelligent artisans. But let it be understood that there is no charity here. A small subscription is necessary for membership. The clubs are for the most part self-supporting, some of them having quite a handsome surplus of funds; and those clubs which have been started by individual effort or philanthropic associations will in course of timo follow others in becoming self-sustainining. During last season one of the Brooklyu workingmen's clubs raised a library of 1000 volumes, including some very valuable works; they had song meetings, musical and literary entertainments, lectures on physiology, music, the Sandwich Islands, Utah, humorous readings, and lectures by well-known elocutionists and humorists, as well as papers on religious topics, fitly spoken

and in season on proper occasions. Religious creeds and politics are never discussed or interfered with.

At another of the Brooklyn clubs there is a large bowling alley, and a mutual relief society which attends to the sick and to members when out of employment. The Boston and Philadelphia clubs are on a much larger scale, and are in a flourishing condition. Mechanics' clubs are, therefore, no new experiment, and will, no doubt, increase in number. Already we note employers instigating and aiding them, and I believe, if properly and judiciously managed, they will be a great power and a great good; that they will tend to elevate and refine; that they will be a source of amusement and enjoyment to hundreds who to-day, when their daily business is over, are at a loss where to go for inexpensive rational amusement and instruction. I feel quite safe in saying, with strong conviction of its truth, that as a general thing mechanics and workmen have not the means to frequent costly amusements; but as a general thing they need and must have for their evening recreation something better than a tenement house or a cheap boarding-house, or barroom or second-class theatre can give them. As a most powerful and important body, they are capable of self-culture and self elevation, and of forming institutions inexpensive in character and ennobling in influence. I consider that to-day the most important and vital truth for mechanics to realize is their capability of self-elevation. Cooper Institutes are very rare. Evening business schools are none too many. The lack of mechanics' institutes can be met only by the formation of mechanics' clubs for evening instruction, mutual aid, mutual improvement and mutual amusement. By no other means can so many industrious workmen be reached and benefited as by their own mechanics' clubs. There are few communities in which one or more of these clubs can be organized, and I therefore submit the following practical suggestions for their formation. Of course those who are fortunate in having a happy family and a comfortable home have little inclination to look for outside amusements; but we know too well that there are thousands to whom such clubs would prove advantageous in more than one respect:

1. Eligible rooms in a good neighborhood to be used for library, reading, smoking and games, and a small gymnasium, if possible.

2. A board of three managers, who arrange and conduct all business, rent of rooms, payment of fees, disposition of apartments and furniture and games; entertainments, lectures and amusements; printing, advertising, &c.

3. A treasurer and secretary to take charge of funds, membership and correspondence.

4. Janitor to place and take care of property.

5. Librarian to take charge of books and papers.

6. Open every evening.

7. A debate or talk on some science or interesting topic every week. Positively no card-playing.

8. A monthly public lecture or first-class musical and literary entertainment, free to members.

9. Mechanical drawing and other branches taught, if rooms and teachers can be had.

10. An ample supply of games, and a piano open to all good players; amateurs in any accomplishment that may amuse or improve invited and interested in the objects of the club.

11. A relief fund for those out of work or sick.

The first outlay should be met by voluntary subscriptions and donations. Offices of curator, secretary, &c., should be filled by volunteers. Initiation fee might be $1; monthly subscription, 25 cents, and monthly subscription to relief fund also 25 cents. Of course the first outlay and furnishing rooms, &c., will be the main difficulty; afterward the club would be self-supporting. Very much can be done by volunteers, and if each member will study just what he personally can do to help the general prosperity of the club, there will be no trouble in reaching success. There are always those willing to help men who exhibit a desire to help themselves. A few simple rules and a very few well-selected officers, fully willing and competent, are all that are necessary for smooth and judicious management.

Problem in Board Measure.

From H. S. K., *Watsontown, Pa.*—My father is a subscriber to *Carpentry & Building*, and has called my attention to the problem in board measure published on page 203 of the issue for October. I have worked at the problem and obtain the following results: The area of the triangle is 1008 square inches. One-half of this will be the area of one of the two equal parts into which the triangle is to be divided—in other words, 504 square inches. By geometry, like dimensions of similar plane figures are as the square roots of their areas. Referring to the accompanying sketch, suppose D K to be the dividing line; then we would have two triangles, viz., $A\ B\ C$ and $D\ B\ K$. According to the rule above, $\sqrt{A\ B\ C} : \sqrt{D\ B\ K} :: P\ B : O\ B$. $A\ B\ C =$ 1008 square inches, or the area of the small triangle. The length of $P\ B$ is 12 feet, or 144 inches, and is the altitude of the larger triangle. $O\ B$ is the altitude of the larger triangle, and is the unknown quantity. Therefore, substituting numerical values, we have the $\sqrt{1008} : \sqrt{504} :: 144 : X$. By performing the calculations necessary, we find that X equals 101.823 inches, which is the altitude of the triangle $D\ B\ K$. Subtracting this from 144 inches, the altitude of the triangle $A\ B\ C$, leaves 42.177 inches as the distance from the base $A\ C$ to the line $D\ K$. I will be glad to know, through the paper, that I am correct in this solution. I am only a schoolboy, and shall be glad to see solutions proffered by more experienced persons.

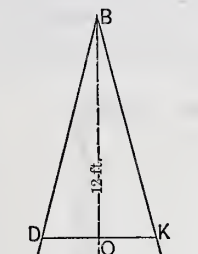
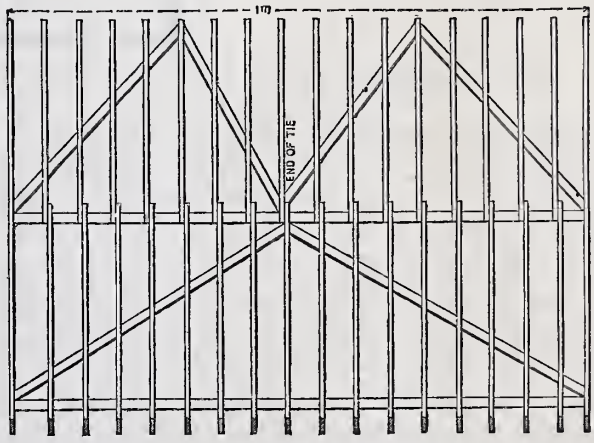


Diagram Accompanying Letter from H. S. K.

Truss Roofs.

From G. A. H., *Pacheco, Cal.*—In looking over the back numbers of *Carpentry and Building* I notice in the December issue for 1882 a communication entitled "Truss Roofs," from "F. S. W.," Cleveland, Ohio. In July of the same year I put up a hay barn, 30 x 110, with side sheds 16 feet wide. I put a tie across the center of the barn, well secured at each end to bolts and rafters. The roofs of the barn and sheds I trussed upon the same principle as that used by "F. S. W.," with the exception that instead of nailing the truss pieces on the under edge of the rafters I fixed them into the upper edge by notching the rafter. I nailed the roof boards to both rafters and truss. This plan has answered a satisfactory purpose, for there is no perceptible give to the roof yet. Last August I put up another hay barn on the same property. It is 10 feet shorter, but built on the same plan. I followed the method above described, with the same results, so far as experience indicates. I used rafters 2 x 6 inches, spaced 2 feet between centers. The truss pieces were 1¼ x 3 inches. I inclose a plan of my manner of bracing or trussing roofs. The upper part of the sketch shows one-half of the barn roof made one-third pitch. The lower part shows the shed roof one-quarter pitch.



Plan of Trussing Roofs, Submitted by G. A. H.

Adz.

From O. T. B., *Rochester, Ill*—I desire to inquire if the word "adz" is singular or plural. I overheard a carpenter talking a short time since, and he made use of the following expression: "I thought I had lost my adzes. The fellow who borrowed them brought them back to the house when I wanted them here. It was the best adzes I ever saw, but now I must grind them, besides all the worry, just to pay me for lending." You will sometimes hear a cooper speak of his adz as a pair of adzes.

Answer.—The word "adz" is singular. If a mechanic has two tools known by this name it would not be improper for him to refer to them as his adzes. In the quotation above, from the carpenter who had lent his adz, we see nothing but a disregard for grammatical rules on the part of the speaker, indicating a lack of education. Many other peculiarities of speech might be cited, all proving, however, nothing more than that those who make use of the terms in an unusual way are ignorant men. We have never before heard of the cooper's habit of speaking of this tool above mentioned. A pair of adzes we should understand to be two separate tools in the same sense as a pair of hammers or a pair of saws.

Fire-Proof Shutters

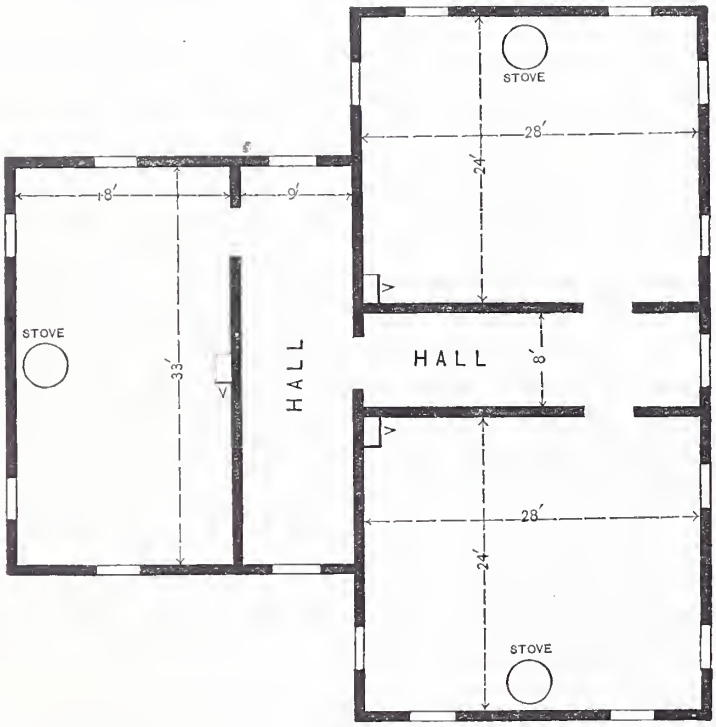
From T. J. M., *Fayetteville.*—I want more information than I at present possess about the construction of fire-proof window and door shutters. I refer to wooden shutters covered with tin. I desire to know how the tin should be applied to the shutters in question, and what width strips are best to employ in the wooden core of the shutters?

Answer.—There are several ways in which the wood shutters may be constructed, and also in which the tin or iron covering may be applied, each of which will probably answer a satisfactory purpose. The special features to be aimed at are sufficient stability in the wooden core to cause the shutter to maintain its shape, fit tightly and answer the general purpose in a satisfactory manner. For this purpose it may be made of two or three thicknesses of light stuff, tongued and grooved together and laid on diagonally, thus making the pieces cross each other in such a way as to be interlocking and self-bracing. A shutter that will answer satisfactory purposes may be made, so far as the woodwork is concerned, in a less expensive manner. After the woodwork is prepared, however it is put together, the points to be observed in covering are to make the covering, so far as possible, air-tight, and to avoid soldered seams. The latter are objectionable, because in the case of a fire they would melt, causing the wood to be exposed. The theory of the shutter is exclusion of air, resulting in very slow combustion, even when so much heat is applied as would ruin an ordinary iron shutter. The sheets of tin may be grooved together. Probably a plan analogous to that employed in laying a flat-seam roof, using sheets, however, much smaller than are usually employed in roofing, would be very satisfactory. A good tinsmith should have no difficulty in covering a smooth wooden door or shutter in such a way as to make a neat job and practically air-tight.

Question of Ventilation.

From J. M. G. & Co., *Mount Pleasant, Ohio.*—We inclose a draft of a schoolhouse which we desire to ventilate. The rooms seat from 45 to 50 students each. We propose putting in the Grosius ventilating stoves. We would like to know if pipes 10 x 20 inches from each room, where they are indicated by V on the plan, will be large enough. The pipes are to run from the floor through the roof. The building is two stories, the hight of each being 12½ feet.

Note.—The problem presented by these correspondents is one, perhaps, that may be profitably discussed by all who are engaged in the work of heating and ventilating. Two of the rooms in question are 24 x 28 feet in plan, with a ceiling hight of 12½ feet. These rooms have a cubic capacity of 8400 feet. A pipe of the size named by our correspondent has a capacity of 200 square inches on a little more than 1⅓ square feet. Our correspondents do not say how the draft through these ventilating-pipes is to be maintained, and, judging from their plan merely, we are justified in inferring that no artificial draft is contemplated. Under these circumstances we regard the system altogether inadequate. The system will be a failure, irrespective of the size of the pipes, unless



Question of Ventilation Proposed by J. M. G. & Co., Mount Pleasant, Ohio.

a strong draft is created in them by artificial means. Perhaps some of the practical ventilating engineers among our readers will see in this scheme an opportunity of reading a lecture to those who are engaged in this class of work without knowledge or experience, and if they choose to furnish us specifications of the thorough ventilating of the building we shall take pleasure in publishing them. We should mention that these correspondents hardly give enough particulars concerning the plan they propose to use to enable any one to pass an intelligent opinion upon it. They do not indicate where the ventilating-pipes are to open, although the inference is that they open near the floor. They do not indicate, either, where the fresh air is to be derived, although we may infer in this case that it is taken at some point near the stoves, the latter being located at opposite sides of the rooms from the ventilating-pipes. We shall be glad to see this question carefully considered by our readers.

Removing Ink Stains from Ivory.

From T. M. C., *Boston, Mass.*—I suggest to "O. B. M.," who inquires in a recent number of *Carpentry and Building* for some method for removing ink stains from ivory, to try soaking the rule in a dilute solution of oxalic acid. He can procure the crystals of this acid from any druggist. Dissolve the crystals in about 20 times their bulk of water. Most kinds of black ink will be entirely cleared away by this process. If the long soaking should make the ivory yellow it can be bleached by exposing it while moist to the sunshine in a box with a tight glass cover. Great care should be taken in using oxalic acid, as it is very poisonous.

Blackboards.

From J. Q. B., *Wacousta, Mich.*—I find, by inspection of the numerous public-school buildings, that nearly all of the blackboards in use are in a miserable condition. They are either slightly painted on wood or painted on plaster. I know of no school apparatus so defective in construction and unsuited to the requirements of the case, and so much neglected, as blackboards. Will you not submit the question of the best construction of blackboards to the readers of *Carpentry and Building* for solution? What is the best method of constructing blackboards, and what are the best materials to be employed for blackboards in public shools? How shall the reflection of light be overcome in them?

Note.—Without any desire to forestall the discussion of this question by our practical readers, we would remind this correspondent that various recipes have been published in our columns for the preparation and construction of blackboards. While our correspondent's statement that blackboards in the public schools are in a very bad condition for use may be correct, so far as relates to his particular section of country, we believe that for the most part in schoolhouses erected within the last 15 years the reverse of this is the case. The subject of blackboards has been pretty thoroughly discussed by both the educational and mechanical papers, so that we think there are comparatively few architects and builders who are not acquainted with better methods of constructing boards than the use of simple black paint upon a board or wall surface. Among the materials in the market which may be used for the purpose named, various preparations, known as liquid slate, silica, &c., answer an excellent purpose. We some time since described in these columns a material known as soapstone finish, which the manufacturers also recommend for use in the construction of blackboards. They furnish this material properly colored for the purpose, and, as the color would be as deep as the coating which was applied, a board so constructed would not be likely to wear out and would never be effaced. This surface, we have reason to believe, would be dead in character and not likely to reflect the light. As mentioned at the outset, we have no desire to prevent a free discussion of this question by our readers, and hope all that have anything to say upon it that will be of advantage to the craft at large will write us.

Ends of Floor Joists.

From W. C. C., *Pullman, Ill.*—Can you give me a formula for ascertaining the strain on the end of a floor joist cut in the common manner for fitting over the sill of a building? Such a form, if it fails at all, would, of course, split from the top of the cut into the body of the joist rather than by shearing. If such a formula were known it would be easy to proportion the tenons or gains so that the ends of the joists would be of equal strength with their centers. As more faults occur at such places than at all others in carpentry, it would seem that the question suggested is one of general interest to builders.

Note.—A correspondent gave the question raised by this subscriber some attention in our issue for November, 1882, and at that time presented about all that it seemed to us was worth while under the circumstances. The conditions which determine the cutting of a joist in the manner that our correspondent suggests are so arbitrary that we are under the impression that very few builders ever take the trouble to make calculations in order to avoid the difficulties. We know, of course, that this is no answer to our correspondent's suggestion, but, on the other hand, a formula that determines simply a theoretical safety point is of comparatively small importance when the entire strength of the piece can be secured by a modification of construction. Considering the varying character of timber, such a formula would be somewhat difficult of expression, and more difficult of use even when understood.

Ventilation of Upper Story.

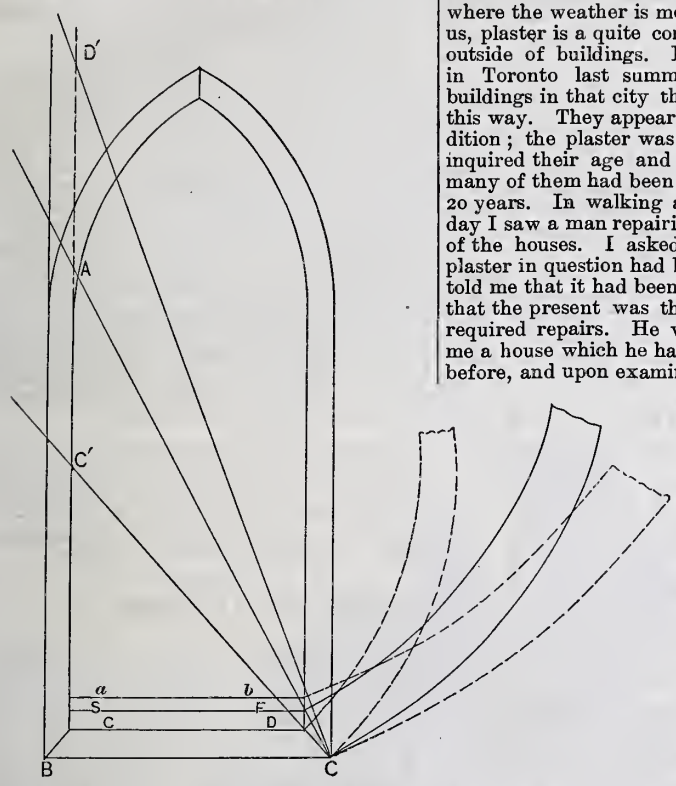
From W.—A neighbor of mine has a two-story house, the chambers of which are very close and hot during the summer months. They are evidently in need of more ventilation than can be obtained from the windows. I wish the advice of *Carpentry and Building* concerning the best and cheapest way of overcoming the difficulty. The building is 44 feet long and 22 feet wide. It has a tin roof, the pitch of which is 2½ inches to the foot, the highest part being in the center of the roof. The roof is hipped and slopes away on all sides to nothing. All the space between the under side of the roof and the plastered ceiling of the upper rooms is without ventilation. There is no way of ventilating this space save from the roof.

Answer.—The difficulty presented in our corespondent's letter is one very commonly met in frame and brick houses of the cheaper class. In many instances the ceilings of the chambers are very low and the windows of small size, which makes the lack of ventilation of the space above the ceiling more apparent than it would otherwise be. Our correspondent does not mention the hight of the upper story nor the size of the windows, but we have no doubt that in both of these respects the conditions are unfortunate. This being the case, it will be very difficult to do any more than slightly modify the present conditions. Thorough ventilation of the dead space above the ceiling will no doubt help in this direction. Just how this can be accomplished it is difficult for us to say without further particulars. If it is possible to make openings through the outside walls between the ceiling joists or between the rafters in such a way as to afford fresh air to that portion of the space that is least in hight, the desired result may be accomplished by combining with such openings a good ventilator located at the appex of the roof. The openings at the eaves should be numerous and should be as large as circumstances will admit. They can be protected by wire screens or perforated sheets of metal, in a way to avoid the annoyance of birds building their nests in them. The ventilator at the appex of the roof should have a capacity fully equal to or larger than the aggregate area of the openings. The ordinary form of ventilator, we think, would answer a good purpose, while, on the other hand, any of the newer forms

which are at present being handled by the trade will also give satisfactory results. If any of our readers have any better plan to suggest than the one we have offered, or any modification of our suggestion, we shall be glad to hear from them.

Splayed Work.

From J. D. A., *Memphis, Tenn* —In the number of *Carpentry and Building* for September I notice a communication from "J. R. L.," submitting a diagram purporting



Splayed Work.—Diagram Accompanying Letter from J. D. A.

to be a method for obtaining the arc of the splayed jamb of a Gothic window. Upon inspection I find the same incorrect, and I am persuaded that the correspondent has neglected something—just what, may be derived from the diagram which I inclose, and which shows how different results may be obtained by following his method. I would inquire, for the benefit of all concerned, what the lines B C and S F of the correspondent's diagram, and which are reproduced in my sketch, are intended to represent? I would also inquire what proportion should the distance between these two lines bear to the splay of the jamb? Suppose, for example, we make the line *a b* represent the line S F; we would then have a very different result from what your correspondent anticipates. The point *a* would be at the point D, making the radius of the article described greater than is required. Then, supposing the line S F is moved to the position indicated by C D. In this case the result would show a wide difference, also indicating that a great many different results might come from apparently the same rule. My business, which is that of an architect, gives me an interest in problems of this kind, and, while I understand this question thoroughly and apprehend what your correspondent evidently intended to convey, I fear that others may fail to see it clearly, and therefore I call attention to the problem in this manner, hoping that "J. R. L." will make the required correction.

Note.—The evident intent of the communication from "J. D. A." is to call attention to the fact that the correspondent whom he criticises has neglected to define the actual splay which the Gothic window frame is to have, and to show the relationship of that splay to the diagram which he has drawn over the frame for the purpose of obtaining the radius of the piece. Since we have already presented correct rules for obtaining patterns of this kind, there is, perhaps, less interest attaching to this problem now than at first. We shall be glad, however, if "J. R. L." will reply to the question, and to have others join in the discussion.

Outside Plastering.

From W. W., *Pittsburgh.*—Plaster upon the outside of buildings has been a common method of finishing for at least a hundred years. I have no doubt that at the present time it can be accomplished as well as formerly, the only requirements being proper materials and good workmanship. I must acknowledge, however, that in nearly every case where it has been attempted in this part of the country that a failure has resulted. On the other hand, in Canada, where the weather is more severe than with us, plaster is a quite common finish for the outside of buildings. During a short stay in Toronto last summer I noticed many buildings in that city that were finished in this way. They appeared to be in good condition; the plaster was firm and sound. I inquired their age and was informed that many of them had been finished upward of 20 years. In walking along the street one day I saw a man repairing the plaster on one of the houses. I asked him how long the plaster in question had been in use, and he told me that it had been in use 25 years, and that the present was the first time it had required repairs. He volunteered to show me a house which he had plastered 31 years before, and upon examination it appeared to be in excellent condition and gave the promise of lasting 30 years longer. This particular house had an important advantage over many others that I saw. A deep stone-base course kept the plaster high and dry above the accumulation of snow and the splashing of water from the ground. Exterior plastering is like everything else. If proper materials of a good quality are used, applied intelligently, and in the best manner, the result will be satisfactory work. I believe the reason that outside plaster has not been successful in this vicinity is on account of using improper and inferior materials. I think the sand in particular has been at fault. No plastering, either inside or outside, can be made of a satisfactory quality without using good, sharp, clean sand. This is a material that cannot be easily got at all times, and, accordingly, plasterers sometimes resort to soft bank sand and loam. These will not make a good cement, no matter how good the lime may be. This, I take it, is the reason which causes plastering on the outside of buildings about Pittsburgh to prove a failure in the majority of cases.

From S. C., *Toronto, Ontario.*—In reponse to an invitation contained in *Carpentry and Building*, a short time since, for records of practical experience in the use of outside plastering, I would say that rough casting is no experiment in this city, or in this section of country, for that matter. It is probably more frequently used for the outside covering of houses and outhouses than all other materials combined. For this reason, probably, a stranger coming from the States would say of this city, as did a correspondent of a Detroit paper a short time since, that it is "an old-looking place. Its narrow streets, old-fashioned buildings, and its general foreign appearance gives the impression at once that you are in some old English village which is about 100 years behind the times." The main reasons for using plastering in this vicinity are, I think, cheapness and the protection which it furnishes against fire. The fire laws permit the use of this material within what are called fire limits. Aside from these reasons it has no merit whatever. Its general use has become so monotonous that, to some minds at least, a log-hut in the wilderness would seem to possess architectural beauty in comparison. Rough casting, after being on a house two or three years, assumes a dingy, dirty-drab color that reminds one of a cloud. It soon breaks off, exposing the lath in places, which is certainly anything but pleasing to the occupants of the houses, especially in winters of the kind that we usually have. If the breaks are repaired, as such places sometimes are, the new work presents a different color from the old. In some houses three or four patches in different stages of coloring will be noticed. In these days of fire-proof paint and Queen Anne style of architecture rough casting in my estimation is an outrage upon architectural beauty, and in this so-called Queen City of the Dominion is an insuperable obstacle in the way of the the really beautiful construction which otherwise might be introduced.

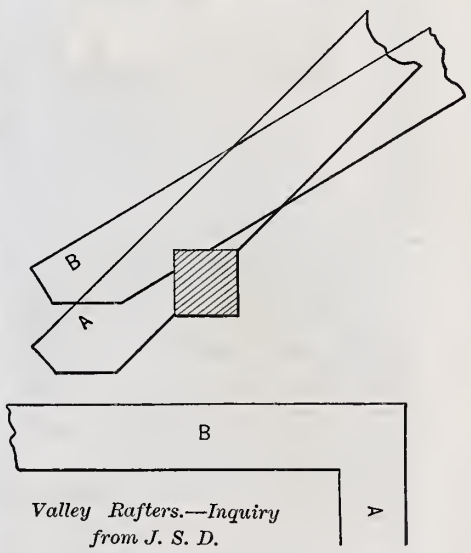
REFERRED TO OUR READERS.

Warm Houses.

From P. F. D., *Fairport, N. Y.*—I am not a mechanic, and yet I am an appreciative reader of *Carpentry and Building*, and I confess myself constantly indebted to it for many valuable ideas. While so much is being done for house plans and house construction and details, it occurs to me that no one has called attention to the general need of frost-proof walls for frame dwellings that could be employed at moderate expense. So far as my observation of house building extends, hemlock sheeting covered with cheap paper seems to be the commonly accepted limit of effort in this direction. The suggestion that economy and comfort would warrant one or more air spaces between the walls, lathing, for instance, with one coat of rough plaster midway between the stud, might do much to this end. The object of this communication is to ask what practical builders have to offer to the householder who would construct a comfortable home and whose means are moderate.

Valley Rafters.

From J. S. D.—Will some of the readers of *Carpentry and Building* be kind enough to inform me of the method of locating the valley rafter when two intersecting roofs are not the same pitch? For example, in the accompanying diagram, the roof marked A is to be 45° pitch, while that marked B is to be 8 inches to the foot. What I want to



Valley Rafters.—Inquiry from J. S. D.

know is where on the face of the plate will a valley rafter be located, so that the two roofs will intersect upon the center of it?

Framing Flag Poles.

From C. N. M., *Redfield, Ohio.*—I would like to see discussed, in the columns of *Carpentry and Building*, the best methods of framing flag poles where there is a splice in the top bar. I would also like to see discussed the question of construction to be employed at the cross-tree, and likewise the best splice to be used in the lower section. It is very popular nowadays for political parties to raise flag poles, and builders are frequently called upon to frame and prepare such work and to superintend the erection. Accordingly, these questions are of general interest to the readers of the paper.

Circular Kerfing.

From W. R. W., *Cambridge, Ohio.*—I desire to refer a question to the many readers of the ever-welcome *Carpentry and Building.* I have a circular bay window, the radius of which is 8 feet. I wish to know how to get the lines for kerfing a 6-inch spring molding around the coruice. If some of my brothers in the trade will answer it will not ouly be a favor to me, but doubtless to others also.

Corrugated Roofing.

From I. D., *Dolgerville.*—If some reader of *Carpentry and Building* who has had practical experieuce will explain the best construction of corrugated iron roofs, with directions for painting them, he will confer a favor upon the writer and probably other readers of the papor.

TRADE PUBLICATIONS.

Portable Houses.

As a new article of manufacture and sale, portable houses seem to be coming into greater favor of late than ever before. The demand for buildings of this kind exists in various directions. They are wanted in frontier towns, where building materials and the mechanics for putting up buildings are alike scarce, and where buildings are wanted upon the shortest possible notice. They are also in demaud wherever large engineering work is in progress and where suporintendents, foremen and workmen are to be housed at some considerable distance from towns. There is also a certain demand for them at the seaside for summer cottages and likewise in the mountains. A demand also exists for export, and much work of this kind is being sent from both this country and Canada to various points in the West Indies, Mexico, the Central American States and to South America. We do not know how many companies and firms are engaged in this line of manufactnre in the United States. Some have essayed this business and have given it up because it did not prove satisfactory. Others have continued in it with apparent prosperity. We have recently received several circulars of firms engaged in this line of business, which we shall notice briefly.

The American Portable House Manufacturing Company, whose office is at 31 Wall street, and whose factory is at Corona, Queens County, N. Y., have issued a pamphlet circular describing the special features of the houses they manufacture. The houses made by this company are constructed under patents issued to Earl Lee, manager of the company, and bearing date August, 1880. The construction, which is somewhat difficult to iudicate by verbal description alone, is such that the parts as they leave the factory are readily combined at the site upon which the house is to be erected with very few nails or screws. No fitting is required and very few tools are necessary to put up the house complete. The walls of the houses are double and are composed of ½-inch siding 10 inches wide, which is grooved into the corner posts and studding. Each siding-board is cleated on the inside every 3 feet of its length, and these cleats come between the outer and inner board. The cleats are depended upon to prevent warping or splitting, whether in or out of the building. The window frames are made into the solid. All the parts of the building are braced and held together with iron rods having turnbuckles or nuts to adjust them, by which strength and firmness are secured. One of the illustrations in the pamphlet shows the construction of the panel siding and roof used by this company. The panels are made of ½-inch stuff, worked 4½ inches wide, and tongued and grooved. Panels are made of two thicknesses, the outside running vertically and the inside at right angles to it or horizontally. Tarred roofing felt is placed between the two thicknesses for roof panels, and rosin-sized sheeting paper between the thicknesses for the siding panels. A considerable portion of the pamphlet is devoted to different designs for small buildings suitable for watchmen, laborers, small families, &c. Among the special purposes to which some of these buildings are devoted may be mentioned icehouses, photograph galleries, shooting boxes, churches, &c.

We have also received circulars from the Portable House Construction Company, whose office is at 130 Dearborn st., Chicago. The circular contains a number of illustrations of houses, stores, hotels, &c., accompanied by a list showing the cubic feet occupied by each when packed for shipping, shipping weight and price. The last page of the circular contains a perspective view of a skeleton of one of theso buildings, showing at a glance the details of construction. The special feature is the dovetail joints which are employed in all places. The dovetail principle is also extended to the coverings for the sides and ends of the building. A section of double dovetail covering is also presented. In addition to the double dovetail covering the company furnish buildings with clapboard siding, drop siding, and shiplap siding. In a supplementary circular these three styles, including the dovetail covering, are fully illustrated.

Messrs. Lindsley & Co., whose office is 484 Lumber street, Chicago, in addition to illustrated circulars of their portable buildings, have favored us with a tracing showing their patent construction. Dovetailed joints are also used to a greater or less extent in the construction followed by this company. The wall filling and roof panels are let into the framework by grooves in such a manner as to be held thoroughly in place. The circulars which they have sent us contain designs of buildings for various purposes, and are accompanied by price list, with shipping weights and other desirable particulars. The double walls of the buildings, ⅞ inch in thickness, are beaded inside and wainscoted. Partitions are ⅞ inch thick. Doors and windows are cased inside and outside, and are shipped with the hardware attached. All the buildings are priced painted.

In the construction of buildings where portability and convenionce of transportation are prime requisites it would appear at first thought that there is possible but very little variation in design. On comparing the different illustrations contained in the several circulars before us, however, we find that there is much more variety in this respect than would at first be supposed. Not only is this variety apparent among the designs of each individual company, but it is still more apparent in comparing the group of designs of one firm with those of another. Some very tasteful cottages and houses of moderate size are showu in these illustrations, indicating that there is a range of choice in work of this kind for those who have occasion to purchase it.

Painted Buildings.

We have received from Messrs. Geo. D. Wetherill & Co., No. 56 North Front street, Philadelphia, a copy of their "Portfolio of Artistic Designs of Buildings." The work consists of 24 quarto plates on cardboard, neatly put up in what may be described as a portfolio box, and secured by a ribbon. A sample sheet of the colors—"Atlas Ready-Mixed Paints"—manufactured by the firm is also included. These goods the manufacturers guarantee to be genuine linseed-oil paints. The variety of colors and shades is large, and the samples are neatly arranged, making a very showy card. The plates show the application of the colors to house painting. The same designs are shown treated in different ways, thus affording the painter a chance to show his customers how a given building will appear with different combinations of colors. On the back of each plate there is given a key to the colors employed. Four houses, a church, a stable and carriage-house and two interior studies are presented in this manner. The designs of houses shown range from the conventional Quaker mansion current 50 years ago to the modern Queen Anne cottage. Considering the difficulty of correctly representing the painting of a house by a small picture in this manner, the plates are well done, and the portfolio is a desirable addition to architects' and builders' libraries. It would be still more valuable, however, if the commonplace in colors and contrasts had been more widely departed from.

TRADE NOTES.

Among receut sales mado by the Egan Company, of Cincinnati, there is reported a complete outfit for a planing mill at Chattanooga, Tenn.; also of a furniture factory at Rome, Ga.; a coffin works at Batesville, Ind., and a bracket factory at Spades, Ind., besides a large number of single machines shipped in various directions. This company report business very fair, taking into consideration the general depression which exists throughout the business community.

The Cincinnati Corrugating Company have established an Eastern agency in Philadelphia. Messrs. Lindsay, Parvin & Co., 328 Walnut street, are the agents. Through this house they are successfully introducing their corrugated sheet iron, shcet steel and sheet zinc into the Eastern market. A number of contracts for roofing that have recently been executed by this firm may be mentioned. Among these are tho buildings of the Pennsylvania Agricultural Society, Philadelphia; coal breakers for Messrs. Coxe & Co., at Derringer, Pa.; also coal breakers for the Buck Mountain Coal Company, at Delano, Pa., and for the Lehigh Valley Coal Company, at Wilkesbarre, Pa. Tho have also roofed several new buildings for the Delaware and Hudson Canal Company.

The firm of A. Hammacher & Co., No. 209 Bowery, New York, importers of French band-saw blades, has been changed to Hammacher, Schlemmer & Co. The firm is now composed of Albert Hammacher, Wm. Schlemmer and Chas. F. Goepel.

STRAY CHIPS.

William B. Morgan is building on Vermont avenue, between N street and Iowa Circle, Washington, D. C., a handsome house, which he expects to occupy before Christmas It is 25 x 70 feet on ground floor, and will cost $12,000. The parlor and library will be finished in cherry, and the dining-room and hall in oak. Tho house will contain 13 rooms, and in addition a high attic, which may be divided into rooms at any time. The front will be of pressed and molded brick, with Hummelstown brown-stone water-table, lintels and steps. The house will be heated by furnace, and will have all modern improvements. Robert Stead is the architect and W. C. Morrison, builder.

W. E. Mansur, of Bangor, Me., has furnished plans for the following improvements: A three-story hotel, 30 x 45, for T. N. Egery, at Dedham; a double frame house for Morse & Co., of Bangor, cost about $3500; station-house, 25 x 60, two stories, at West Cove, Moosehead Lake, for Boston and Portland Railroad; frame dwelling for Fred. Johnson, of Bangor, to cost about $4000.

An extensive cotton goods mill is in progress of erection at Yazoo City, Miss., by Messrs. Phillips, Marshall & Co.

A new Episcopal church building is under construction at Glen Cove, L. I. It will cost about $12,000, and will be erected for tho Rev. J. C. Middleton.

The First Methodist Episcopal Church at Grafton, Ill., are erecting a stone building, 80 x 120 feet in size, to cost $60,000. George H. Helme is the architect, and William D. Richardson the builder.

The Young Men's Christian Association are putting up a brick building, 50 x 157 feet in plan and three stories in hight, at Springfield, Ill. The cost is placed at $20,000. S. A. Bullard is the architect and John T. Rhodes the builder.

A building, 76 x 132, to be used as a family hotel, is being erected by Willard White, corner Dudley street and Woodward Park, Boston.

R. C. Church, of San José, Cal., is making additions to his building, corner Market and San Fernando streets, that will call for an outlay of $10,000. B. J. Clinch is the architect in charge, and J. Gleason the contractor.

A young men's library association building is being erected at Buffalo, N. Y., from plans furnished by Leo Eidlitz, of New York. The cost will be $250,000.

Messrs. Curtiss & Bennett are the architects for a two-story and basement frame dwelling in progress of erection at Napa City, Cal., for Mrs. Yant; cost, $10,000. Grey & Stover have the contract.

Messrs. Bruce & Morgan, of Atlanta, Ga., are the architects of the new $30,000 court house to be put up at Covington, in that State.

Albert Cook, of North Vassalboro, Me., is erecting a building for factory purposes, 35 x 80 feet in dimensions and two stories and basement in hight.

Our regular Denver correspondent, who has kept our readers so thoroughly informed about building matters of that city for many months past, writes to us that at present comparatively little building is being done in that city. During July only 33 permits were granted for work aggregating in cost $60,500. In August only 35 permits were issued for work to cost $48,570.

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Seven-Room House in Brick.

The accompanying perspective, elevations and details form the study submitted by Mr. T. C. King, of Des Moines, Iowa, in our Twelfth Competition, and were awarded the second prize in that contest. The subject of the competition referred to was elevations and details of a house in brick, built to the set of plans that had previously been used in similar studies of frame construction. We have already presented the first and third prize designs in this competition, so that our readers are familiar with the subject. Mr. King's elevations have been carefully considered and his details thoroughly worked out, although there are not as many of them presented as are sometimes given. A contrast between the color of the stone used in the belt courses and for window caps and other trimmings and that of the brick is depended on for some of the effect of the design. This is indicated in both the perspective view and in the elevations.

PERSPECTIVE VIEW OF SEVEN-ROOM HOUSE IN BRICK RECEIVING SECOND PRIZE IN TWELFTH COMPETITION.

T. C. King, Architect, Des Moines, Iowa.

Bog oak, which the chemical action of the peat-water renders perfectly black, is very rarely obtained in a sound state, and in most cases the outer portions of the tree or log are rotten, and useless even for fuel purposes. When laid up for use, care must be taken that it is not placed in the open air, lest it may, from the sun's rays, become open and shattered into chips from end to end. To preserve it, it must be put into some cool place and left to dry gradually, and when properly seasoned it must be cut in lengths of from 2 to 4 feet, and these lengths be split again and the sound parts removed from the unsound. It takes from four to six years to season some specimens, as in many instances the wood is found at a depth of 8 feet and sometimes 10 feet under the surface. The finish is not quite perfect until the article has been for some time in use, and the longer the finer the article seems to be, no matter whether used as a personal or table ornament.

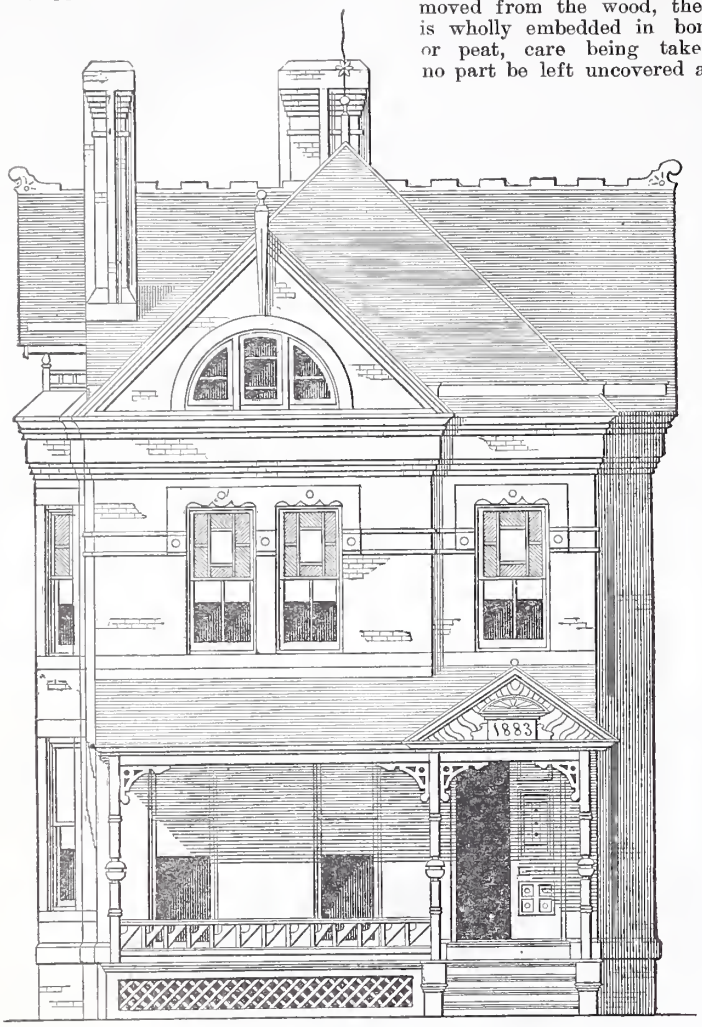
Setting up Machinery.

Various readers of this journal have occasionally worked as amateur millwrights or machine erectors. The following remarks on this subject, by Mr. James F. Hobart, which we find in a recent issue of the *Cabinet Maker*, will undoubtedly prove interesting to numerous subscribers:

When we first went to work as a millwright we thought everything of "lines and levels." We would spend three hours getting a line by which to set up a cylinder planer. Plumbing down from the line-shaft in two places some distance apart we drew a line on the floor. We measured off from this line to where the planer was to stand, drew another line on the floor and set the cylinder-shaft true with it by plumb lines from each end. The counter-shaft was put up in the same manner. We measured off on the floor plumbed up to floor joist, and hung up two plumb-bobs; then brought the center of the counter to them and bolted it up level; time, seven hours. A few days since we had occasion to put up a swing-saw. It was a well-built iron-frame concern, made by Lovewell, of Chelsea, Mass. The counter-shaft ran in bushings on which the frame was to swing. A set-screw bearing on an intermediate shell held the bushings in place. We had a bench made and fastened to the wall, regardless of being square with the shafting. Hanging the saw up loosely on four lag screws through the frame to which its hangers were bolted, we laid a steel square against the saw and rest upon the bench, moved the saw until it would swing square, and then screwed it up for good.

This saw required the belt to run around a corner. We do not like loose pulleys, so we fitted the corner shaft with a bottom step and top box. We stretched a silk line be-

tween the tight and loose pulleys on the saw counter-shaft and extended it beyond the place where the corner shaft was to hang. From this line, opposite the main shaft, we measured off half the width of the pulley on the saw counter, plus half the diameter of the drive pulley on the corner shaft, and bolted the top box to a floor joist plumb over this point. We then put the shaft in the box and put on a temporary collar to hold it up. The step we hung in place by three ¾-inch rods, which were threaded and fitted with two nuts at each end; these rods were bent to fit, and were put through holes in a flange on the step, and the other ends through holes bored in the floor joist. They were adjusted by means of a long thread cut on the upper end of the rods. The drive pulley on the corner shaft was moved up so it sighted to the top of the pulley on the counter-shaft. The other pulley on this shaft was sighted to line with the bottom of the drive pulley on the main shaft, which was in turn sighted and slid along the shaft until it lined with the face of its driven pulley on the counter-shaft. Of course we had to look out and not get our corner shaft up where the pulley would come in the way of a hanger, but that can be easily guarded. We put on the belts, started up this saw, and the belts ran true; time, 2½ hours. The saw counter is level; it must be to make the saw cut square. The corner shaft may not be exactly plumb, and we don't care whether it is or not; it is not necessary. Two lines of shafting can be connected by a belt, no matter at what angle they may stand, provided they both lie in planes parallel to each other. If the angles of the planes are not greater than 15 or 20 degrees, a belt can also be made to transmit power to advantage without the use of guide pulleys. If the angle exceeds this the belt will slip off, owing to the stiffness of its material, and give trouble. In putting up this saw, it would have required two hours to run lines, and an hour more to square the bench to the lines.



Second Prize in Twelfth Competition.—Front Elevation.—Scale, ⅛ Inch to the Foot.

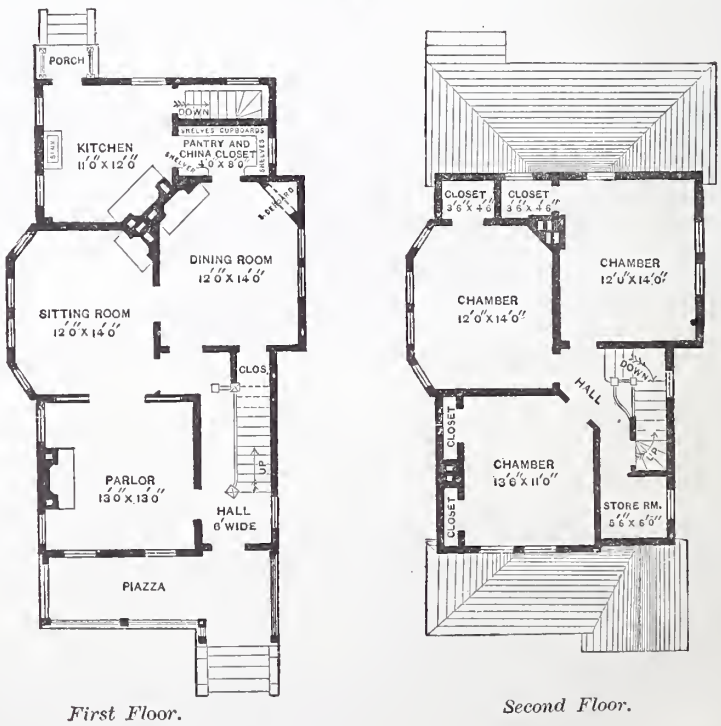
One more process for the expeditious seasoning of timber has just been made public by Herr E. Rossdeutscher, of Potsdam. The process, in which heat is altogether dispensed with, is, as will be seen, of a very simple character. After the bark has been removed from the wood, the latter is wholly embedded in boneblack or peat, care being taken that no part be left uncovered and exposed to the air, which would cause "shakes" in the timber. The moisture contained in the wood will be readily absorbed by the before-mentioned materials, and, after having been thus covered for from 10 to 14 days, the wood may be taken out, and will be found thoroughly seasoned, free from all fissures, and is then ready for use.

Wood Stains.

To turn oak black, so as to cause it to resemble ebony, the wood should be immersed for 48 hours in a hot, saturated solution of alum, and then brushed over several times with a logwood decoction, prepared as follows: Boil one part of best logwood with 10 parts of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one-half. To every quart of this add from 15 to 20 drops of a saturated solution of indigo, completely neutral. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdigris in hot, concentrated acetic acid, and repeat the operation until a back of the desired intensity is obtained. To imitate rosewood a concentrated solution of hypermanganate of potassa is spread on the surface of the wood, and allowed to act until the desired shade is obtained. Five minutes suffice ordinarily to give a deep color. A few trials will indicate the proper proportions. The hypermanganate of potassa is decomposed by the vegetable fibers with the precipitation of brown peroxide of manganese, which the influence of the potassa, at the same time set free, fixes in a durable manner on the fibers. When the action is terminated, the wood is carefully washed with water, dried and then oiled and polished in the usual manner. The effect produced by this process on several woods is remarkable. On the cherry especially it gives a beautiful red color.

Metrical Contractions.

The following contractions were adopted by the recent International Metrical Congress at Paris, and are recommended for general use: 1. Length—kilomètre, *km;* mètre, *m;* decimètre, *dm;* centimètre, *cm;* millimètre, *mm.* 2. Surface—square kilomètre, km^2; square mètre, m^2; square decimètre, dm^2; square centimètre, cm^2; square millimètre, mm^2; hectare, *ha;* are, *a.* 3. Cubic Measure—cubic kilomètre, km^3; cubic mètre, m^3; cubic decimètre, dm^3; cubic centimètre, cm^3; cubic millimètre, mm^3. 4. Hollow Measure—hectolitre, *hl;* litre, *l;* decilitre, *dl;* centilitre, *cl.* 5. Weight—ton (1000 kilogrammes), *t;* metric hundred-weight (100 kilogrammes), *q* kilogramme, *kg;* decagramme, *dkg;* gramme, *g;* decigramme, *dg;* centigramme, *cg;* milligramme, *mg.* Italic letters are used for these contractions, and no stop is to be used at the right of them. The contractions succeed the figures to which they refer, on the same line, and after the last decimal placed when figures are used which contain decimal fractions.



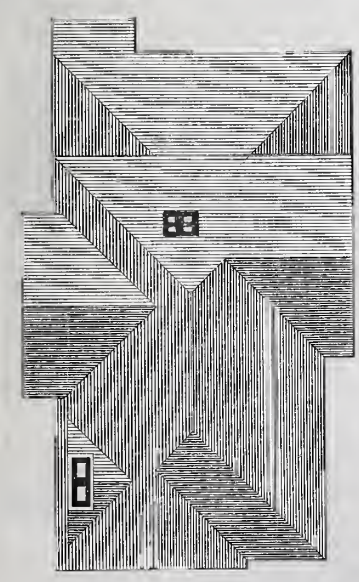
First Floor. *Second Floor.*

Floor Plans.—Scale, $\frac{1}{16}$ Inch to the Foot.

Beauty in Fire Screens.

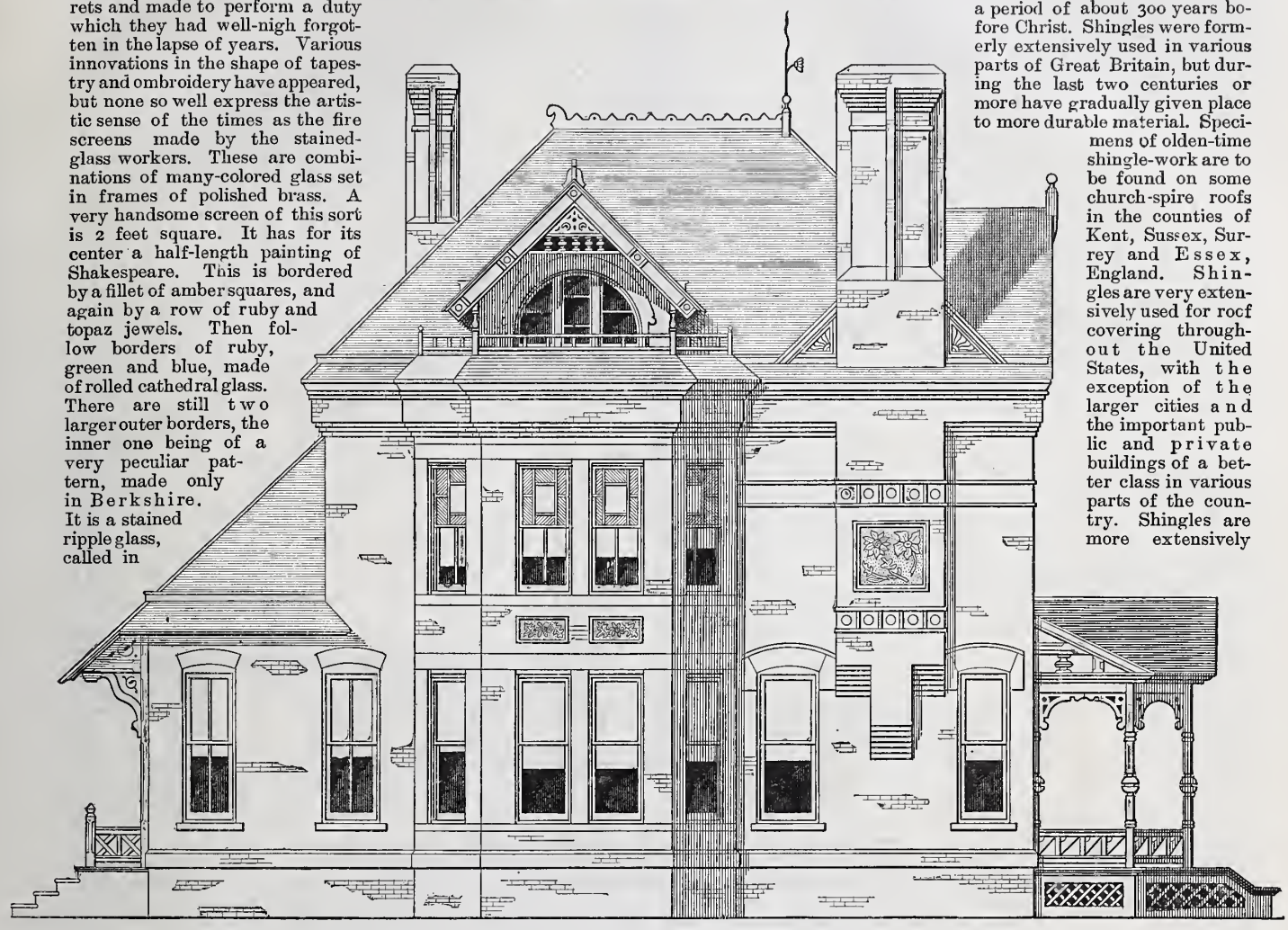
The popularity of open fireplaces has created a great demand for fire screens. Old fashioned samplers, made by our grandmothers, have been brought down from garrets and made to perform a duty which they had well-nigh forgotten in the lapse of years. Various innovations in the shape of tapestry and embroidery have appeared, but none so well express the artistic sense of the times as the fire screens made by the stained-glass workers. These are combinations of many-colored glass set in frames of polished brass. A very handsome screen of this sort is 2 feet square. It has for its center a half-length painting of Shakespeare. This is bordered by a fillet of amber squares, and again by a row of ruby and topaz jewels. Then follow borders of ruby, green and blue, made of rolled cathedral glass. There are still two larger outer borders, the inner one being of a very peculiar pattern, made only in Berkshire. It is a stained ripple glass, called in the trade "beefsteak." The outer ripple is sea-green. The combination of these borders of different-colored glass forms a very handsome frame to the picture.

The leading of this screen is in regular lines, but in another screen of the same size



Roof Plan.—Scale, $\frac{1}{16}$ Inch to the Foot.

the leading runs in every direction, as it does in many stained-glass windows. This screen is made of cast opalescent glass, and the design seems to be a quarter moon rising among clouds. It is studded with jewels and surrounded by a fillet of rolled cathedral glass. The upper half of a small screen has the head of a saint, with squares of opalescent glass, and the lower half is a panel of pierced brass. These screens are made from designs drawn out in detail by artists, and as specimens of stained-glass work they cannot be surpassed. A more simple style of screen consists of a picture surrounded by squares of sheet glass, each square being picked out in some pattern. These possess none of the brilliant contrasts of color found in the opalescent and rolled cathedral screens. While these screens are expensive, they are not so costly as might be supposed, the price of the one first described being $55, and that of the second one $50. A ready sale is found for such screens.



Second Prize in Twelfth Competition.—Side Elevation.—Scale, ⅛ Inch to the Foot.

Shingle Roofs.

The form of roof known as a shingle roof is of the greatest antiquity. When it originated or by whom invented history fails to tell us. It is probably one of those things of natural growth which never had a definite beginning, but came up by gradual steps of improvement from a very primitive form to its present shape. Reasoning by analogy, it may have originated in an attempt to imitate the feathers of birds, which shed water in a most remarkable manner. Its prototype is also found in the arrangement of leaves on certain trees. It may have been preceded by the thatch and some forms of bark roofs, and those have come into use as an improvement on a still more primitive type. Shingle roofs may be described as pioneers in roof construction. When timber is abundant a shingle roof is one of the cheapest that can be constructed. Its lack of durability in a comparative sense, and its frequent destruction by fire, make it less desirable than other materials; accordingly, as lumber becomes scarce, as house owners become wealthier, and as buildings improve in character, shingle roofs give way before material better adapted to stand the test of time and exposure to fire. In ancient history we find occasional reference to shingle roofs at different periods, showing that this form has been employed in various parts of the world during a very long period of time. We learn that shingles were used in Rome until a period of about 300 years before Christ. Shingles were formerly extensively used in various parts of Great Britain, but during the last two centuries or more have gradually given place to more durable material. Specimens of olden-time shingle-work are to be found on some church-spire roofs in the counties of Kent, Sussex, Surrey and Essex, England. Shingles are very extensively used for roof covering throughout the United States, with the exception of the larger cities and the important public and private buildings of a better class in various parts of the country. Shingles are more extensively employed in the newer sections of the country than in the older, and the use of shingles upon roofs is to a certain extent an indication of the class of buildings that are being erected. As pine timber becomes scarcer, and as prices for shingles gradually advance, their use is likely to be more and more restricted until it is possible that in this country, as in England, the time may come when their employment will be the exception. A shingle may be described as a flat, wedge-shaped piece of timber of varying dimensions. Shingles are made in length from 12 inches as a minimum up to 24 inches, and in a few cases still larger. In width they vary from 3 inches, which is about the smallest that can be used advantageously, up to the widest possible that can be readily obtained from the tree out of which they are cut. The thickness at the butt varies from $\frac{3}{8}$ inch to nearly $\frac{3}{4}$ inch with the different lengths. The points are from $\frac{1}{16}$ inch to $\frac{1}{8}$ inch in thickness. The most common sizes employed are 16 and 18 inch. In some portions of the Eastern States 18-inch is the standard, while in the vicinity of Chicago and throughout the West 16-inch is the standard. In a commercial sense, a shingle is a piece 4 inches wide, and in speaking of 1000 shingles we mean the equivalent of 1000 pieces of whatever length, 4 inches wide.

The hotel building now in progress of erection at Atlanta, Ga., known as the Kimball House, will cost $750,000. One of the peculiar features of construction will be the roof, which will be handsomely tiled. It will be inclosed on all sides with a parapet wall set back from the edges, and will be partially covered with a beautiful garden. It will be illuminated by the electric light.

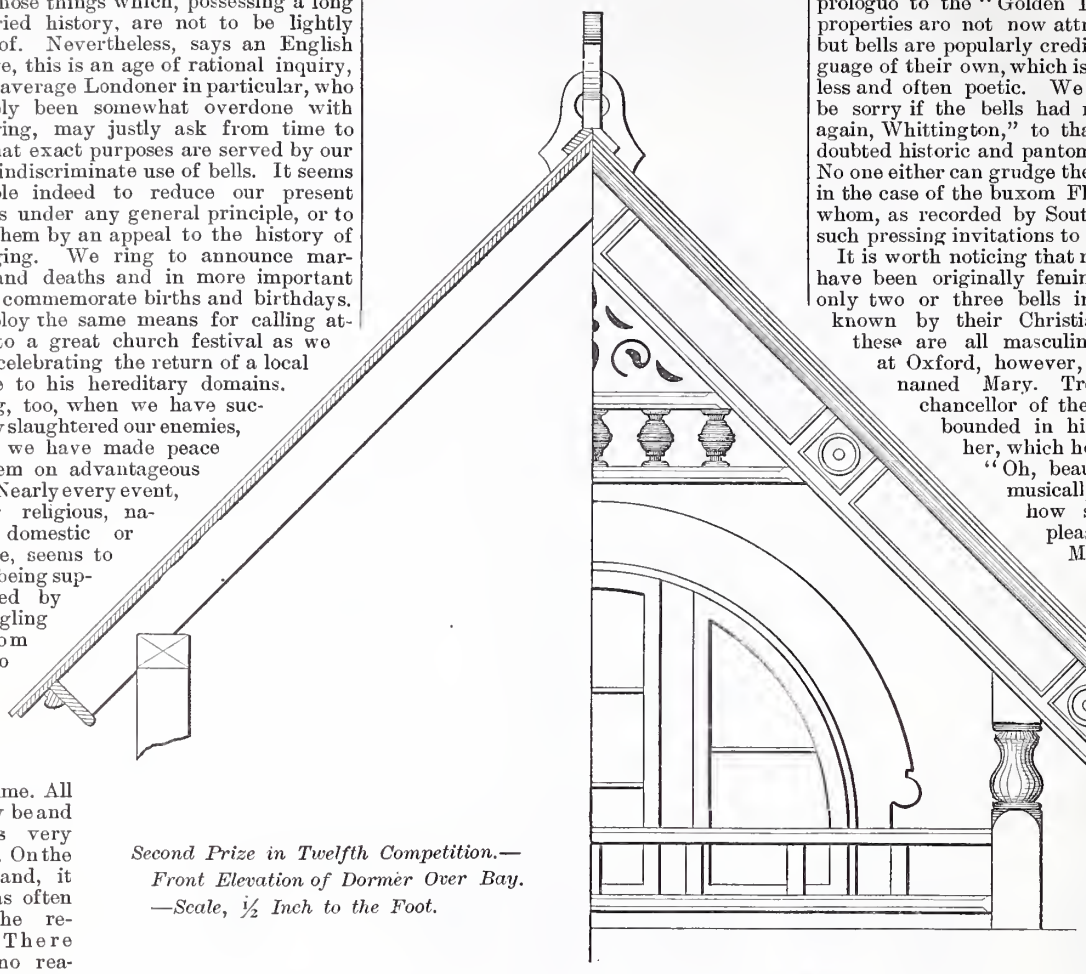
Bells.

Bells, and especially church bells, are among those things which, possessing a long and varied history, are not to be lightly spoken of. Nevertheless, says an English exchange, this is an age of rational inquiry, and the average Londoner in particular, who has lately been somewhat overdone with bell-ringing, may justly ask from time to time what exact purposes are served by our wonted indiscriminate use of bells. It seems impossible indeed to reduce our present practices under any general principle, or to justify them by an appeal to the history of bell-ringing. We ring to announce marriages and deaths and in more important cases to commemorate births and birthdays. We employ the same means for calling attention to a great church festival as we use in celebrating the return of a local magnate to his hereditary domains. We ring, too, when we have successfully slaughtered our enemies, or when we have made peace with them on advantageous terms. Nearly every event, whether religious, national, domestic or mundane, seems to require being supplemented by the jangling of from eight to twelve bells for a shorter or a longer time. All this may be and often is very suitable. On the other hand, it is just as often quite the reverse. There seems no reason why, without injury to anybody's feelings, we should not place this matter on a common-sense footing. It would be reverent as well as rational to do so. History shows us the bell under three very different aspects. Its first uses were utilitarian only. Its second were ceremonial and superstitious. Its third, as we have remarked, form an incongruous medley. Little bells are, of course, far more ancient than their larger relatives, but use was the first thing thought of in any case. Eveu the bells which ornamented the robe of the Jewish high priest were meant, as Dean Hook assures us, to give notice to the people of his approach. The Romans used them to signify their times of bathing. In early times, before Christianity was recognized by the civil power, they could not, of course, be used for ecclesiastical purposes. Then they were adopted as the ordinary means of communication already customary. Paulinus, Bishop of Nola, caused a large brass vessel to be hung up and struck with a hammer. At least, tradition says he did, although Bingham treats belief in his ingenious conduct as a "vulgar error." Anyhow, some such custom soon became universal, even among the Greek Christians. It is curious that the first introduction of a mystical element seems to have originated with the Turks, who, after the taking of Constantinople, prohibited them, lest their sounds should disturb the repose of the souls who are wandering in the air. The bells of Sens certainly performed an analogous, if more material, feat, for at the siege of that city, in 610, the army of Clothaire was frightened away merely by the fact of their being rung. Turketulus, abbot of Croyland, seems to have first hit on the brilliant idea of christening his bells, but he was quite practical about it. One he called Turkettul, after himself, and others had such names as Guthlac, Tatwin, Pega, and Bega, which at this distance of time we may perhaps conclude to have been the namos of his intimate friends. There is a long interval between such a ceremony as this and the celebrated baptism of a peal performed by the Bishop of Châlons. On that occasion "the holy and happy family of bells" one and all received saintly cognomens, Marie, Seraphine and Prudentienne being among the number. The ceremonies of the mediæval church, in fact, both in connection with the casting and dedicating of bells, were of an extraordinary elaborate nature. But if we should now regard these as dictated by superstition, it is at least well to observe that it was entirely consistent behavior. The recognized functions of a bell from their point of view are summed up in the old monkish distich :

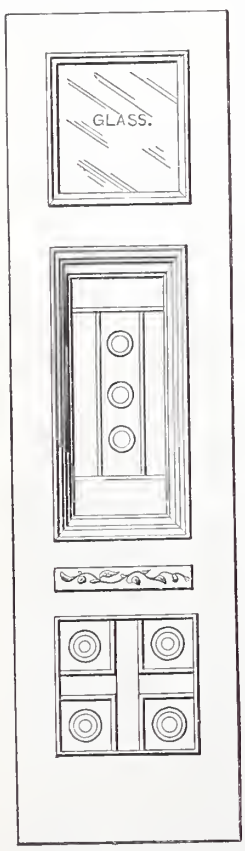
"Laudo Deum verum, plebem voco, congrego clerum,
Defunctos ploro, pestem fugo, festa decoro."

Bells, in fact, had acquired vast spiritual capabilities. They were efficient against storms and evil spirits, and other ills material or moral. Readers of Longfellow do not require to be reminded of the weird and stirring prologuo to the "Golden Legend." These properties aro not now attributed to them, but bells are popularly credited with a language of their own, which is generally harmless and often poetic. We should all of us be sorry if the bells had not said, "Turn again, Whittington," to that citizen of undoubted historic and pantomimic excellence. No one either can grudge their interpretation in the case of the buxom Flemish widow, to whom, as recorded by Southey, they issued such pressing invitations to "take a spouse."

It is worth noticing that most bells seem to have been originally feminine. There are only two or three bells in England now known by their Christian names, and these are all masculine. Great Tom, at Oxford, however, was originally named Mary. Tresham, the vice-chancellor of the period, was unbounded in his admiration of her, which he thus expressed: "Oh, beautiful Mary, how musically she sounds; how strangely she pleaseth my ear." Mary has done little to belie her reputation since. Only once has this celebrated bell been a disgrace to itself since adopting the name and attribute of Tom. In the year 1800 it suddenly began a series of incontinent strikings, to the great alarm of the undergraduates, who, according to one of their number, were divided in opinion as to "whether there was an earthquake, or whether the dean was dead, or the college on fire." What they pictured in jest an earlier age would have imagined in sober earnest. The reflection of how entirely we have abandoned the superstitious views of the bell may well leave us wondering when we shall dispense with its purely fanciful employment. In the country they still serve their original purpose. The sound of the church bell now calls the scattered congregation together pleasantly and appropriately. Even in the country town the bells of the parish church, undisturbed by competing sounds, are enjoyable, while the University towns would be almost strange without their sound. But in London it is a very different matter. Large, harsh, unmusical bells, made, apparently, on purpose to ring down their neighbors, clamor in the startled air, and make not only night, but even day, hideous. The pious soul who would like to feel that it is all as it should be is, just as often as not, dismayed to find that nothing more significant than a "practice" has occurred, and that no particular emotion need be felt. The weary feel that this last addition to surrounding noises is verily the proverbial last straw. The mu sical are driveu from their homes in nervous dread of the fell repetition, just as Carlyle could not sleep because he knew the cock was going to crow again shortly. In

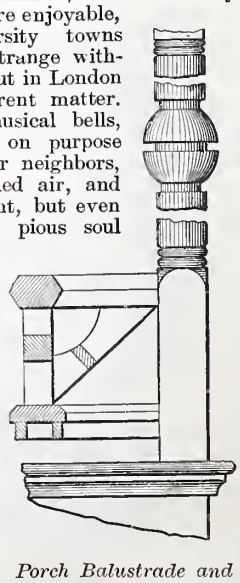


Second Prize in Twelfth Competition.—Front Elevation of Dormer Over Bay.—Scale, ½ Inch to the Foot.



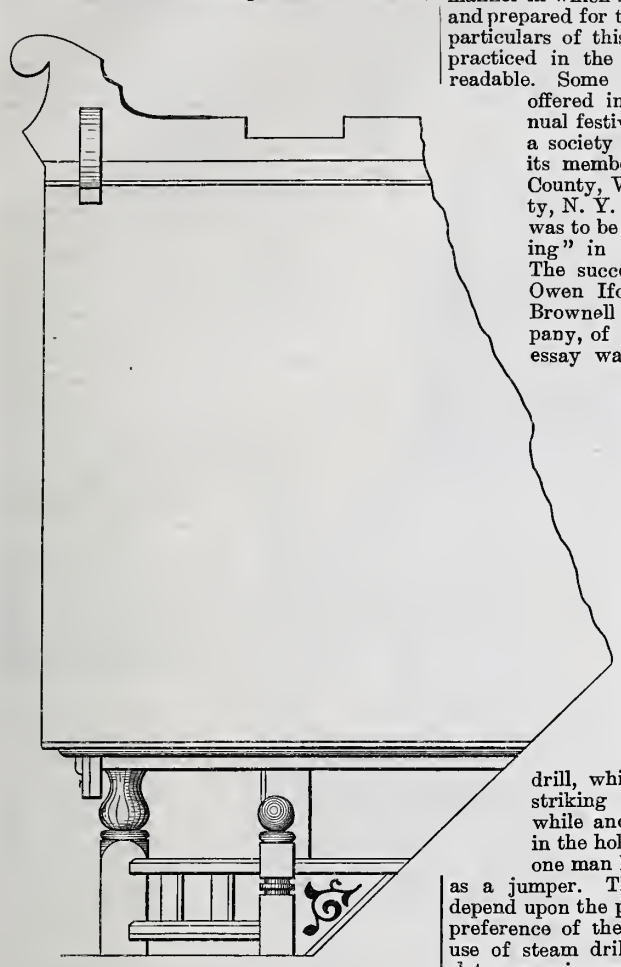
Detail of Front Door.—Scale, ½ Inch to the Foot.

Section Front Door. ¾ In. Scale.



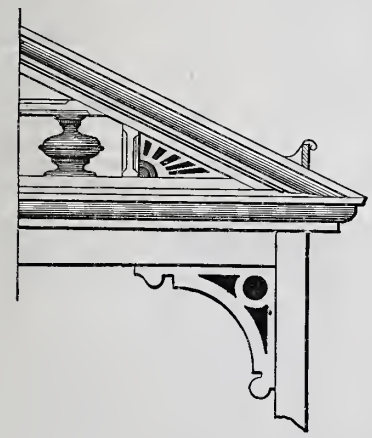
Porch Balustrade and Porch.—Scale, ½ Inch to the Foot.

the city there is less noise than in the so-called fashionable quarters, but it is even more appalling, as church after church, with every possible discordance, bids people come and behold its emptiness. It is said,



Second Prize in Twelfth Competition.—Side Elevation of Dormer Over Bay.—Scale, ½ Inch to the Foot.

and truly, that in the main we are a people of religious instincts, and if all these ringings served any clear purpose of religion or edification, no doubt they would be welcomed. As it is, we doubt whether they are more than a manifestation of thoughtless-



Porch Cornice and Bracket.—Scale, ⅓ Inch to the Foot.

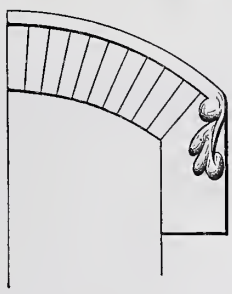
ness. We have received the custom and carry it on without pausing to think whether it is suited to changed circumstances. Church synods are now annually engaged in the healthy ventilation of every apparent abuse. They might do worse than consider whether in these days, when bells have a limited significance, we should not modify their use to a commensurate degree. As it is, we have kept the letter of mediæval custom while condemning the spirit.

Working a Slate Quarry.

Those who are familiar with the roofing business have more or less of an idea of the manner in which slate are quarried, dressed and prepared for the market. Nevertheless, particulars of this kind written by a man practiced in the business will no doubt be readable. Some time since, a prize was offered in connection with the annual festival occurring in May, by a society which comprises among its members the slaters of Rutland County, Vt., and Washington County, N. Y. The subject of the essay was to be "Slate and Slate Quarrying" in the two counties named. The successful competitor was Mr. Owen Ifor, superintendent of the Brownell Slate and Flagging Company, of Paulett, Vt. The original essay was prepared in the Welsh language, and it was deemed so valuable by those who became familiar with it in that form that the author was induced to have an English translation prepared and published. From the latter we take the following, which in the pamphlet that Mr. Ifor has put out bears the title of "Operation of Working a Slate Quarry":

The first operation is that of quarrying the blocks. The first process is to drill a hole in the slate rock by an ordinary drill, which is used by two men striking or hammering it down, while another man turns it around in the hole. Another method is by one man lifting the drill up and down as a jumper. The particular method will depend upon the position of the hole and the preference of the men. Of late years the use of steam drills has been introduced in slate quarrying, with considerable success.

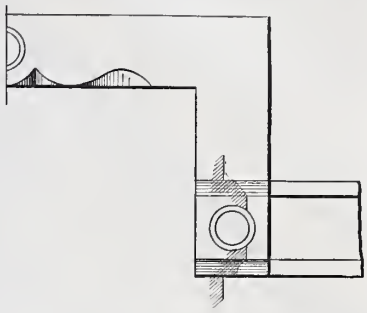
The explosive generally preferred is the ordinary rock-blasting powder. The force wanted is a dull, heaving one, which will heave and displace the rock without unnecessarily breaking it. The skill of a quarryman is tested by his ability to take every possible advantage of slips, joints and floors, and to make each hole do the greatest possible amount of work. The depth of the hole



First Story Window Cap.—Scale, ½ Inch to the Foot.

and the amount of powder used will depend largely upon the right occurrence and use of these natural helps.

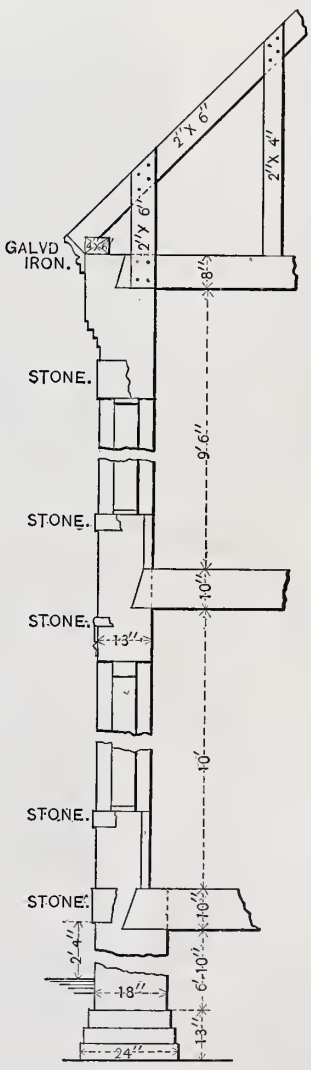
Having obtained the blocks, broken into convenient sizes for the slate-makers, here again the judgment of the quarryman is required. He has to study the material—how he can reduce it to make slate with as little waste as it can be helped. In the large blocks there are certain amounts of disfigurements which hinder their working, such as curls, bends, cramps and spang veins. These have to be chiseled out and cut off in dressing. When the blocks are too wide, the quarryman has to cut a notch in one end with his gouge and with his chisel cross way to the line of cleavage; he does what is called *pileru*, or pillaring, dividing it into two parts to suit two slates of different width. He has to study the grain of the block to do this, to enable him to get the pillaring to run straight the whole length of the block; sometimes he has to drill what is called a plug-hole in the block to divide it. When this is done he uses what is termed two iron feathers, putting one each side of the hole, then drives an iron wedge between them, which expands the block by dividing it into two parts. When this is done the quarryman uses his chisel to mark the blocks into the required lengths, and cross-cuts them by



Second Story Window Cap.—Scale, ½ Inch to the Foot.

striking over the mark with a wooden beetle, ironed for that purpose. After having them split to about 2 inches in thickness they are ready for the splitter.

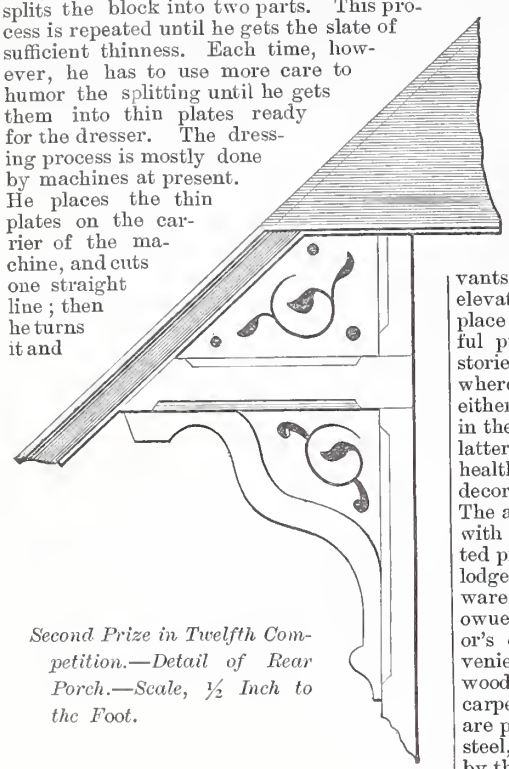
The splitter now takes the material in charge and splits them into thin plates in the following manner: The splitter is seated on a block raised a little above the level of the



Section Through Walls.—Scale, ¼ Inch to the Foot.

floor. He has the blocks placed in a heap on his left-hand side. His tools are a wooden mallet, ironed at each end, and three or four splitters, which are their chisels, with a broad, fine edge, about 3½ inches wide on one end, which range from

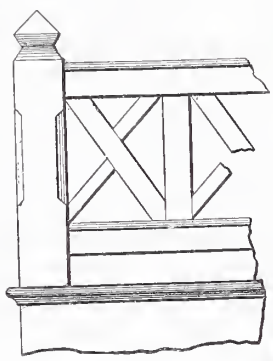
10 to 15 inches in length. He takes the blocks, one after the other, and places them against his left thigh, with the smoothest or the straighest end uppermost. He places the splitter in the center, and splits the block into two parts. This process is repeated until he gets the slate of sufficient thinness. Each time, however, he has to use more care to humor the splitting until he gets them into thin plates ready for the dresser. The dressing process is mostly done by machines at present. He places the thin plates on the carrier of the machine, and cuts one straight line; then he turns it and cuts another side by placing the first side cut against a guide, thus leaving his plate cut at right angles. Now he applies it to a notch on the gauge, which is fixed on the machine for that purpose. The notches on it are cut to suit the various sizes the slate is made into. The dresser sorts the slate into first and second qualities as he makes them, and he also arranges each size together, ready to be carried out and stocked in a pile in the slate-yard, where they are counted and from which they are loaded for the market. It was the custom before the machines were invented to have the slate dressed by hand, the dresser sitting on a bench with a carrier before him, which is made of a steel frame. In his right hand he has a steel knife to dress the slate. To size them he has a notched stick. When the material is sharp and brittle they use this process at the present time.



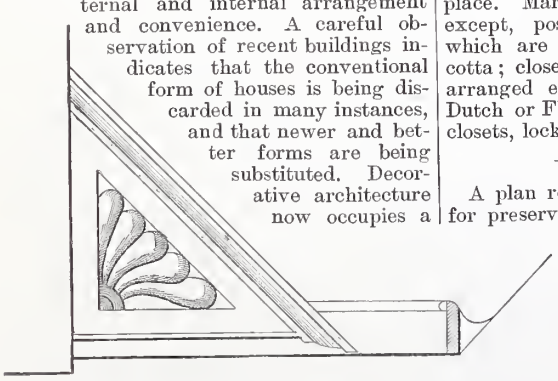
Second Prize in Twelfth Competition.—Detail of Rear Porch.—Scale, ½ Inch to the Foot.

Modern House Planning.

A criticism that is very commonly made upon the domestic architecture of cities is that all the houses are alike, both in external and internal arrangement and convenience. A careful observation of recent buildings indicates that the conventional form of houses is being discarded in many instances, and that newer and better forms are being substituted. Decorative architecture now occupies a very important place in the interiors of the best houses. The narrow hall and vestibule and the ladder-like staircase—with its quarter-turns, heavy newels and balustrades, out of all proportion to the width of stairs or hall—is passing away. So also are the two saloon parlors on the main floor, with dining-room partly underground and the kitchen in the rear. The staircase now occupies a central and important place, having a whole room the full width of the house on the lower floor. The shaft and skylight overhead have become larger, too, always occupying a space of 20 x 12 feet, and sometimes taking in fully two-thirds of the upper part. Under this is a cathedral glazed-dome sash of 6 x 16 or 18 feet, or, where possible, clusters of windows are placed above the platforms or break with the rise of the steps in each story. In the place of the saloon parlors, with their heavy plaster ornaments and mirrors, the first floor is now divided into reception-rooms, stair hall with open fireplace, library and dining-rooms, with butler's pantry in rear of and adjoining the main stairs and servants' flight of stairs. Hydraulic passenger elevators also now occupy a very important place in the new home, serving the useful purpose of lifting coals to the several stories, as open fireplaces are put everywhere, though all the heating is done either by hot-air registers from a furnace in the cellar or by a steam furnace. The latter are considered the best, both for health and cleanliness. The trimmings and decorations are generally rich, but plain. The age of "ginger-bread" work has gone with the growth of good taste, as these fretted projections and gross carvings are only lodges for dust. The selection of the hardware is made with skill and good taste. The owner or architect sees to it, as the contractor's only incentive would be cheap or convenient work. Floors are generally of hardwood, well polished, although covered with carpets or rugs for winter use Gas fixtures are plain, but very rich in design, either of steel, old brass or bronze, enriched mainly by the grace of the form, and almost free from carving or figures of any kind. The decoration is generally of dark, warm colors for the dining-rooms and libraries, but light and warm for all other rooms. Flock papers prevail, either painted and gilded or left plain, according to taste. The prevailing woods are mahogany or rosewood for parlors; old quartered oak for halls and stairs, and walnut, oak or mahogany for libraries and dining-rooms. Colored or cathedral glass is not being used as much as formerly, fine grilled brasswork taking its place in the interior, and beveled plate glass for the exterior. Wood mantels still hold the first place. Marble and stone are not used now, except, possibly, for the entrance halls, which are sometimes of stone and terra-cotta; closets, the delight of all ladies, are arranged everywhere, as the old English, Dutch or Flemish styles of interior permit closets, lockers and surprises throughout.



Balustrade, Rear Porch.—Scale, ½ Inch to the Foot.



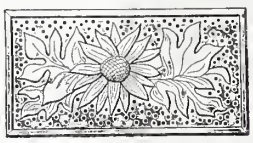
Chimney Gable.—Scale ½ Inch to the Foot.

A plan recently introduced into Belgium for preserving wood from the decay produced by the atmosphere, water, &c., is to fill the pores of the wood with liquid gutta-percha, which is said to effectually preserve it from moisure and the action of the sun. The process employed consists in exhausting the air from the pores of the wood, and carefully filling them with the solution, so that not a crevice escapes. The solid gutta-percha is liquefied by mixing it with paraffine in proportion of about two-thirds of gutta-percha to one-third of paraffine; the mixture is then subjected to the action of heat, and the gutta-percha becomes sufficiently liquid to be easily introduced into the pores of the wood. The gutta-percha liquefied by this process hardens in the wood as it becomes cold.

Rosewood.

A transparent liquid rose-pink, says the *Art Amateur*, used in imitating rosewood, consists in mixing ¼ pound of potash in 1 gallon of hot water, and ¼ pound of red sanders wood is added thereto; when the color of the wood is extracted 2½ pounds of gum shellac are added and dissolved over a quick fire. The mixture is then ready to be used on a groundwork made with logwood stain. 2. Boil ½ pound of logwood in 3 pints of water till it is of a very dark red; add ½ ounce of salts of tartar. While boiling hot stain the wood with two or three coats, taking care that it is nearly dry between each; then with a stiff, flat brush, such as is used by the painter for graining, form streaks with black stain. This imitation will very nearly equal the appearance of dark rosewood. 3. Stain with the black stain, and when dry, with a brush as above dipped in the brightening liquid, form red veins in imitation of the grain of rosewood. A handy brush for the purpose may be made out of a flat brush, such as is used for varnishing; cut the sharp points off, and make the edges irregular by cutting out a few hairs here and there, and you will have a tool which will actually imitate the grain.

Post and Rail in Bay Dormer.—Scale, ½ Inch to the Foot.



Terra-Cotta Panels in Bay.—Scale, ½ Inch to the Foot.

Roofing of the Royal Exchange.

The roofing of the Royal Exchange, London, involved engineering features which make it of more than passing interest. The inclosure covered is about 116 feet in length and 58 feet in width. The roof is in accordance with the style of the building, and was designed with the idea that any roof to be added over the open area should be not a mere glass cover, but of a character consistent with the architecture of the court, such that it might have been designed by the architect of the building, the late Mr. Tite, as a great saloon, had he been so instructed originally. The design of the roof is symmetrical, applicable only to the particular building. The ceiling is composed of glass coffers, glazed in prismatic form, with the tops hinged so that the inside can be cleaned from the outside. In the center of the roof is a dome 40 feet in diameter, around which are louvres for ventilation. Access for cleaning, removing snow, &c., from every part of the outside of the roof has been provided with complete safety to the workmen by means of steps ou each main rib, by a platform or gallery around the

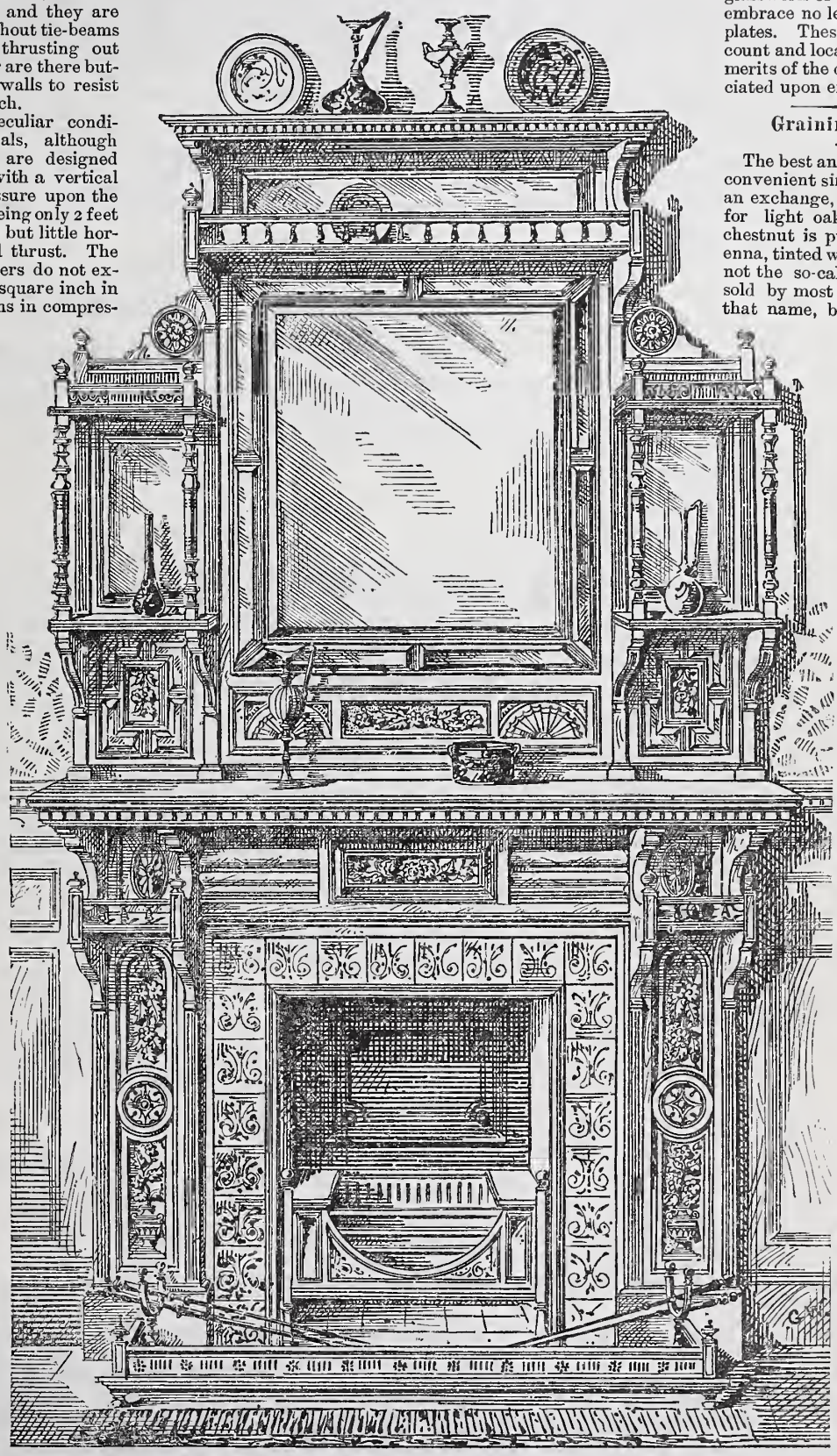
Terra-Cotta Panel in Chimney.—Scale, ½ Inch to the Foot.

outside of the dome, and another around the lantern-light. For the principals a box section has been adopted, as being peculiarly suitable for resisting the strains to which the roof is subjected. They are arched in form, with a total rise of 17 feet. There are eight principals or ribs, six of which span the court-yard, 58 feet in width, and the two center ones carry the dome or cupola. Trussed principals in such a situation have been considered inadmissible, and they are therefore made without tie-beams to prevent them thrusting out the walls Neither are there buttresses behind the walls to resist the thrust of an arch.

Under these peculiar conditions the principals, although arched in shape, are designed to act as girders, with a vertical or downward pressure upon the walls. The latter, being only 2 feet thick, would resist but little horizontal or outward thrust. The strains in the girders do not exceed 5¾ tons per square inch in tension, and 4¾ tons in compression. For calculation, the maximum horizontal pressure of the wind has been assumed to be half a hundred-weight per square foot of vertical surface opposed to it in roof and dome, coming from any quarter. The greatest strains are in the two griders carrying the dome, and one of these has been tested with loads equal to all the weights and pressures that can possibly come upon it, in order to ascertain if there would be any danger of its thrusting out the walls. The feet rested on iron plates and spread apart with the loads already mentioned ½ inch, and this was due in a great measure to the two halves of the girder having been fastened together with service-bolts. The result of this experiment is considered satisfactory. All the wrought-iron arched-roof principals were lifted into position by means of an upright timber or derrick, 95 feet high and 16 inches square, properly guyed, from which the girders were suspended by their middle with a rope a little over 2 inches in diameter. Additional strength was given to the derrick by a system of trussing with twisted strand wire and short wooden struts to prevent flexure. The tackle consisted of upper and lower blocks, each containing three sheaves, which made six parts to the rope. The first girder erected weighed, with its attachments, 9 tons. Besides the tackle mentioned, a double-purchase crab was used, and a separate snatch-block at the foot of the derrick.

Wooden Mantelpiece.

The accompanying design of a wooden mantelpiece is by Messrs. W. Bailey & Son, No. 102 Curtain Road, London. This firm is noted in England for its large and elaborate stock of mantels and other varieties of cabinet-work, and the novelties which it is continually bringing out. The mantel presented is a happy interpretation of the prevailing fashions, and is a design which may be manufactured at reasonable cost out of any of the cabinet woods which are considered appropriate for the purpose. It may be interesting to our readers to know that this design is manufactured by the firm above mentioned in American walnut, oak, mahogany and of different woods ebonized. They may also be interested in learning the list price which is put upon an article of this kind in England. As given by the manufacturers, the mantel alone is £6. 10/, while the over-mantel is placed at £10. 5/, making a total of £16. 15/, or, expressed in American money, about $84. The over-mantel is 4 feet 9 inches high and is 5 feet 3 inches wide. The figures given above include the glasswork of the mantels, which embrace no less than 20 different plates. These the reader can count and locate for himself. The merits of the design will be appreciated upon examination.



DESIGN OF MANTELPIECE, BY W. BAILEY & SON, LONDON.

Graining Grounds.

The best and cheapest and most convenient simple material, says an exchange, for making grounds for light oak, maple, ash and chestnut is pure raw Italian sienna, tinted with pure white lead, not the so-called sienna which is sold by most paint dealers under that name, but the genuine article, which can be and should be obtained even at some cost and trouble, the said article being one of the most useful and indispensable articles in the paint shop. For maple ground, of course, the smallest quantity is required, it being necessary only to change the white to the faintest suggestion of straw color. For ash the ground should be a little darker. For light oak more of the sienna will be required, while for chestnut a decidedly yellowish tone is wanted. Care must be taken not to make the grounds too dark—rather in the other extreme, for the reason that there is a remedy for a too light ground in the application of a greater quantity of graining color, as also in the glazing coat, while a ground too dark cannot be made lighter. For dark oak, burnt Italian sienna with white will produce a far better ground than any other single color. The same caution must be observed, however, in obtaining this color as recommended in the case of the raw Italian sienna. The domestic so-called siennas will not prove substitutes for the genuine Italian pigments. The ground for black walnut may be the same as for light oak, with the addition of a little burnt sienna and black.

The sum of $50,000 has recently been given to Phillips Exeter Academy, of Exeter N. H., for the purpose of erecting a building to be used as a gymnasium.

NOTES AND COMMENTS.

It may interest some of the readers of *Carpentry and Building* to be informed that many of the articles which appear in our columns from month to month are being reproduced by English and Continental journals. A number of our illustrated articles have already appeared in the English architectural and engineering journals, and recently a monthly paper published at Berlin, Prussia, called *Zeitschrift der Zimerkunst*, has reproduced two of the recent series of prize drawings from this journal. In the October number of the paper last referred to, the design of Mr. F. J. Grodevant, published in our January issue, appears. It is significant that none of our competitors, even in borrowing from our columns, present the studies in full. All of them omit a part of the elevations, and generally all of the details. The distinction of publishing house designs in such a complete manner as to adapt them without additional drawings to the use of builders belongs exclusively to this journal.

We have received from J. W. Packer, Oneonta, N. Y., a photograph of a residence which he has recently completed for himself, based on the design published in the September number of *Carpentry and Building* for 1883, from the pencil of Mr. F. J. Grodevant. The design in its leading features has been carefully adhered to, although the plan has been reversed, bringing the bay window on the right instead of the left. The rear portion of the house has been made two stories, instead of one story, and Mr. Packer informs us that some slight deviations have also been made in dimensions, his house being a trifle large than the plan as we published it. He is greatly pleased with the design, and finds the house very convenient. We understand that the design has been so well appreciated in the neighborhood in which it has been erected that the contract for another house has been based upon it. The latter is to be finished in brick-veneered, with marble trimmings for water table and window sills. We are aware that a great many houses are built to designs which are published in *Carpentry and Building* that we never hear of, but we know of enough buildings based upon these studies to warrant the assertion that this journal, in the few years that it has been published has afforded satisfactory designs for several thousand dwellings—a result of which we may well feel proud. We are always gratified to learn of the satisfactory use of one of our designs, and shall be glad if others who have used to advantage the studies we have published would follow Mr. Packer's example, and send us either photographs or descriptions of their buildings.

We have before this referred to the condition of the brick manufacturing industry at St. Louis. Our regular correspondent in that city gives us some particulars with reference to the output of brick during the present year, with an estimate of what will be accomplished another season. The St. Louis Hydraulic Pressed Brick Company have produced 50,000,000 bricks this year, and expect to turn out no less than 60,000,000 in 1885. The Union Brick Company, which has consolidated with the company first mentioned, but which still retains its separate name and management, has produced 20,000,000 bricks the present year. Besides the above-mentioned companies two other machine-brick companies are at work while hand-making concerns are numerous. Nothwithstanding these sources of supply there have been delays of from four to six weeks on buildings in various parts of St. Louis during the present year, because of the impossibility of furnishing bricks fast enough to meet the demand. In explanation of the annual scarcity of bricks in St. Louis, in the face of the large sources of supply which exist, and the constant increase of facilities being made, it is said that the outside demand for brick is very large. St. Louis brick have a desirable reputation, and there is a constantly increasing demand for them in neighboring towns and cities, as well as from more distant points. This demand more than absorbs the surplus that might otherwise attend the yearly increased production.

Recent strikes for a reduction of the hours of labor without any corresponding reduction in wages have led to a very general discussion of the question of the hours of employment. It is frequently claimed that a man will do as much work in nine hours as in ten, and this is brought forward now as an argument in support of such claims as the strikers have made. No one, however, believes this assertion in a practical way. No builder or other employer would agree to it, and workmen themselves, by their own actions, show that they have no faith in it. Accordingly, in the case of these strikers the question resolves itself into the form of a demand for an increase of wages. Supposing that a strike should be successful on the nominal issue, and that the demands of the workmen be acceded to in all respects, it must be evident to every thinking person that sooner or later the scale of wages must conform to the work done to earn them, irrespective of the number of hours per day, or, in other words, that in the end the law of supply and demand would prevail. From this it is evident that, however sincere the rank and file of the workmen engaged in these strikes may be, the ostensible issue is not the real one. While we have full sympathy for those who work by the day, and would rejoice with them to see their hours of labor reduced and their compensation increased, we have no faith in strikes as a means to accomplish these ends. Successful strikes gain but temporary advantages, and no organization of mechanics, however well officered and managed, is able to stem the tide that sets against it whenever the demands are for more than can be afforded, or, in other words, are out of proportion to the general scale of prices prevailing in the community at large.

There are still other considerations growing out of this general question to which it is well to direct the attention of every thinking mechanic. Irrespective of the justice of the claims of any set of men for an increase of compensation, it is evident that whether the general rate is high or low the man who is content to do nine-tenths as much work as other people must make up his mind to see himself rewarded with only nine-tenths as much respect and nine-tenths as much comfort and happiness as his neighbors enjoy. Those who succeed in this world, whatever their position, generally do so by hard labor, and at the cost of rigorous self-denial. Many a man has made progress, both financially and otherwise, by working from 12 to 16 hours when others worked but 10, and many another has failed to accomplish anything above the common average because he was unwilling to improve his opportunities hy working more than was commonly called a day. The effect of organized strikes and of organizations generally is to reduce all to a common level. While they may sometimes be a benefit to those below the average, they are very generally a corresponding disadvantage to those who are smarter or better able than the average to make their way in the world. Those who achieve eminent success in business or in the mechanical trades for the most part pursue their course single-handed.

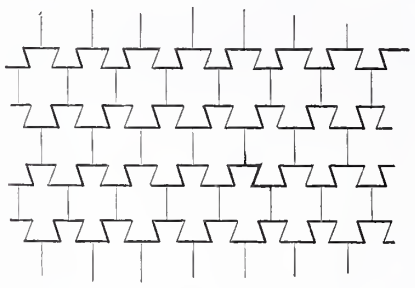


Fig. 1.

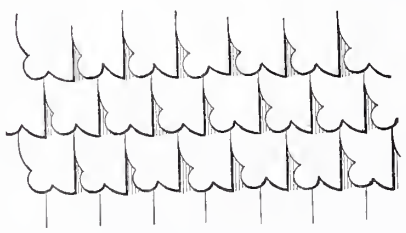


Fig. 2.

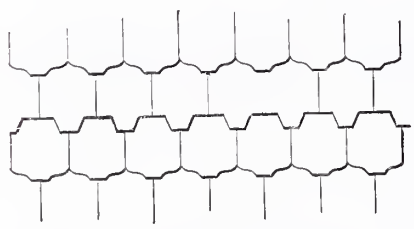


Fig. 3.

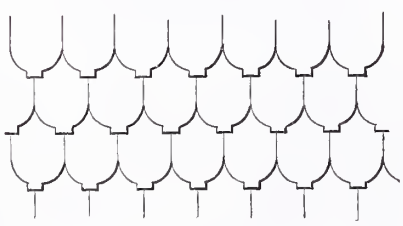


Fig. 4.

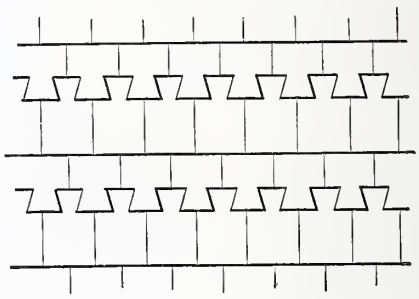


Fig. 5.

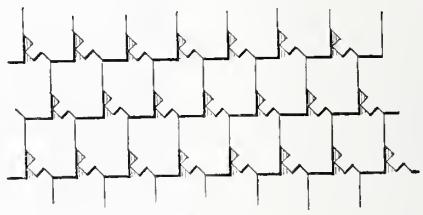


Fig. 6.

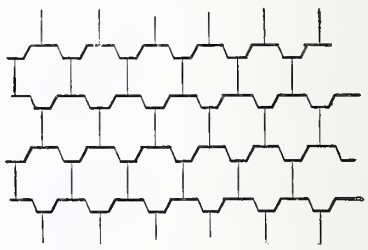


Fig. 7.

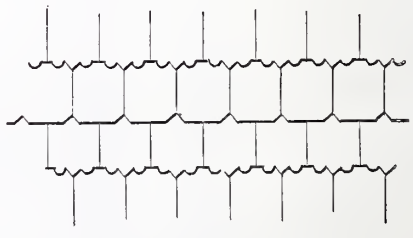


Fig. 8.

SPECIMEN CUTTINGS FROM SLATE AND SHINGLE ROOFS.

The number of different ways in which a simple mathematical problem may be regarded for purposes of solution, and the number of different methods which produce the same result, and which, therefore, it may be concluded, are correct in principle, is strikingly illustrated in the additional answers to the problem in board measure which we present this month. The question is not abstruse in character, and, as several of our readers have shown, is very easy of solution if principles are thoroughly understood. That it can be made somewhat difficult is also illustrated by some of the demonstrations. Our readers have before them a choice of methods varying from simple arithmetic, using only the rules of proportion and square root, to algebraic methods involving equations of two unknown quantities. There are also purely geometrical rules, so that our readers, whatever may be their predilections, need have no difficulty in selecting that which very nearly corresponds to their own ideas. The efforts at solution of a problem of this character by men situated in various sections of the country, and who, coming from different schools, approach it in different ways, cannot fail to be instructive. There is a display of methods and schemes of analysis in correspondence of this kind which, if brought to the attention of students at school by a judicious teacher in illustration of the studies pursued, would give a wider view of matters in general than it is possible to attain in any other way. The first letters on the subject will be found in our November issue.

Some simple means of deadening the noise of work is desirable in every shop where operations are conducted requiring much hammering and pounding. Various methods have been suggested, some of the best of which may be enumerated in this connection. One of these is rubber cushions placed under the legs of the workbench. A case is cited where a factory employing 50 coppersmiths made so little noise as to be scarcely noticed in the immediate neighborhood. It is even asserted that the noise was scarcely audible in the room below where the coppersmiths worked. The device used in this case was a rubber cushion under each bench leg. Another plan is the employment of kegs of sand or sawdust applied in the same way. A few inches of sand or sawdust is first poured into each keg. Upon this is laid a board or block upon which the leg rests, and around the leg and block is poured fine dry sand or sawdust. Not only is all noise overcome by this means, but all vibration and shock is likewise prevented. It is asserted by those who have tried the experiment that an ordinary anvil mounted in this manner may be used in a dwelling-house without annoying the occupants.

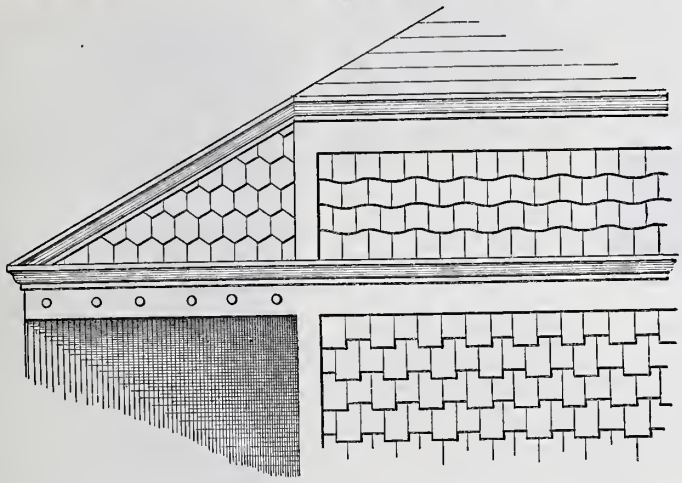


Fig. 9.—Cuttings of Slate from the Battery Place Station of the Elevated Railways, New York City.

Slate and Shingle Patterns.

The illustrations on this and the opposite page show some of the ornamental as well as fantastic forms into which slate and shingles are occasionally cut in modern house-building. We purposely consider slate and shingles together—first, because to a certain extent the same patterns are used in both, and also because the two kinds of covering are used for the same places. Shingles as they are quite commonly painted are nowadays difficult to distinguish from slatework without close scrutiny. To the casual observer the two materials answer the same general purpose. Some of the patterns of shingles in common use are ridiculous in the extreme, whether the effect of the design is considered or the utility of the pattern is taken into account. The grain of the wood is frequently exposed, and the shape in which shingles are cut often has much to do in hastening decay. The "modern craze," as the Queen Anne style of architecture is sometimes called, has led architects and builders into the use of various fancy forms of shingles on the sides of buildings and in gables. A few of these are illustrated herewith. Such a pattern as shown in Fig. 2 and also the one in Fig. 6, for example, have very little to recommend them. The designs shown in the second group are those which are very frequently used in cutting slate. Some of them have been in very common employment for many years past, while others are of exceptional use. Some of them are of a character to be considered very hard to produce by those who are accustomed to use hand tools in doing work of this kind. Some of them become comparatively easy, however, by the use of machines with dies which are at present lagely employed in dressing slate. The cut shown in Fig. 13 bears the general name of "hexagon." A variation of the semicircular form shown in Fig. 15, being a trifle pointed at the bottom, has been named in Stafford's "Slaters' Manual" as the "American Cottage." A still more pointed form of the same general shape is called by the same author "Gothic." The style shown in Fig. 10 has been named "Washington." These shapes are being very generally used, and we believe the names applied to them are current in various directions. In a book on slate roofing issued by Messrs. Auld & Conger, of Cleveland, Ohio, some of the patterns to which we have referred are shown, as also numerous others which are made possible by the use of a special machine which they sell. It is a peculiarity of the machine referred to that cuts very difficult to make by hand are produced by it as readily and with as little loss as the easiest cuts made in the old way. On general principles it may be asserted that slate should not be cut save in such forms as are natural to it, and which, accordingly, do not tend to destroy it. All entering cuts, therefore, like that shown in Fig. 14 and that shown in Fig. 11, if made very pronounced, are not expedient to attempt in slate.

Very excellent architectural and decorative effects are sometimes produced by a judicious combination of different patterns of slate. The effect is still further heightened by the use of colors. Color effects, however, are not nearly so popular with present architectural styles as they were formerly, and roofs in which striking contrasts are made are frequently dubbed at present as "calico" or "oil-cloth" patterns. The tendency at present seems to be to use a single color of slate, or at most two shades of the same general color, and to obtain the principal effect by judicious combination of patterns. In Fig. 9 we show the cuttings of slate used on the Battery Place station of the elevated railways running on the west side of New York City. In the small section at the left our readers will recognize a modification of the hexagon cut, while the upper panel at the right shows something a little different from that presented by one of the special engravings shown in the group. The lower panel presents a pleasing effect, which is gained by using slate of different lengths, or, what would be the same, by varying the lap. The effect of this work when viewed from the street is very satisfactory indeed.

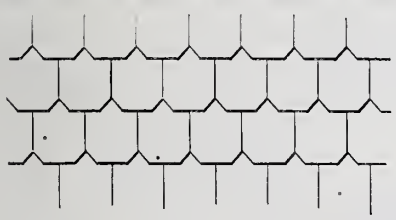


Fig. 10.

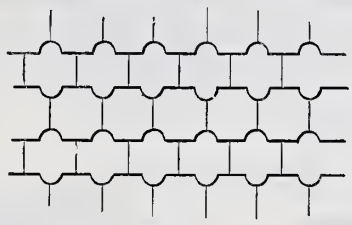


Fig. 12.

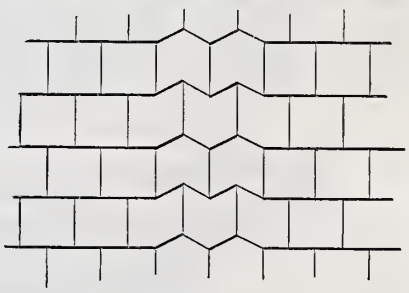


Fig. 14.

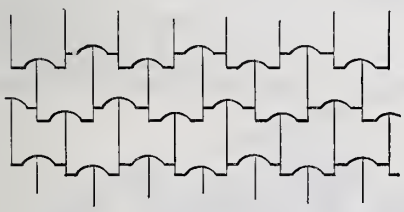


Fig. 11.

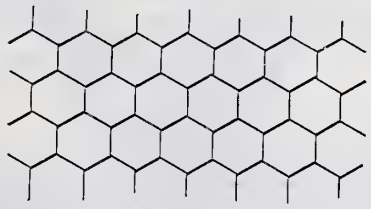


Fig. 13.

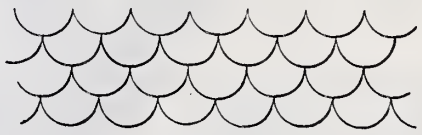


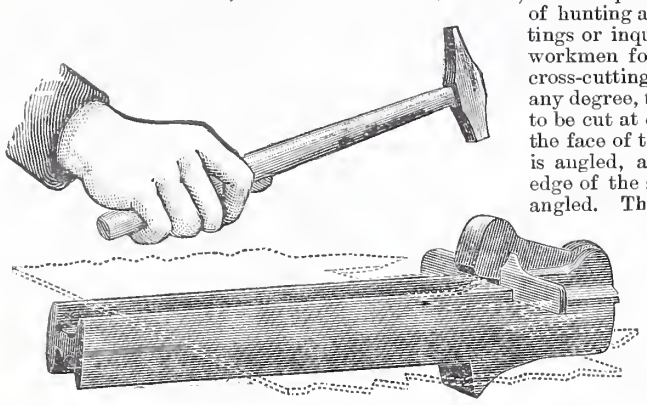
Fig. 15.

SPECIMEN CUTTINGS FROM SLATE AND SHINGLE ROOFS.

NOVELTIES.

The Criterion Saw-Set.

A new saw set, the latest addition which E C. Atkins & Co., Indianapolis, Iud., have made to their line of saw tools, is represeuted in Fig. 1 of the accompanying illustratious. In this saw-set, which is intended only for cross-cut saws, the manufacturers have combined the principle of the anvil and hammer with other features. The main portion of the tool is made of malleable iron, the anvil being chilled. The hammer or striking part is of steel, drop-forged. The face of the hammer is slightly concaved, to conform to the usual shape of that portion tion of the saw tooth which receives the blow, thus distributing the effect of the blow, and consequent strain upon the steel, across the tooth, imparting, it is claimed, the requisite and an absolutely uniform set to each tooth, and preventing more set than is desired. For the efficiency of this article the manufacturers make special claims, and put it on the market with the confidence that it will be favorably received.



Novelties.—Fig. 1.—The Criterion Saw-Set.

Tilting-Table Saw Bench.

In Fig. 2 we illustrate a tilting or angling table saw bench recently brought out by the Philadelphia Wood Tool Works. As may be seen by the design, it is substantial in its parts and is provided with attachments and conveniences to make it meet the requirements of a first-class saw bench. The table may be adjusted to any required degree not exceeding a "miter." The elevation of the saw above the table may be increased as desired, and may be retained in any position without clamping. The sliding gauges E and M, shown on the table of the machine, are for ripping and cross cutting, the gauge M being used for the former. This gauge is so arranged as to be quickly adjusted for any width of material up to the entire width of the table. It can be swiveled to line with the saw at all times. When not in use it may be swung entirely out of the way without the necessity of detaching it from the machine. This is an important advantage, since the gauge is always easily found when wanted, and the operator is saved the trouble of hunting among sawdust and cuttings or inquiring among his fellow-workmen for it. The gauge E for cross-cutting can also be angled to any degree, thus allowing two bevels to be cut at one operation—one with the face of the stuff where the table is angled, and the other with the edge of the stuff where the gauge is angled. This arrangement of parts is of advantage to millmen and those who have occasion to make work of the general shape of hoppers. There are few machines in the woodworking line that are put to such severe tests or are so roughly handled as saw benches, and there are few in which so little provision is made in the driving mechanism for withstanding the severe strain to which they are subjected. Having these points in mind the builders of this machine have wisely guarded against the defects of other machines by placing the pulley on the mandrel outside of the table, thus making it possible to uso a larger pulley than could otherwise be employed. The box or bearing outside of the pulley surface serves to divide the belt strain between the two journals. All this will be understood by reference to the engraving. It is well known to all sawyers that to do good sawing it is absolutely necessary to have the saw and guide parallel. This is difficult to obtain unless such a device as is employed in this machine is resorted to. By examination of the engraving it will be seen that there is a screw which acts upon a box at the belt end of the mandrel. By tilting this the mandrel is swiveled in either direction, and, accordingly, may bo kept square with the cross-cut gauge E and parallel with the slitting gauge M. The hand-wheel B for elevating the saw is placed at such a point on the machine that the operator can readily see when ne has the saw at the desired hight. The boxes on the mandrel of this machine are of the self-oiling type, and thereforo require but little attention. Referring to the base of framing, it will be seen that this machiue is well calculated in its design to give a solid foundation to the running parts. We are assured by the makers, Messrs. E. & F. Gleason, 2201 American street, Philadelphia, that such a thing as tremor or vibration is out of the question.

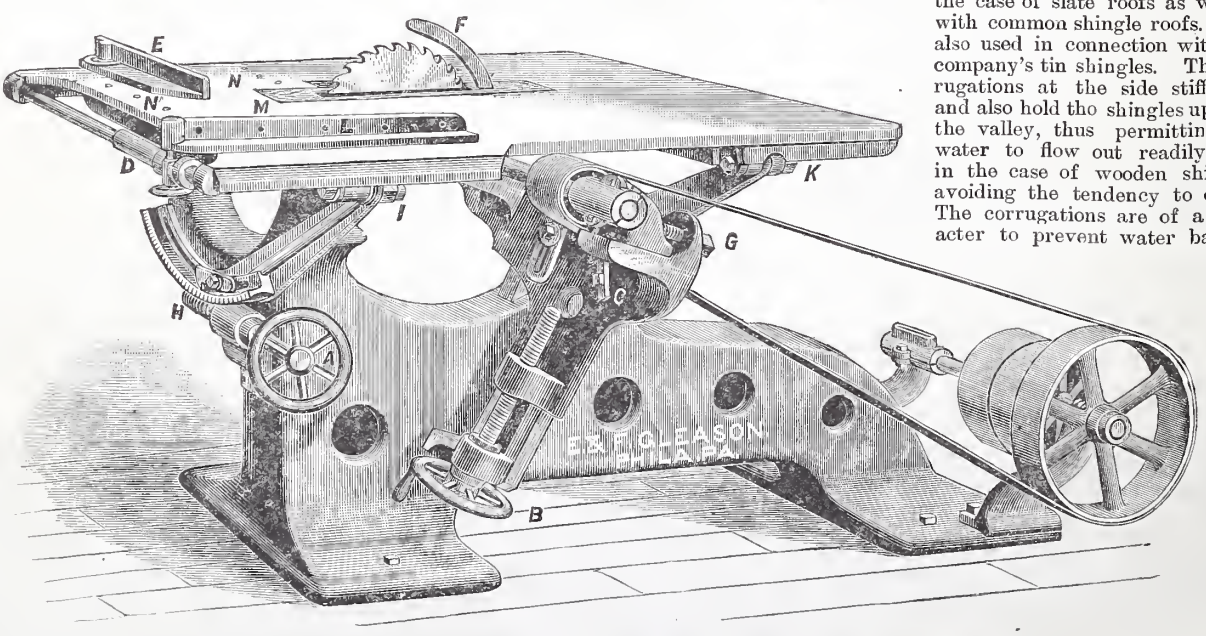


Fig. 2.—New Tilting-Table Saw Bench, Built by E. & F. Gleason, Philadelphia.

New Valley and Ridge Capping.

Cooper's metallic valley, a new article of manufacture which is heing introduced by the National Sheet Metal Roofing Company, of 21 Cliff strcet, New York, is shown in Fig. 3. Those of our readers who are acquainted with the general features of Walter's tin roofing and siding plates, manufactured by this company, and which were described and illustrated in this journal some months since, will perceive that the article we now illustrate has some of the general features pertaining to these goods. This valley is intended to be used in connection with various kinds of roofing, and is applicable in the case of slate roofs as well as with common shingle roofs. It is also used in connection with this company's tin shingles. The corrugations at the side stiffen it, and also hold tho shingles up from the valley, thus permitting the water to flow out readily, and, in the case of wooden shingles, avoiding the tendency to decay. The corrugations are of a character to prevent water backing up, as is sometimes the case with slate where common flat valleys are employed. In using this valley it is fastened by nailing through the lugs at the upper corners, as shown in the cut. These lugs are of such a shape that after laying the overlap-

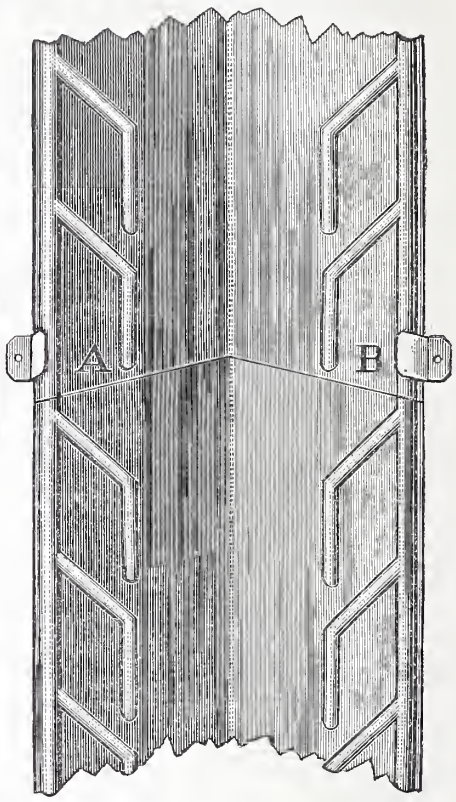
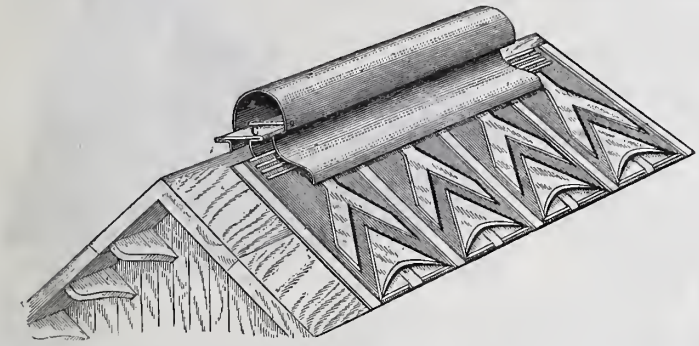


Fig. 3.— Cooper's Patent Metal Valley.

ping sections a wing is bent over it, which is sufficient to hold it in place. It is claimed by the manufacturers that builders find this form of valley specially adapted to their requirements. It is of a shape to be readily transported, easily handled about a building, and readily and quickly applied as wanted. Roofers are favorably inclined toward it for the same reasons. The upper end of each section is faced with asbestos wool, which, being indestructible by fire or water, prevents the passage of moisture between the sections.



Novelties.—Fig. 4.—Ridge Capping Made by the National Sheet Metal Roofing Co.

Fig. 4 shows a form of ridge capping which the same company are now putting upon the market for use with their patent tin shingles or upon roofs covered with other material. The form of this ridge differs somewhat from the stock ridging made by many other manufacturers, and the design is one that adds much to the appearance of the roof. We understand that this ridging is being made of galvanized iron, and kalameined iron. The manner of fastening is shown in the cut. The part C is nailed on each side of the comb before the shingles are put in place.

The Vassar Alarm Bolt.

The Vassar Alarm Bolt Company, of No. 58 Broadway, are introducing some mechanical alarms which possess features to render them interesting to architects and builders generally. In Fig. 6 of the engravings we show an alarm bolt of their manufacture of a character adapted for use on doors. The article is attached to the door in very much the same manner as a rim lock. A nose-plate accompanies the alarm, but is not shown in the engraving. All that it is necessary to do to put the alarm in working order when required is to throw the bolt forward into the nose-plate by means of a slide. The alarm is then wound by means of the handle. Whenever an attempt is made to force the door the bolt is pressed against the nose-plate, which has the effect of tripping the alarm, the bell of which is shown in the opening near the bottom, when it commences to ring. It continues to the extent of one revolution, when it stops automatically. In case it is pressed the second time the bell rings again, the length of the spring of the alarm being sufficient to make it operate several successive times. Another form of the alarm is arranged for attaching to window sashes. It works upon essentially the same principles as are embodied in the device already described, and is attached to the window by securing to the top of the lower sash. A cross-bolt, which may be withdrawn for raising and lowering the sash, engages in thimbles which are placed in the upper sash. These are arranged at different intervals so that the sash may be left partly open and yet have the alarm operate. The effect of moving either sash when the alarm is set in this manner is to bring a pressure upon the bell which sets the alarm going, while the adjustment of the device is such that the rattle of the window from winds will have no effect upon it. Still a third form is made, shown in Fig. 5, which is portable in character and may be applied to any door transom or window sash by means of thumb screws with a very few minutes' work, and accordingly is specially adapted to the use of travelers and hotel guests. It enables a traveler to rest in perfect security. The device is ingenious in its features, and seems well calculated for the purpose for which it is intended.

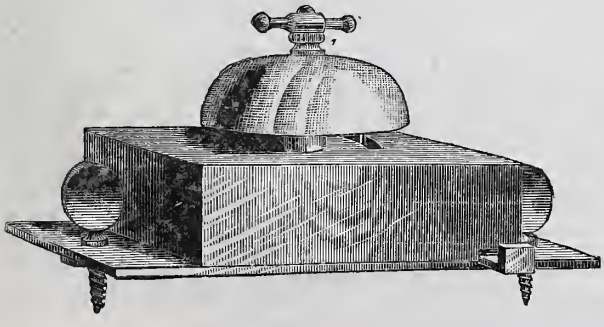


Fig. 5—.Portable Alarm for Doors and Windows.

Moore's Suction Ventilator.

The accompanying cut, Fig. 7, represents a new form of ventilator, for which Hall & Carpenter, of No. 709 Market street, Philadelphia, are sole agents for the United States. It is a modification of a form of ventilator very largely used in this country, and which goes by the general name of the Emerson ejector. The standards carrying the cap are lengthened somewhat, and a band of metal is placed between the upper and lower section and is sustained by riveting to the standards. By this means it is claimed that the vacuum suction principle is brought into play, so that, no matter in what direction the wind is blowing, an upward draft is created. The ventilator has the advantage of being very simple in construction, easy of application and readily understood by all who have occasion to use or apply it. The improvement gives the ventilator efficiency over the old form, both in the matter of suction and in the safe defense the band offers against storms. It is offered by the manufacturers as having a perfectly free delivery, and not being liable to be stopped up by snow or sleet.

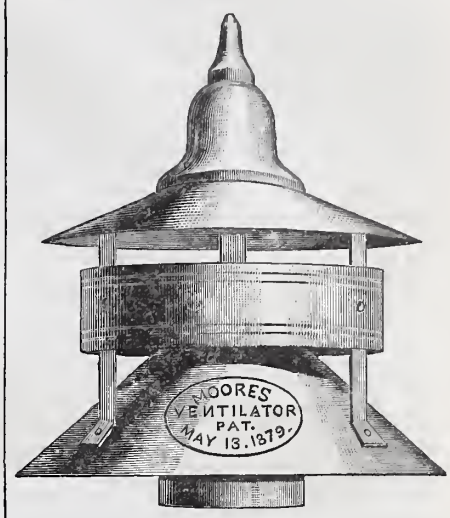


Fig. 7.—Moore's Suction Ventilator.

Safety Picture Molding Hook.

Fig. 8 of the engravings represents Franklin's patent safety picture molding hook, which is being introduced by Butler & Constant, 18 Warren street, New York. The special feature of this hook is that it extends back to and rests against the wall, thus relieving the molding of a certain amount of strain put upon all hooks of the ordinary shape, and enabling it to sustain a much greater weight than it could otherwise carry. Another feature to which attention is directed is that chafing of the cord, or kinks or bends in the wire, are avoided, since with the use of this hook the cord or wire rests on a segment of a circle. The hooks are finished in different styles, in some cases being enam-

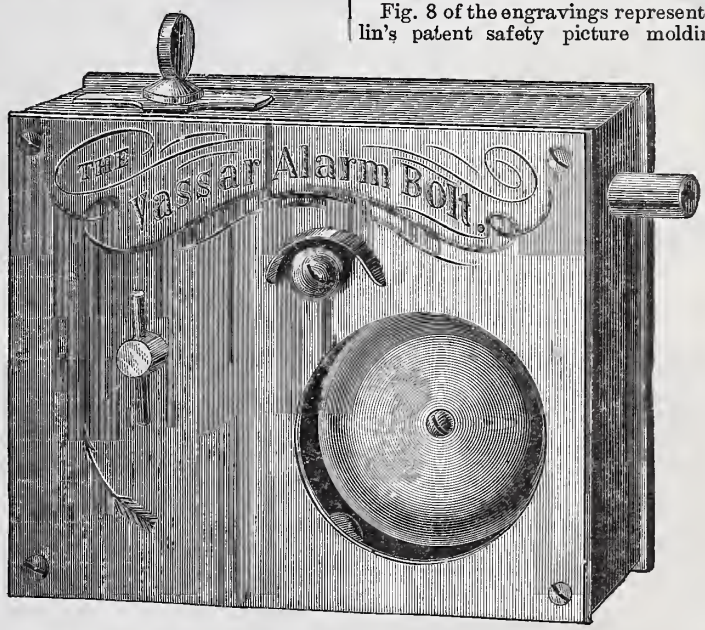
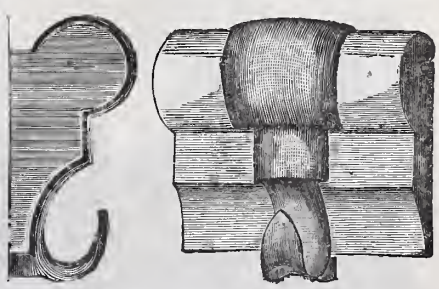


Fig. 6.—The Vassar Alarm Door Bolt.

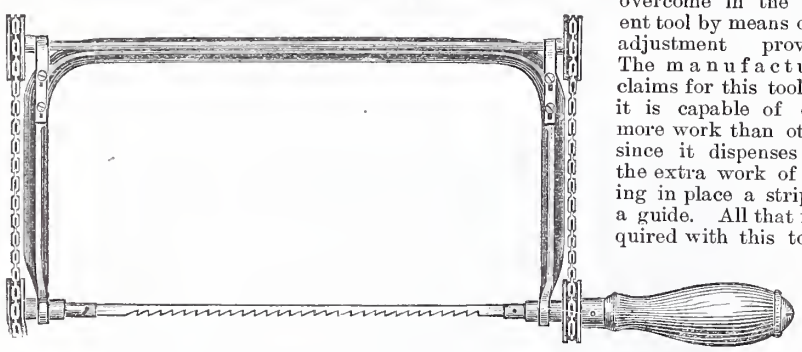


Novelties.—Fig. 8.—Safety Picture Molding Hook.

eled to match colored moldings, thus making a uniform finish.

The Fenner Hand Scroll-Saw.

The article shown in Fig. 9, which is made under a recent patent and is just put on the market, is an imporvement on the bow saw. It is manufactured and sold by the T. G. Conway Company, 20 Warren street, New York. The improvement, as is evident from the accompanying illustration, consists in the mechanism by which both euds of the saw are turned by one movement of the handle, thus keeping the blade straight and preventing its twisting. By a reference to the cut it will be seen that this is accomplished by means of chains which pass over pulleys, two of which are attached to the spindles which hold the saw, and two to the shaft by which the motion is communicated. By this device the motion imparted to the handle in turning it is communicated by means of such shaft and chains to the end of the saw opposite to the handle, the spindles at either end of the saw always moving together, thus keeping the saw straight and true. At the outer end of the handle it will be perceived that there is a screw by means of which the saw can be strained. The guides which hold the shaft, it will also be observed, are slotted



Novelties.—Fig. 9.—The Fenner Hand Scroll-Saw.

for the purpose of taking up any slack in the chains. The utility of this article is apparent, and it will be found useful for stair-builders, pattern and cabinet makers or other workers where a scroll-saw is required, and will also serve for amateur scroll-saw work. It can easily be carried in the carpenter's tool-box, and can be used with stuff of different thicknesses. It is made japanned and nickel-plated.

Siegley's Adjustable Plane.

In Figs. 10 and 11 of the accompanying engravings views of the opposite sides of a new combination plane, manufactured by C. Siegley, Wilkesbarre, Pa., are presented. Fig. 12 shows an enlarged cross-section, and will enable our readers to better understand the arrangement of parts. The tool shown is a most ingenious and successful combination of a common carpenter's plow, dado, side and center-bead plane, making in all respects a very serviceable, and at the same time

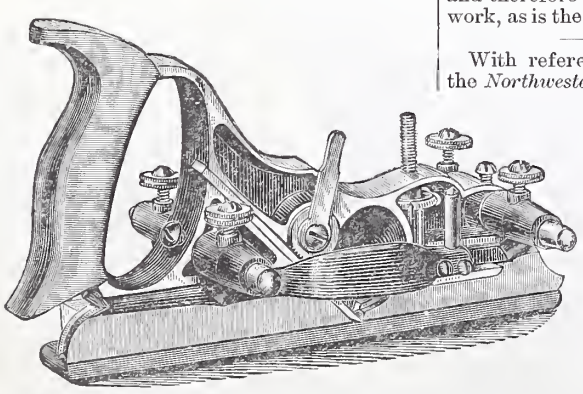


Fig. 10.—Siegley's Adjustable Plane.—General View.

cheap, tool. The combination tool is in some respects superior to each of the single tools combined in it. Using it as a plow plane, it has some advantages over the common wooden plow, on account of the throat being the closest at the side of the bit, and therefore preventing the bit from tearing. The manufacturer asserts that this tool will produce a clean groove in any kind of cross-grain wood. With it the setting and running of a gauge is dispensed with, since, by placing the bit exactly in line with the advance cutters, which is a special feature of this tool, it will do the work of a gauge; therefore all possibility of a rough groove is avoided. In using this tool as a dado it also has some advantages over the ordinary wooden tool. It is adjustable from ⅜ inch to any required width. The advance cutters are fastened by set-screws, holding them firmly in place, and are secured in a slanting position, so as to give a free clearing to the blades. Only the point of the cutter comes in contact with the sides of the groove. Accordingly, the tool works much easier than the wooden dado. A common objection in the use of dado planes is that after the point of the advance cutter is worn away it will stick in the groove. This difficulty is successfully overcome in the present tool by means of the adjustment provided. The manufacturer claims for this tool that it is capable of doing more work than others, since it dispenses with the extra work of nailing in place a strip for a guide. All that is required with this tool is to hold the square where the groove is to be made, and, running the tool along the square a few times, get the groove started. This done, the square can be laid aside and the groove finished to the required depth. Considering the tool as a side bead, it has the advantage of doing its work as well as the wooden one, while it does not take up the chest-room required for keeping wooden bead planes. The tool is easily kept in order from the fact that it is not necessary to keep the bit in conformity with any peculiar shape, as is always the case with the wooden bead plane. As a center bead this tool works equally well, and is much quicker adjusted than the wooden center bead. The necessity of nailing a strip in place for the guide is also overcome. The same bit in this tool will work either as a side or center bit, and only a moment's work is required to change it from one to the other. The advance cutters can also be used in this case, and therefore the tool is not likely to tear the work, as is the case with common bead planes.

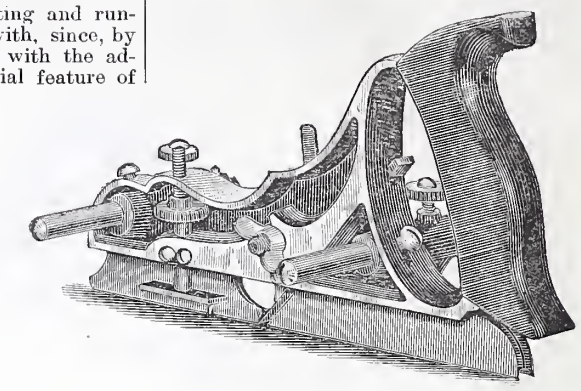


Fig. 11.—Elevation of the Opposite Side of Siegley's Plane.

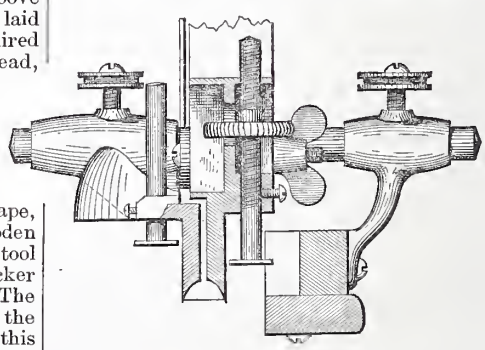


Fig. 12.—Cross-Section Through Siegley's Plane.

With reference to painting shingle roofs, the *Northwestern Lumberman* says: "More shingle roofs are painted now than ever before in the history of building in this country. It is mostly seen in cities and suburban towns, although in the country it is by no means rare. Considerable inquiry has led to the conclusion that many have their roofs painted to add to their appearance, which in many cases it certainly does, while others labor under the impression that the paint acts as a preservative to the shingles. The latter are probably right, providing the paint is renewed as often as it needs to be. If the roof is allowed to remain with the paint partly worn off, the shingles will retain more moisture, and consequently decay sooner than they would were they not painted at all. On the score of durability, however, little can be gained in cost by painting. A good shingle roof unpainted will last a great many years, and the expense of painting it a few times would replace it.

NEW PUBLICATIONS.

Modern Low-Cost Houses. Pamphlet, 10½ x 14 inches. Published by the Co-operative Building Plan Association. Price, 50 cents.

This pamphlet, which is edited by Robert W. Shoppell and illustrated by Stanley S. Covert and Francis K. Kain, contains a considerable number of designs of houses ranging in cost from $500 upward. No details are given. Some of the designs are shown in perspective and others by a single elevation. A floor plan of first and second story is given, and a brief description of the desirable features of design and plan accompanies each study. At the bottom of each page there is a reference to the price list of working plans and full specifications, which is given at the beginning of the book. In other words, the special object of this compilation of plans seems to be to make a market for working drawings and specifications. These, according to the list, range in cost from $12 to $60 a set. The attempt evidently is to reduce the business of the architectural profession to a definite routine, thus lessening the cost to clients and increasing the volume of business for the architect. Whatever may be said of the feasibility and utility of this scheme, it must be admitted that the present pamphlet contains designs of greater merit than those which have appeared in previous publications issued by this company. There is very little in it, however, that any one will find of advantage, unless accompanied by the plans and specifications above referred to. Of the merits of these we are not in position to speak, not having had the opportunity of examining them.

Picturesque Sketches, comprising Architectural Sculpture, Statues, Monuments, Domes, Fountains, Cathedrals, Ironwork, Details of Ornament, &c. 26 plates, oblong, 9 x 15 inches, contained in an envelope. Published by James R. Osgood & Co.

The scope and contents of this collection of sketches, which have been printed by the heliotype process, are so fully indicated by the comprehensive title given above that

little remains to bo said of them. The engravings are reproductions from pen and-ink sketches, and are mostly well done. The work is a desirable addition to evory architect's library, and designers generally will gain useful ideas from it in working up the various studies upon which they may be engaged. Some of the illustrations have already appeared in the current issues of the *American Architect and Building News*. There is no letter-press accompanying the designs save the individual captions. These are very brief, but, for the most part, give the name of the authors of the designs to which they are affixed.

Directory of the Lumber Mills and Lumber Dealers in the United States and Canada. 7 x 10¼ inches, 622 pages, bound in cloth. Illustrated with finely engraved and colored maps. Published by Rand, McNally & Co. Price, $5.

This book is said to contain about 5000 names, and to be a complete list of pine sawmills, hardwood sawmills, stave mills, shingle mills, planing mills, sash, door and blind factories and lumber dealers in the United States and Canada. It is arranged in such a manner that the various lines of business are distinguishable one from the other. The work also embraces an abstract of laws for millmen, and a digest of the statutes affecting lumbermen and lumbering. Under the name of each town is given the railroad which reaches it, and also the name of the express company by which goods may be shipped to it. One of the most valuable features of the work is the very good maps of the several States, Territories and Provinces, in color. This, in connection with the list of railroad and express companies above mentioned, makes the work a comprehensive shipping guide as well as a directory.

Wrought Iron and Steel in Construction. Size, 7 x 4¼ inches; 186 pages. Published by John Wiley & Sons, 1884. Price, $2.50.

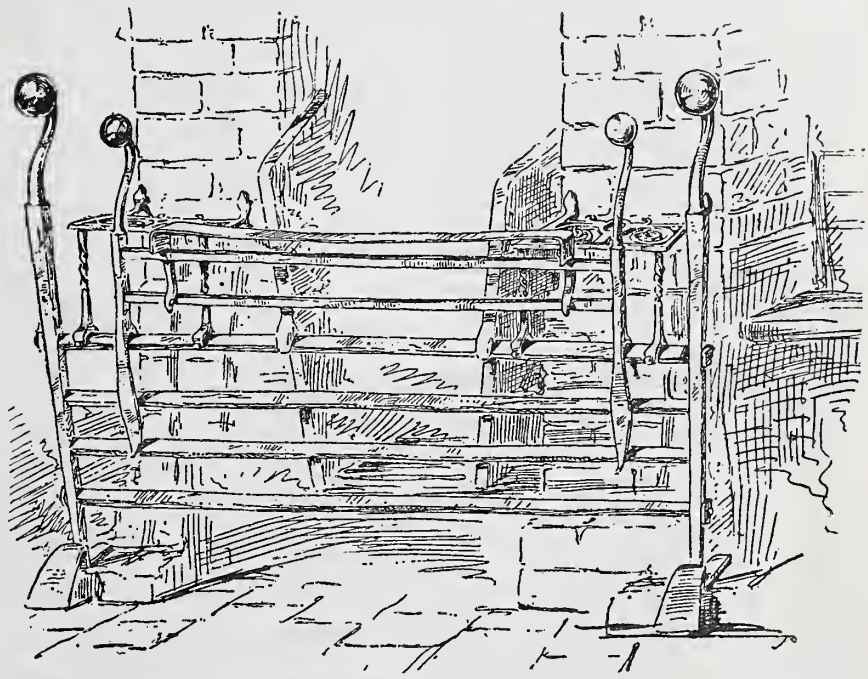
This book is a compilation of convenient rules, formulæ and tables for the strength of wrought-iron shapes used as beams, struts, shafts, &c., manufactured by the Pencoyd Iron Works. From the nature of the contents, as well as from the style of its publication, it would be classed as an engineer's pocket-book, but dealing, as it does, with one subject, it is specially adapted for the use of engineers and builders in iron and steel. The book was compiled by Messrs. A. & P. Roberts & Co., proprietors of the Pencoyd Iron Works, and consequently deals more particularly with the properties of their manufactures, as the experiments made for the purpose of corroborating data were upon various Pencoyd shapes. The authors states that it was his aim to eliminate as far as possible matters of theory from statement of fact, so that, where conflict of opinion may arise, each one may draw his own conclusions. The article upon struts, which covers some 40 pages, includes formulæ and tables of I, beam, angle, tee and channel struts, and is based upon the results of several hundred experiments made at Pencoyd, a full description of which was given in two papers by Mr. Jas. Christie, published in the "Transactions" of the American Society of Civil Engineers, entitled "Experiments on the Strength of Wrought-Iron Struts," and "The Strength and Elasticity of Structural Steel." Besides the formulæ and tables that refer especially to Pencoyd shapes there are a number of tables of areas and weights which are of general application. At the end of the book are 24 plates showing the various sections of Pencoyd shapes, the first plate being reduced to a scale of one-quarter size, the remainder, with the exception of the last two, being drawn to a scale of one-third size. The book is bound in flexible cloth, with rounded corners, and presents as a frontispiece a phototype of the Pencoyd Iron Works.

An Ornate Iron Building.—The Pittsburgh papers say that the Keystone Bridge Company are now constructing one of the finest iron buildings ever put up in this country. It is to be the mining pavilion for the Mexican Government, which is to exhibit at the World's Fair in New Orleans. It will be built on the Moorish style, octagonal. Each side will be 32 feet long, with a dome in the center. The whole will require about 150 tons of iron, of which a great deal is made at the works—especially all the castings, which are of the finest kind, representing figuros and ornamentations, with painting of many colors. The structure is so arranged that it can be taken apart, and will be, after the exhibition, removed to the City of Mexico, where it is to be permanently located.

Quaint Old Fireplaces.

Ono of our English contemporaries a short time since presented a sketch of a quaint old fireplace found in the City Barge Public House, Chiswick, London. This curious old grate was carefully sketched by Mr. Henry Jacques, and an engraving, of which the second of the accompanying cuts is a reproduction, was made of it. The City Barge is a tavern of some antiquity, and, like many other old houses standing in the neighborhood of the church in this ancient village, has features of construction and furniture that are of the greatest interest to all lovers of the old and quaint. The style of the houses in this neighborhood is for the most part Queen Anne. A number of those still standing were once important residences, while still ethers, like the house of the famous Hogarth, have a historical character about them of more than ordinary interest. According to the account of our contemporary, there are a number of good specimens of ironwork in the way of gates and railings to be found in this neighborhood. The grate in question is quite novel in its features. It is so clearly shown in the engraving as to require but brief description. The dimensions of the several parts are indicated. The front or hob bars are an inch in diameter and are round in section. Those of the fender hob are flat, measuring in width 1 inch and in depth ⅜ inch. In the opinion of our exchange there is much that is admirable in this somewhat primitive contrivance, and, while more modern arrangements may have superior advantages in many ways, it must be admitted that this old grate is both serviceable and picturesque.

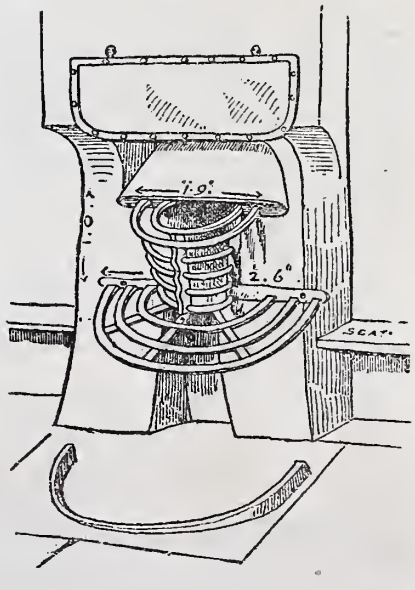
In the first engraving presented herewith we show a curious old grate to be found at the Woodman Inn, Holley Head road, Birmingham. This grate may be described as of the portable order. It was sketched by Mr. J. K. James, who gives the following particulars as to the manner of taking apart for cleaning. First, the top flat bar is removed. Next, the two top bars, with their stanchions, come off altogether. The hobs are next removed, after which the feet of the main uprights may be pulled out. The latter releases the top remaining bar from the hooks of the heavy iron sides of the fireplace which are built into the wall. By unscrewing the bottom bar and the fourth bar the second and third will drop out of place. By this it will be seen that the whole is resolved into pieces. Mr. James says concerning this grate: "There is an air of graceful fitness in every part, simple though it be, that contrasts favorably with the general run of the smith's work of the present day, for this was constructed at a time when the artist and the common workman had not yet become two separate individuals, with little in common, which, unfortunately, is the case in modern times." It will be seen that both of these grates occur where seats can be arranged at the sides.



Quaint Old Fireplaces.—Grate Still in Use at the Woodman Inn, Birmingham, England.

They form interesting studies both to artists and mechanics, and, while there is little about them which is adapted to modern wants, useful suggestions can no doubt be derived from them.

For floor polish cut beeswax into small pieces or else grate it up—add turpentine. Aliow the mixture to stand for 12 hours, then heat the mixture over the fire until it dissolves. Care must be taken not to heat the mixture too hot, and also the flame must not come too near, for explosive vapors are generated, which are liable to take fire. Brushes are especially manufactured for polishing the floors.



Grate in the City Barge Public House, Chiswick, England.

How to Obtain Good Material for Tin Roofs.

Architects and builders are always interested in obtaining good roof coverings for the structures upon which they are engaged. In the range of choice that is before them, from slate on the one hand to tar and gravel on the other, there is the necessity of exercising all care possible. Prices are as varied as the materials which are candidates for use, and whoever would obtain a good roof at a reasonable price must be in a position, fortified by knowledge and experience, to demand what is necessary to make a good roof and to enforce his orders to the letter. Tin roofs for a long time past have been considered very desirable for use on average structures, because, among other considerations, they are reasonable in cost; they add very little weight to the building, and they are quickly applied. Tin roofs of good quality give satisfaction in point of durability. It is only poor tin roofs that cause trouble and provoke complaint. With tin roofs, as with almost everything else, excellence in the finished article depends upon the materials employed and the workmanship used. Hence, in the first place, good tin plates must be secured, and to that part of the subject we propose to devote this article.

Of tin plates, whether the term is used in the broad sense or the restricted one of referring specially to those which are commonly used on roofs—which, by the way, are not "tin" plates at all, but "terne" plates instead—there are in the market at all times good, bad and indifferent articles. It becomes an important consideration, therefore, to know just how to distinguish between a satisfactory article and one that is unfit for use. Architects who have attempted to obtain satisfactory material appreciate the difficulties which beset their path. Tin plates are commonly described by peculiar terms, which to any one not an expert in the business are somewhat difficult to memorize as well as to comprehend, and, if inquiry were to be made of those whose regular business is to sell tin plates as to what all these terms really mean, very little satisfaction would be obtained, from the fact that in many cases there is the densest ignoraunce in this direction. The one who inquired might, however, be justified, in the light of his experience, in inferring that the principal use that is made of the "I C's" and "I X's," "primes," "cokes," "best charcoals" and the others, to say nothing of names or brands and of terms indicating manner of manufacture, is to befog and entrap the unwary. It is no wonder, therefore, that architects and builders generally give up the problem, more especially when they find that even the tinners whom they employ to do the work are ignorant upon many of the points involved. If they attempt in their specifications to indicate just what is required, some mistaken use of terms makes them appear ridiculous, besides destroying the force of the contract. If they name a brand which has been strongly recommended to them by the importing house which sells it, they know that fair competition will be impeded, and that the chances are that the roof, when laid, will be no better than the average, while it will cost probably $1 a square more than the market price. The situation, therefore, may be described as anything but satisfactory.

At different times in the past we have discussed the technicalities of the tin-plate trade, and have laid before our readers much useful information on this general subject. We have before now given some particulars of the efforts of *The Metal Worker* in the way of instituting a reform in the tin-plate trade, which for years past and until recently has been in a very unsatisfactory condition. Much has been accomplished in the past by this journal that was of the greatest value to consumers of tin plates, but what it has done very recently is not only important to sheet-metal workers, but is also of special interest to architects and builders. It is owing to the efforts of *The Metal Worker* that there are now in the market what are known as "guaranteed" roofing plates. These plates are distinguished from others simply in the fact that a correct description of the qualities they possess is given by the dealer, and that he guarantees them in all respects to conform to this specification. This alone assures an architect of his ability to obtain good material for a tin roof on demand. At the present time it is possible to obtain from a number of reputable houses roofing plates that are guaranteed in this manner to be fully up to certain specified standards. The uncertainty attending the old practice of naming brands is at once overcome. However satisfactory this state of affairs may be, a point still further in advance has been recently reached by *The Metal Worker*. It is the publication of a definite system of standards of terne and tin plates in the form of a table, by which a description of the qualities of a plate is greatly facilitated. This scheme is of interest to architects from the fact that it affords them the means of accurately specifying the quality of plates which they desire used in their work, and which heretofore it has been impossible to do. It has the advantage of applying to plates of the cheapest sort as well as to plates of the highest grade, so that where it is desirable to specify a cheap plate it can be done as positively and as accurately as in those cases where the very best is required. As being of great importance to architects and builders generally, we present the table referred to herewith:

The table is based upon the plan of using a letter of the alphabet for each of the more important qualities, both of the plate itself and of the coating of the plate. The physical properties of the plate are given in the column at the left, while the different coatings and variety of finish which may be applied to it are in the headings of the columns to the right. In the squares at the intersections of the horizontal and vertical lines occur the combination of letters designating both quality of plate and coating. By this table, therefore, it becomes possible to designate in a specification the precise quality of roofing-plate that is wanted for covering a building, and that, too, without specifying any particular brand or naming any house from which the plates must be purchased. These advantages will be appreciated. The table is of such character also that it furnishes a key to the architect or builder by which he can determine for himself, by casual examination of the plates that are being used upon a building, of what quality they actually are, and whether they are such as should be employed or not. We give the table in full, not that it is of interest in all its parts to our readers, but in order that they may see

The Metal Worker Standards

FOR TIN AND TERNE PLATES.

QUALITY OF PLATE.	KIND OF COATING AND FINISH OF SURFACE.						
	LEADED OR TERNE.			BRIGHT.			
	Light Coating. M*	Ordinary Coating. Q*	Heavy Coating. R*	Coke Finish. S	Ordinary Surface. T	Fine Surface. V	Extra Fine Surface. Y
A — Will not bend a Square Edge.	AM	AQ	AR	AS	AT	AV	AY
C — Will bend a square edge, but will not groove	CM	CQ	CR	CS	CT	CV	CY
D — Will groove, but will not double seam.	DM	DQ	DR	DS	DT	DV	DY
F — Will double seam with care.	FM	FQ	FR	FS	FT	FV	FY
G — Will double seam under all reasonable conditions.	GM	GQ	GR	GS	GT	GV	GY
H — Will double flat and open without fracture.	HM	HQ	HR	HS	HT	HV	HY
J — Will do shallow stamping.	JM	JQ	JR	JS	JT	JV	JY
K — Will do ordinary stamping.	KM	KQ	KR	KS	KT	KV	KY
L — Will do deep stamping.	LM	LQ	LR	LS	LT	LV	LY

* The coating of Leaded or Terne plates may be more accurately specified by giving the weight to the box. In such cases, follow the **M, Q or R**, as the case may be, with the number of pounds, thus: "I C 14 x 20 **F Q** 12," or "I C 14 x 20 **G R** 18.

EXPLANATION.

THE METAL WORKER STANDARDS are upon the plan of using a letter of the alphabet for each of the more important qualities, both of the plate itself and the coating of the plate. The physical properties of the plate are given in the column at the left, while the different coatings and variety of finish which may be applied to it are in the headings of the columns to the right. In the squares at the intersections of the horizontal and vertical columns will be found the combination of letters designating both quality of plate and coating. Thus, a plate that can be depended upon to double seam and which has a fine bright surface is indicated by **G V**. A quality designation of this kind is definite, and therefore very desirable for use in transmitting orders. Gauge and sizes of plates are to be given in addition, and in the usual way; as, I C, I X, and 14 x 20, 20 x 28, &c. Wasters are designated by W. Particulars of a general nature, like "true to gauge," "square trimmed," "absence of wire edge," "free of wasters," &c., are to be expressed in the usual way.

the comprehensiveness of the scheme, and be able to avoid misunderstandings based upon the use of some combinations of letters that might arise in practice, the meaning of which would not be evident if we published only that portion of the table relating to roofing plates. The only plates which architects can ordinarily afford to specify for their buildings are indicated by F, G and H. The former should be discriminated against in most cases. Ordinary coating, indicated by Q, may answer a satisfactory purpose in some cases, but there are few who desire less than an extra-heavy coating on roofing plates, and, therefore, specifications should be drawn "G R" or "H R," "Metal Worker Standards." As will be seen, by reference to the explanation accompanying the table, the coating of roofing plates may be more accurately specified by giving the weight per box. For example, several of the guaranteed roofing plates now in the market are described as carrying 18 pounds of coating metal to each box of 14 x 20 plates. A specification, therefore, covering such a plate would be "H R 18" or "H R 36," depending upon whether 14 x 20 or 20 x 28 plates were employed. We commend this scheme of standards for tin and terne plates to the attention of architects generally, as an important help in the work of preparing specifications. It may be used without reserve, for every importer of tin plates in the country has been made acquainted with it, while tinners are also well informed concerning it.

The Size of Bricks.

There is a diversity in size of bricks, says the *Clay Worker*, in different sections of the country, and often in the same localities. The dimensions vary from 7½ x 9¼ inches in length, 3½ x 4½ in width, and from 2 x 2¼ in thickness. The variations are due in a great measure to the nature of the clay used. Strong clays absorb a large quantity of water in tempering, and the bricks made from this class of clays suffer a large loss by evaporation in drying, and when they are burned they are again greatly reduced in size by the action of the heat. Bricks made from such clay that are of large size when molded are often small and undersized when taken from the kiln. Their strength, however, is not impaired, the principal objection to their use being that a larger number are required. Weak clay absorbs but little water in tempering, and bricks made from it shrink but little either in drying or burning. The effects from these causes are the same in both hand and machine made work. The relative value of bricks of different sizes is rarely taken into consideration. The reduction of ⅛ inch in the thickness of a brick may seem a very small matter, but it is not so insignificant as it may at first appear. This difference is often caused by the wearing down of the molds. New molds may be used in the spring, and they gradually wear down thinner until they have lost from ⅛ to $\frac{3}{16}$ inch in depth, and the bricks made in the latter part of the season will be correspondingly thinner than those made in the spring.

To lose this ⅛ inch in a course of bricks is to lose 1 inch in hight in every eight courses, or 1 foot in every 20 feet in elevation of the wall. In a medium-sized house, say 25 x 60 and 60 feet in hight from foundation to finish, the walls being 1½ bricks in thickness, which, with chimneys and inside walls, would measure about 200 lineal feet, the loss would be about 600 cubic feet of brickwork, or over 10,000 bricks. There would also be a loss in handling and laying that extra quantity of bricks. These facts should be remembered, and architects, contractors and builders having in charge large contracts requiring large quantities of bricks and a considerable period for their completion should require that all molds that are subject to friction and liable to loss of depth, whether they be hand or machine molds, should be renewed not less than three times each season. This will save much unnecessary loss, and at the same time produce bricks that will make the courses level and uniform throughout the work.

CORRESPONDENCE.

Problem in Board Measure.

From A. S., *Cincinnati.*—In the issue of *Carpentry and Building* for October I find the following, proposed by "H. J. R.," Buffalo, N. Y., for solution: "Given, a board 12 feet long, running to a point at one end and 14 inches wide at the other, of even thickness throughout. Required, the exact distance of a line parallel to the broad end, which shall cut the board so as to leave the same amount of lumber in each end."

Diagram Accompanying Communication from A. S.

My solution is as follows:

$B\ C = 14$ inches;

$A\ F = 144$ inches.

As areas of triangles are to each other as the squares of similar sides, triangle $A\ B\ C$: triangle $A\ D\ E :: B\ C^2 : D\ E^2$, and as by the terms of the proposition the line $D\ E$ divides the triangle $A\ B\ C$ into equal parts, and as triangle $A\ B\ C$ contains 1008 square inches, $A\ D\ E$ has 504 square inches, so that, substituting into the above proportion, we have 1008 : 504 :: 196 : 98. $D\ E^2 = 98$ and $D\ E$ 9.9 inches. As triangle $A\ D\ E$ contains 504 square inches, the rectangle which has base $D\ E$ 9.9 and altitude $A\ G$ will contain 1.008 square inches; hence, divide area 1.008 by 9.9 gives altitude of rectangle and of triangle 101.818 inches, which, deducted from 144, the hight of large triangle, gives 42.182 inches as the distance from base $B\ C$, to meet the requirements of the proposition.

Proof. $\frac{14 \times 9.9}{2} \times 42.182 =$ area of $B\ C\ E\ D$ 504.073

And $\frac{101.818 \times 9.9}{2} =$ area of $A\ D\ E$ 503.999

Total..... ..... 1.008.072

From C. E., *Port Jervis, N. Y.*—The problem from "H. J. R.," Buffalo, N. Y., is as follows: He has a board 12 feet long, one end 14 inches wide, which tapers to a point at the other end. He wishes to draw a line across the board parallel with the wide end which will divide it in two equal parts. According to his figures, the line should be drawn 43¾ inches from the broad end. He does not state whether the board tapers from a corner at the wide end to the opposite corner at the other end, thereby forming a right-angled triangle, nor whether 12 feet is the length of the perpendicular or slanting side; or whether the board tapers from both corners at the wide end to the middle at the other end. I assume, however, that it tapers from both corners at the wide end to the middle at the other end. Thus: Let $A\ G$ be the perpendicular 12 feet or 144 inches. Doing the work in inches, we have $A\ B =$ 144.17. Then, by the rule, similar triangles are as their homologous sides. We have $A\ B\ C : A\ E\ D :: A\ B^2 : A\ E^2$, whence $\sqrt{A\ E} =$ 101.94 inches, and E the point from which the division line will start. $E\ D$ is found to be 9.90 inches long by the proportion $A\ B : A\ E :: B\ C : E\ D$. The area of $A\ E\ D = \frac{A\ F \times E\ D}{2} = 504.0090$ square inches $= 3.50$ square feet. Area $B\ C\ D\ E = \frac{D\ E + B\ C}{2} \times F\ G = 504.0510$ square inches $= 3.50$ square feet. The distance from the broad end of the board to the division line measured on the side will be 42.06. The perpendicular distance will be 42.18, neither of which agree with "H. J. R.'s" figures. Following are the several distances:

Inches.	Inches.
$A\ G = 144$	$F\ G = 42.18$
$A\ B = 144.17$	$B\ C = 14$
$A\ E = 101.94$	$E\ D = 9.90$
$A\ F = 101.82$	

From W. B. M., *Brentwood, N. J.*—I noticed a problem in board measure from "H. J. R.," Buffalo, N. Y. I will give my method of working such problems. All similar triangles are to each other as the squares of their homologous sides, and as one triangle is to be one-half the area of the given triangle, state it thus:

$$2 : 1 :: 12''^2 : \sqrt{72}.$$

Or, in other words, extract the square root of one-half the square of the given length to get the answer sought.

I will give the readers a harder nut to crack than the previous one. Divide a board trapezoidal in form and dimensions as follows: Length, 72 inches; width at wide end, 24 inches; at narrow end, 12 inches. The cut, to divide into two equal parts, to be made parallel to the ends. Required, distance and demonstration.

From D. A. W., *Salt Springville, N. Y.*—I send one method of solving the problem in board measure referred to by "H. J. R." Let x = distance of line from small point, in inches. It is evident that for every inch from point toward the broad end the board gains in width $\frac{14}{144}$ inch, and this ($\frac{14}{144}$ inch) multiplied by distance (x) will give the width of board at the line of cut-off. The width multiplied by the length, divided by 2, will equal one-half the area of board:

$$\frac{\frac{14\ x}{144} \times x}{2} = 504 \text{ (area of half in inches.)}$$

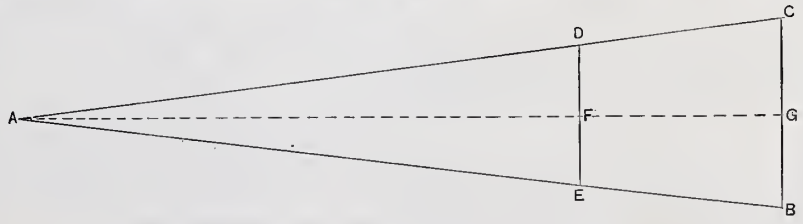
$$\frac{14\ x}{144} \times x = 1{,}008.$$

$$14\ x^2 = 145{,}152.$$

$$x^2 = 10{,}368.$$

$x = 101.824 +$ = distance from point, or $42.176 -$ = distance from broad end, in inches.

From Y., *Lisbon, D. T.*—I offer the following solution to the problem in board measure. A principle proven in geometry is that the areas of similar plane figures are to each other as the squares of the like dimensions of the figures. Therefore, the area of the whole board is to the area of the pointed half of the board as the square of the altitude of the whole board is to the square of the altitude of the pointed half of the board. Area of the whole board is 1008 square inches, area of the pointed half is 504 square inches, altitude of whole board is 144 inches, the square of which is 20,736. Then 1008 is to 504 as 20,736 is to the square of the altitude of the pointed half; or 1008 is to 504 as 20,736 is to 10,368; 10,368 must be the square of the altitude of the pointed half, the square root of which must be that altitude or distance from the point the board would be cut. The square root of 10,368 is



C. E.'s Solution of Problem in Board Measure.

101.823376 +, which is the uumber of inches from the point to cut board.

From R. H. H., *Fort Scott, Kan.*—I submit two methods of solviug the problem mathematically. They are both founded on the principle that similar triangles are to each other as the squares of their perpendiculars. The accompanying diagram will illustrate both methods:

Diagram Accompanying R. H. H.'s Letter.

Let *A B C* be the board and *D E* the line parallel to the end *B C* which divides *A B C* iuto two equal parts. Let *A F* be drawn perpendicular to the hase *B C*, cutting *D E* in *G*. *A F* is the given length, 12 feet.

1st Solution. — By the principle stated above, as *A D E* is half of *A B C*, then the square of *A G* will be half of the square of *A F*. But *A F* is 12 feet, and its square 144; therefore, the square of *A G* will he half of 144, or 72; and, extracting the square root of 72, we have *A G* = 8.4852814 feet. Suhtract this from *A F* (12 feet), and we have *F G* = 3.5147186 feet, or 42.1766232 inches, the distance of *D E* from the wide end of the board.

2d Method.—As *A F* is 12 feet, or 144 inches, and *B C* 14 inches, *B C* is $\frac{14}{144}$ of *A F*, and *D E* has the same proportional value to *A G*—that is, *D E* = $\frac{14}{144}$ of *A G*. Now, the area of a triangle is equal to its base multiplied hy the perpendicular hight divided by 2. The area of *A B C* = $\frac{14 \times 144}{2}$ = 1008 square inches, or 7 square feet. Let the letter *h* stand for *A G*. Then *D E* = $\frac{14}{144} \times h$, and area *A D E* = $\frac{14\ h}{144} \times \frac{h}{2}$. But this area is half of *A B C*, or $\frac{7}{2}$ square feet. So we have $\frac{14\ h}{144} \times \frac{h}{2} = \frac{7}{2}$ square feet; simplifying, $\frac{14}{288} = \frac{7}{2}$. Multiply hoth sides of equation hy $\frac{288}{14}$, and $h^2 = \frac{7}{2} \times \frac{288}{14} = \frac{144}{2} = 72$, and $h = \sqrt{72}$ = 8.4852814 feet.

The result is exactly the same hy hoth methods, and, I think, correct. "H. J. R." gives 42¾ inches as the distauce from the largest end, which is more than ½ inch too much.

From O. F. R., *Batavia, N. Y.*—In answer to the inquiry of "H. J. R.," in regard to problem in board measure, I think that this rule will apply: The square root of one-half of the square of the side to be measured will give the length at which to cut the board. For example, the length of the hottom edge of the hoard or hase of the triangle is 12 feet; 12 × 12 = 144 ÷ 2 = 72; square root of 72 = 8.485 + feet, or 101.831 + inches, and, as the cut is to he parallel with the 14-inch end, it will be 101.831 + inches from the point, or 144 − 101.831 + inches = 42.168 − inches from the 14-inch end. Apply same rule to the perpendicular: 14 × 14 = 146 ÷ 2 = 98; square root of 98 = 9.890 + inches, which is the length of the line parallel to the 14-inch end; 101.831 + × 9.890 + ÷ 2 = 504 square inches, being the one-half of the area of the board, viz., 144 × 14 ÷ 2 = 1008 inches. The reason of above rule is: The square root of a square gives the length of one side of that square. In this case it is required to find a length of one side of a square that shall contain one-half the area of the larger square; therefore, the square root of one-half the square gives the length for that side. To be exact it is better to use logarithms, as it is difficult to be so with feet and inches.

From O. B. C., *Philadelphia.*—As the given area of a triaugle is to the area of the triangle to be cut off, so is the square of the given base to the square of the required hase. The square root of the result will be the base of the required triangle. The area iu this case is not needed, as we have the proportion given, which is ½. $\sqrt{(144^2 \div 2)} = \sqrt{(20736 \div 2)} = \sqrt{10368}$ = 101.8233 + = hase of triangle sought, *C D E*. (*B C*) 144 − (*D C*) 101.8233 + = (*B D*) 42.1767 − = trapezium *A B D E*, or rather its base.

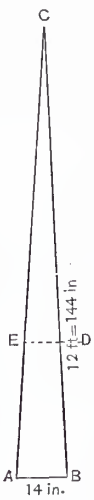


Diagram Illustrating O. B. C.'s Solution.

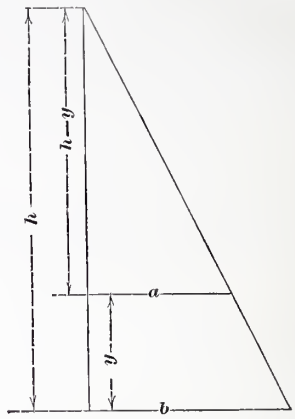
From A. F. H., *International Railway, Maine.*—If the line is drawn parallel to the wide end of the board, the triangular section of the top end of the hoard will he similar in shape to the whole hoard. Areas of similar triangles are to each other as the squares of their respective sides or hight. The square of the hight of the hoard (12 feet) = 144, which is double the square of the hight of the small triangle. 144 ÷ 2 = 72. Square root of that = 8.485 feet, hight of the small triangle. 12 − 8.485 = 3.515 feet, or 42 $\frac{18}{100}$ inches, which is over ½ inch less than "H. J. R.'s" result.

From F. N. S., *Castile, N. Y.*—The problem in hoard measure is solved by the application of the 25th proposition of the fourth hook of Legendre. Let the accompanying diagram represent the board. Then, according to the ahove proposition, as "similar triangles are to each other as the squares of their homologous sides," we have the following: *A B C* : *D B E* :: *A B*² : *B D*². Having *B D*, we cau easily find *A D*, the distance required, by substracting from *A B*. The actual solution is as follows: Area of the whole board, or *A B C* = 1008 inches; area of one-half the board, or *D B E* = 504 inches. The square of the length of the hoard, or *A B*, is 20,736. According to the terms of the proposition, multiplying and dividing, substituting figures for the letters, we have—1008 : 504 :: 20,736 : 10,368. But the last term is the square of the distance *B D*. Extracting the square root, we have 101.8274 inches as the distance *B D*, and substracting this from 144 inches, the whole length of the hoard, or *A B*, and we have the required distance, 42.1726 inches, or 42 inches and $\frac{3}{16}$ nearly. The following formula solves all problems of this character:

Diagram Accompanying Letter from F. N. S.

$$B\ D = A\ B\ \sqrt{\tfrac{1}{2}}$$

From E. B., *Cincinnati, Ohio.*—The following is an analytical method to find a very simple formula that applies uot only to boards of any triangular shape, but also to those of a trapezoidal shape: The hoard in question is of a triangular shape. As it is of an even thickness throughout, the thickness for any part of the board is a constant factor, and we can eliminate it and substitute for the volume the area. Triangles of same base and hight are of equal area, and, for simplifying the method, we suppose the board forms a rectangular triangle whose hase is 14 inches and hight (length) 144 inches, as shown in Fig. 1. The line *a* (Fig. 1) shall represent the line where the board is to be cut parallel to line *b*. Suppose line *a* (the length of which and perpendicular distance *y* from line *b* is not known) is right. Then the two parts of hoard are of same area, hut one part forms a triaugle and the



Problem in Board Measure.—Fig. 1.—Diagram Illustrating Solution Submitted by E. B.

other one a trapezoid; each one is one-half the area of the whole board.

The area of the whole board = $\frac{b \times h}{2}$.

The area of the trapezoidal part = $\frac{(a + b)}{2} \times y$ = one-half the area of the whole board,

$$\text{or } 2 \times \frac{(a + b)}{2} \times y = \frac{b \times h}{2}.$$

$$(a + b) \times y = \frac{b \times h}{2}.$$

$$(1) \ldots\ a \times y + b \times y = \frac{b \times h}{2}.$$

By the rules of similar triangles, the

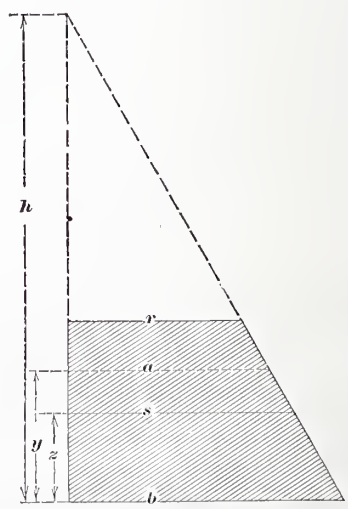


Fig. 2.—The Same Principle Applied to a Board Trapezoidal in Shape.

angles in the large and small triangles being the same, *a* : *h* − *y* :: *b* : *h*.

$$(2) \ldots\ a = \frac{b \times (h - y)}{h} = \frac{b \times h - b \times y}{h}$$

This terminus for *a*, used in Equation 1:

$$\frac{(b \times h - b \times y)}{h} \times y + b \times y = \frac{b \times h}{2},$$

$$\text{or } \frac{b \times h \times y - b \times y^2}{h} + b \times y = \frac{b \times h}{2}$$

$$\text{or } b \times h \times y - b \times y^2 + b \times y \times h = \frac{b \times h^2}{2}$$

Both sides of the equation divided by *b*

$$h \times y - y^2 + h \times y = \frac{h^2}{2},$$

$$\text{or } y^2 - 2 \times h \times y + \frac{h^2}{2} = 0.$$

This is the common form of a quadratic equation; hence,

$$y = +\frac{2 \times h}{2} \pm \sqrt{\frac{(2 \times h)^2}{4} - \frac{h^2}{2}} =$$

$$h \pm \sqrt{h^2 - \frac{h^2}{2}} = h - h\sqrt{.5} = h - .7069\,h.$$

(3)..... $y = .2931\,h.$

In other words, a board of any triangular shape is cut in two equal parts; the distance y of the cut parallel to any side is = .2931 of the corresponding hight.

In the example the hight (perpendicular to the base) is = 144 inches.

Hence $y = .2931 \times 144 = 42.2$ inches.

The length of line a is found by Formula 2.

If we have a board of any trapezoidal shape, as Fig. 2, extend the two, not parallel, sides of the trapezoid to their intersection m; then draw a parallel to b in a distance $y = .293\,h$ (h being the hight of the constructed triangle).

The cut s of the trapezoidal board will then be in a distance = z from line b.

Lines s a r are parallel to b in the same triangle; hence area of large triangle : area of trapezoid :: y : z.

(4)..... $z = \dfrac{\text{area of trapezoid} \times y}{\text{area of triangle}}$.

In Equation 4 is known the area of trapezoid (actually measured), also the area of constructed triangle $\left(\frac{b \times h}{2}\right)$, and that $y = .293\,h$ (h, hight of triangle).

The same method might be applied when the problem is to find the cut for any fraction—*i. e.*, if the board is to be cut in a proportion as 1 : 3, 2 : 3, or 4 : 5, &c. "H. J. R." apparently found 42¾ inches by experimenting with the figures; easy enough for a proportion as 1 : 1.

The formula above requires only the hight (h = 144 inches) to be given.

From J. H. B., *Ottumwa, Iowa.*—The following will be found to be a correct and simple rule for solution of the problem: Reduce the given dimensions to inches and then find the number of square inches in the board. The following proportion can then be formed, which will be found to be correct: The whole number of square inches in the board is to the square of the width of the broad end as the number of square inches in the section to be cut off is to the square of the width of the board where it is to be cut off. Simplify the proportion by extracting the square root, then reduce to the form of an equation, and you have the width of the board where it is to be cut off. Then divide the area to be cut off by the mean width, and the quotient will be the distance from the broad end to where it is to be cut. The following is the actual calculation of the problem by the above rule:

Length of board reduced to inches ..	144
Width of board at broad end, in inches	14
	2)2016
Area of board.....	1008
" to be cut off.....	504

Proportion: 1008 : 196 (14^2) :: 504 : X^2, letting X equal the breadth of board where cut off.

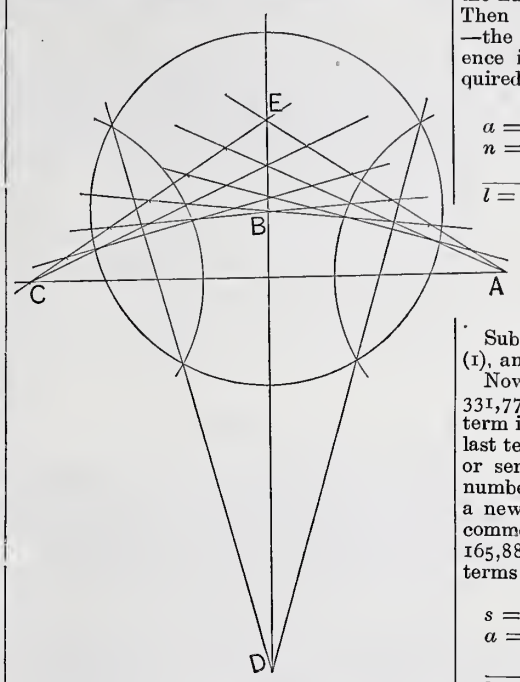
Reducing, $X^2 = 98$

$X = 9.9$ nearly.

Then getting the mean width by adding 14 to 9.9, and dividing by 2, you have as mean width 11.95. Divide the area of portion cut off by mean width, as follows: $\frac{504}{11.95} =$ 42.17, which is the distance from the base of board to place where cut off.

The above answer is not absolutely accurate, owing to failure to carry out fractions.

From B. F. C., *West Pittston, Pa.*—In regard to that "Problem in Board Measure," I beg to differ with your correspondent, "H. J. R.," of Buffalo, N. Y., and to submit my method of solving it, giving an analysis in full, using algebra for the purpose of abbreviating, so as to take the least possible space. Your readers can judge for themselves as to the correctness of my method. It is the first problem of the kind that I ever had occasion to try, and my solution is entirely



Kerfing.—Fig. 1.—Determining Line of Easement and Center from which Saw Kerfs Must Radiate.

original, so far as I know. Although it only reaches an approximate result, it is as close as would be possible to measure, and, consequently, reliable for all practical purposes. By the conditions of the problem, we are led to assume that the form of the surface of the board is either a right-angled triangle or an

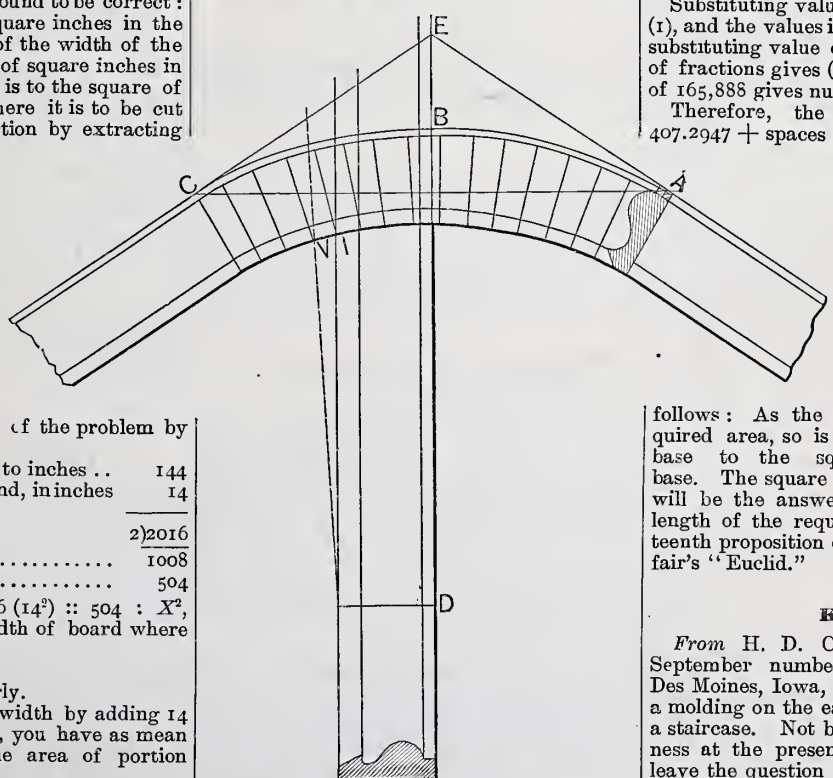


Fig. 2.—Practical Application of Rule Presented by H. D. C.

isosceles triangle, 12 feet long. It makes no difference which, nor is it essential to know the width. Now, for convenience, I divide this length into ¼ inch spaces, making 576 spaces or terms. If you divide any triangle into any number of equal spaces, drawing lines parallel with the large end, then dividing these spaces into triangles, each of which are equal to the one formed by the first space from the point of the large triangle, you will readily see that it forms a series in arithmetical progression. The first space being the first term, twice the first space or term is the common difference, and the number of spaces the number of terms. Then we have a series containing 576 terms—the first term is 1, and the common difference is two times the first term, or 2. Required the sum of series:

*Operation.**

$a = 1$

$n = 576$

$d = 2$

$l = a + (n - 1)\,d$ .....(*A*)

$l = 1151$.....(1)

$s = \frac{n}{2}(a + l)$.....(*B*)

$S = 331{,}776$.....(2)

Analysis.

Substituting the values of a, n and d gives (1), and substituting values in (*B*) gives (2).

Now, we have our triangle divided into 331,776 equal parts; 576 terms; the first term is 1; the common difference is 2; the last term 1151. We wish to cut this triangle or series in two, so as to leave an equal number of parts in each piece. This forms a new series, having 1 as its first term, 2 common difference, and half of 331,776, or 165,888 as its sum. Required the number of terms:

Operation.

$s = 165{,}888$

$a = 1$

$d = 2$

$l = a + (n - 1)\,d$ .....(*A*

$l = 2n - 1$.....(1)

$s = \frac{n}{2}(a + l)$.....(*B*)

$165{,}888 = \frac{n}{2}(1 + l)$..... (2)

$165{,}888 = \frac{n}{2}(2n)$.....(3)

$n^2 = 165{,}888$.....(4)

$n = 407.2947 +$

Analysis.

Substituting values of a and d in (*A*) gives (1), and the values in (*B*) of s and a gives (2); substituting value of l gives (3), clearing (3) of fractions gives (4), extracting square root of 165,888 gives number of terms.

Therefore, the board should be cut 407.2947 + spaces from the small end. One space = ¼ inch, and 407.2947 + spaces = 101.8237 — inches; 144 inches, or length of board, minus 101.8237 — inches = 42.1763 + inches from large end.

From J. T. H., *Orange, Cal.*—The solution of the problem in board measure is as follows: As the given area is to the required area, so is the square of the given base to the square of the required base. The square root of this required base will be the answer—that is, it will be the length of the required triangle. See nineteenth proposition of the sixth book of Playfair's "Euclid."

Kerfing.

From H. D. C., *Philadelphia.*—In the September number a correspondent from Des Moines, Iowa, desired a rule for kerfing a molding on the easing of the wall string of a staircase. Not being actively in the business at the present time, I thought I would leave the question open for some one else to answer, but, as no response has been published up to this time, I have made a small sketch which I think will give the inquirer a pretty fair idea of how to proceed. Let A E C in Fig. 1 be the pitch of the string from the level. Dot off spaces of any convenient width down each side. From points thus established carry over the lines, which will give the easing. Take B as center.

*For formulæ and general application see Robinson's "New Elementary Algebra," page 258.

Strike the full circle. Then, with the same dividers placed at C and A, strike the intersections. Through these intersections draw the lines which intersect at D. This gives a center from which to strike the curve A B C. Next turn to Fig. 2, in which similar letters represent similar parts. With the dividers set to the distance D B of Fig. 1, and from D of Fig. 2 as center, strike the arc A B C. Make a cut in the molding with the saw that it is intended to use for kerfing, and lay it down at the point D. Fasten the end of the molding in place by a couple of nails, as shown. Then bend the molding until the cut is closed, giving it the position indicated by the dotted line crossing the arc at V. Then the space from V to the original position I will be the distance to which to set the dividers for spacing off the cuts to be made. This rule will never fail. When the molding is bent and put in place properly the cuts will all be closed.

From A. L., *Fairfield, Iowa.*—I would say to "H. L. T." of Des Moines, Iowa, that when it is required to spring a molding edgeways by saw kerfing, it should be kerfed on the miter. I assume that he knows how to get the distance apart for kerfing. I would recommend using a steel-wire brad in the kerf, which answers an excellent purpose in drawing the joint up tight, rendering it a good job of the kind.

Half Full Size.

From E. J., *Louisville, Ky.*—Among a lot of detail drawings at present in use in the shop where I am employed is one upon which the scale is given thus: "Half full size." Upon seeing this a workman remarked that this designation of size was erroneous, and when asked how it should be, replied, "Leave out the word 'full;' half size expresses the idea." Then followed a free discussion of the ways different draftsmen have of giving the scale of drawings, in the course of which it was stated that neither of the ways mentioned was the right way. It was asserted that the correct plan would be "6″ = 1′." Finally we agreed to refer the question to the Editor. If you will state at your earliest convenience which of the ways stated is the right one, you will confer a favor.

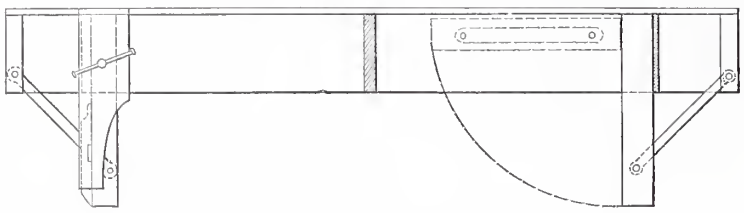
Answer.—We can probably indicate a choice between the ways mentioned, but that either of them is right in the sense that the others are wrong we do not believe. Our preference is for the expression, "half size." "Half full size" is objectionable, because the word "full" is superfluous. It may be claimed that it qualifies the term size, and makes the meaning unmistakable. The reply to this is that "half size" never has led to error, so far as known. Of the other expression, "6″ = 1′," we would say that, while it is very generally used among architects and engineers, it has never appeared to us to be quite as desirable as the one for which we have indicated a preference above. It is just a little enigmatical in character to a person who is not thoroughly posted, and the manner in which it is written frequently leads to errors. By the omission of one of the small marks used to indicate inches, a very different meaning is obtained. It would then be equivalent to six times the real size.

Hand-Railing Tools.

From O. W., *Philadelphia.*—In one of the back numbers of *Carpentry and Building* a correspondent inquired for a description of the tools used for making hand-rail twists, or crooks, as they are sometimes called. I have in my shop a very complete set of tools for the purpose named, all of which I made myself, excepting the bits. Similar tools to what I am using are made by A. Colton, 338 North Fourth street, Philadelphia. I mention this address because it may be of interest to stairbuilders generally.

Portable Workbench.

From L. L. G., *Cortlandt, N. Y.*—I inclose a plan of a portable workbench which I think will meet the requirements of "L. W. F.," of Syracuse, who inquired for such an article some time since. Fig. 1 represents the bench with the side off. The bench is built with bed pieces of 1 x 12 inch stuff. The legs are fastened at the upper end by 9-inch T-hinges. The lower end is held in place by braces. The upper end of the brace is made to slip on a pin which holds the legs firmly. To move the bench the vise is taken off, the braces are slipped off and then the legs dropped into the bench, making it convenient for handling. Fig. 2 represents an end view of the bench. The cross-piece at the bottom is round, on which the braces turn. The diagonal braces keep the bench steady when strains are applied sideways.



Portable Workbench.—Fig. 1.—Side Elevation.—Scale, ⅜ Inch to the Foot.

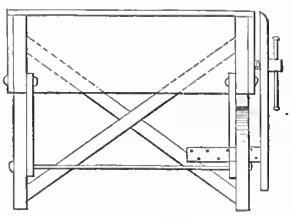


Fig. 2.—End View.

From A. H., *Fayetteville, Ark.*—I notice the inquiry of "L. W. F." in the October number of *Carpentry and Building* for a portable workbench. Please direct your correspondent to the cut and description of my bench published in the number for October, 1882. It may meet his requirements.

Construction of Corrugated-Iron Roofs.

From THE CINCINNATI CORRUGATING COMPANY, *Cincinnati, Ohio.*—We notice the inquiry from "I. D." regarding the construction and painting of corrugated-iron roofs. We desire to say to your correspondent, through your columns, that we shall be very glad to corresponend with him on this subject, and also to send him our illustrated catalogues, which explain some of the points raised, if he will forward his name and address.

Parallelism of Walls.

From O. B.—I desire to inquire if masons in building high walls which are desired to be exactly parallel incline them to each other in order to keep them parallel. Natural laws would tend to make them separate as they go up, since all plumb lines run to the center of the earth.

Answer.—We have never heard of masons attempting to make their walls parallel by any other means than plumbing them from time to time in the course of their work, using the ordinary instrument for the purpose. Our correspondent is correct in asserting that all plumb lines radiate from the center of the earth, and, accordingly, lines which are plumb would not be parallel. It must be borne in mind, however, that the diameter of the earth is so great, being something like 8000 miles, that the lack of parallelism between lines erected on its surface would hardly be perceptible in the hight to which walls are commonly erected. Without stopping to calculate the exact variation, we hazard the assertion that it is too small in the highest walls required to be taken into account in practical construction. The variation in walls from other causes, such as contraction and expansion from unequal distribution of heat, and shrinking and swelling from changes in the conditions of the atmosphere, will be apt to throw the walls out of parallel far more than the natural laws referred to.

Enameling Brick.

From H. A., *Minto, D. T.*—Please inform me, through *Carpentry and Building*, if enameling brick is a secret, and, if not, where I can get a formula for enameling.

Answer.—There is no particular secret about the general process of enameling brick, although we believe some special modes of enameling have been patented, and others are practiced somewhat secretly. In a volume entitled "Manufactures of Brick, Tile and Terra-Cotta," by Davies, there are a number of pages devoted to the general subject of enameling, which we think will furnish this correspondent the information he desires. Attention is given to enameling, not only with reference to the character of the enamel itself, but also with reference to producing different colors and shades.

Siding Gauge.

From R. W. V., *Winchester, Ind.*—I desire to learn where I can obtain a siding gauge or jack, which is used for marking common ½-inch siding before cutting between frames. The tool I have in mind is lined with brass, has a gauge on one side and a level, while the knife runs up and down in a slot on one side. It is Nester's patent, bearing date 1869. If any reader of *Carpentry and Building* knows of a tool answering this description he will confer a favor by giving me the information.

Note.—A tool somewhat similar to what our correspondent describes above was illustrated among our "Novelties" several months since, and although, we believe, it is patented by other parties than he mentions, it may answer his purpose. By referring to page 118 of our issue for June he will find the illustration and description of the article we refer to.

Valley Rafters.

From J. J. C., *Buffalo, N. Y.*—In answer to the inquiry of "J. S. D.," I would say that it will be necessary to put in two valleys in order to have his roof come together without winding.

Plans of Farmhouses.

From M. R. H. K., *Waveland, Ind.*—I was pleased with the suggestion of "Beatrice," of Middletown, N. Y., with regard to the competition in house plans. I have been a constant reader of the paper since the commencement of Vol. II, but have seen no suggestion in all these years that pleases me better than this.

Note.—We have had several other letters making known the approval of the writers of a competition in farmhouses, the suggestion of which appeared in our columns some time since. In the interval we have given the subject very careful consideration ourselves, and have reached the conclusion that a competition having this subject is hardly the best means of reaching the end desired. There are so few architects who are really informed of the wants of farmers and their families that a high order of merit in the studies submitted in such a competition would hardly be reasonable to expect. If such a contest were advertised we fear the results would be very unsatisfactory, and, therefore, we have decided not to offer

prizes at the outset. In order, however, to be serviceable in this direction and to secure some good designs for farmhouses for the benefit of our readers, we invite every one who is interested in this subject to send us the best plan of a farmhouse with which he is acquainted. After obtaining a number of ideas in this way, we will either submit them through our columns to the architectural profession for elevations and details, offering prizes, &c., or we will lay them privately before members of the profession who are able to work out in a satisfactory manner such problems, and thus obtain results in which our readers generally are interested. We imagine that there are some leading features in the planning of the average farmhouse which can scarcely be departed from and have the resulting building entirely satisfactory to those who occupy it. Our intention, therefore, is to find out the fixed conditions of the problem, and then bring to bear upon it the best architectural talent that we can command. We feel sure our readers will approve of this course, and therefore we solicit from them hearty co-operation. The first step is getting into our hands as large a number of floor plans of farmhouses as possible. Having secured an average or typical plan which is generally satisfactory, the question of elevations and finish will be something very easily taken care of.

From A. R. F., *Fairview, W. Va.*—If there is one feature of more interest than another in *Carpentry and Building*, I believe it to be the house plans which are published from time to time. While many excellent plans have appeared, admirably suited to almost every class of people in the community, among them all there has not been one adapted to the average independent farmer. Being a farmer myself, and having lived and freely circulated among farmers all my life, I am persuaded that such a house in its general features is as follows: It should have seven rooms, four below and three above. The first floor should have a parlor, a living-room, which should also serve as a dining-room, and a bedroom, making four in all. The kitchen would come in the form of a one-story addition. All these rooms, unless, perhaps, it should be the bedroom, should be not less than 12 x 15 feet, and the whole structure should cost $1500 to $1800. Plans for such a house I am reasonably sure would interest a large class of your readers. May I not hope that before long some such plans will be supplied?

Note.—We direct our correspondents' attention to the remarks above, merely stating that he is in error in supposing that we have not published plans of farmhouses, although we are free to admit that they have been greatly in the minority. Several interesting studies of this kind will be found in our back volumes. With reference to the cost named by this correspondent, it may strike many of our readers as altogether too low for the kind of house described. There are several things to be considered in this matter, however. In the first place, in rural communities the finish of the house is scarcely ever made as expensive as is current with houses of the same grade in the towns. The owner in many instances expects to furnish a considerable portion of the materials. With a stone quarry on his farm or on a neighbor's farm to which he has access, and with a sand bank also accessible, and a team of horses ready for use, the farmer would scorn the idea of a contractor figuring upon items of this kind as a part of the cost of the building. Before he made the contract he would have the stone for the foundation, the sand for the mortar, and possibly a good share of the framing timber cut in his own woods and sawed at a neighboring mill, on the ground. In addition to this, in many instances he would expect to board the workmen while the building was in progress of erection. We merely point out these features as characterizing the construction of many country houses, and as perhaps accounting in some measure for what would otherwise look like extremely low figures mentioned by this correspondent for the house wanted. We hope this general subject will receive attention at the hands of our practical readers.

REFERRED TO OUR READERS.

Lines on the Miter-Box.

From D. P. W., *Chippewa, Wis.*—If I were not a beginner at the carpenter's trade I might understand the communications from "F. H.," Albany, N. Y., and "J. B.," Louisville, Ky., recently published in *Carpentry and Building*, on the subject of rake and level moldings. As it is, I desire to ask one or two questions, which I will be glad if either of these gentlemen or some other reader of *Carpentry and Building* will answer for my benefit and other beginners in the trade. Supposing a miter-box to be 4 inches on the inside. Suppose the side to be 1 inch thick and the box 4 inches wide, measuring from iuside to inside. Under these conditions, what bevel on the sides and across the top will be correct for a third pitch? Also, what cut in the miter-box will be correct for a quarter-pitch roof? If my question is answered, with the reasons for the steps involved, a lasting favor will be conferred.

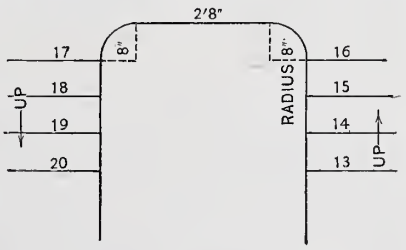
Skylights.

From H. S. B., *Spencer, Iowa.*—If some practical builders will explain their mode of lighting the center rooms of upper floors of large square buildings, showing the construction of skylights useful for such purposes, they will touch upon a subject that will be of value to many of the readers.

Hand-Railing.

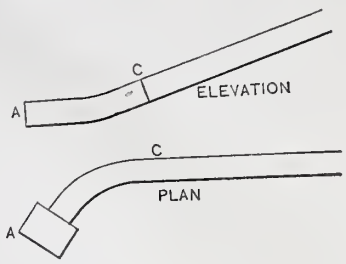
From M. L. G., *Atlanta, Ga.*—I have had occasion recently to get up a rail for stairs built to the inclosed plan. The requirements being unusual, so far as my experience goes, I would like to know how some of the practical readers of *Carpentry and Building* would construct the piece at the end of the second roof. I have done the work, but have never seen anything like it before. The stairs shown were planned by a carpenter. The rise is 7¼ inches, while the tread is 11 inches.

Note.—We present this problem and trust some of our readers will be good enough to respond to it, as requested. If our correspondent had contributed to the general store of information by sending a diagram illustrating his method of doing the work, it no doubt would have pleased many of our readers much better. We shall be glad to see him answer his own question, in order that as many different methods of solving the problem as are feasible may be presented for the consideration of our readers at large.



Plan of Stairs Submitted by M. L. G.

From C. A. Y., *Yorkville, Ontario.*—I would like to ask of the practical readers of *Carpentry and Building* a question on hand-railing. It is this: What is the proper way of obtaining the patterns for ramps, which are so common at the present time and which are indicated by Fig. 1 of my sketch? A B is the railing and A C the ramp, which not only turns up as shown in the elevation, but also at the same time flares sideways, as indicated by A C in the plan. As put up here rails of this kind usually curve for the first two or three steps, and the steps over which the curve comes are generally put in as indicated in Fig. 2. Neither the raking curve nor the side curve seems to be fixed, but is entirely at the taste of the architect. Sometimes both curves are of the same radius. In others they are of different radii and occasionally are as unlike as indicated in Fig. 3, which shows an elevation and plan by single lines. In the first case, where both curves are of the same radius, the ramp is precisely the same as a hip rafter of a bell-cast roof, for that is simply the intersection of two curves of the same radius. I contend that a ramp of dissimilar curves cannot be cut out in one piece from a plank which



Hand-Railing.—Fig. 1.—Elevation and Plan of Ramp Having Double Curve.

is merely thick enough to extend the rail iu its widest section. What say the practical readers of the paper?

Deadening Floors.

From T. F. V., *Marshfield, Wis.*—I desire to inquire, through *Carpentry and Building*, for a means of deadening a hall floor already in use. It is being employed for a roller-skating rink at present. There are two stores below the hall, and the noise created is almost deafening. In fact, it is necessary to suspend business when the skating is in progress. The floor is double, with 2 inches of sawdust packed between the flooring. This experiment has done no good. The last floor has just been put in, and is of hard maple laid upon 2 x 4 inch stuff.

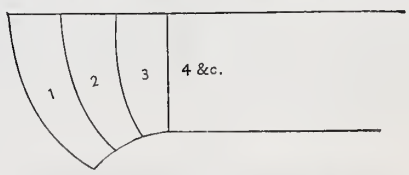


Fig. 2.—Plan of Stairs Using Above.

Note.—The question suggested by this correspondent is a somewhat difficult one, and we shall be interested in the answers which it calls out. Roller skates, it is probable, create more noise than ordinary plans of deadening are intended to overcome.

Paper Ceilings.

From E. D. T., *Beverly, W. Va.*—I desire to learn the addresses of mauufacturers who make paper ceilings.

Note.—We refer this question to our readers, in view of the fact that possibly a special article of the kind inquired for by our correspondent may be in the market of which we are not informed. Our impression is that the only paper ceilings in use are an adaptation of the ordinary building paper, the joints being covered by moldings or some similar plan. The work is arranged in squares or other geometrical figures by this means. In answering a similar question presented to our readers some time since, one of our correspondents took occasion to call attention to the fact that plaster-work as commonly practiced is probably the cheapest finish which can be applied to ceilings and walls at the present day. This information may not be what our correspondent who proposed the above question requires, but we call attention to it as being of possible benefit.

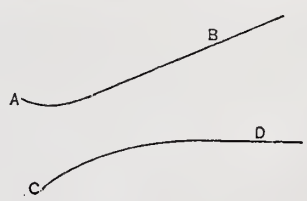


Fig. 3.—Variation from What is Shown in Fig. 1.

TRADE PUBLICATIONS.

Wood-Working Machinery.

P. Pryibil, of Fortieth street and Tenth avenue, New York City, sends us a copy of a catalogue he has recently issued. Among the new goods shown is an adjustable dado or grooving head, consisting of two composition flanges, provided with adjustable scouring knives, which need only be moved to compensate wear, and adjustable and interchangeable routing knives of any desired width, ranging from $\frac{5}{16}$ to $1\frac{1}{2}$ inches. The latter correspond to the widths of grooves to be cut, and are so arranged as to be quickly and easily changed. Another new tool is a sand-papering machine, designed for sand-papering both straight and curved work, where it is desirable to produce square corners and true faces. The catalogue is a desirable addition to the assortment of trade publications gathered by planing-mill managers and all who contemplate the purchase of machinery.

Drawing Instruments.

W. T. Comstock, of No. 6 Astor Place, New York, has issued No. 1 of an illustrated catalogue of drawing instruments, including architects' and engineers' materials, &c. The pamphlet, which consists of upward of 75 pages, bears date of December, 1884. It contains illustrations and price lists of all the standard goods included in the general heads above mentioned, together with a number of specialties, among which may be mentioned the "Positive" T-square and section liner, which we illustrated some time since, and also fine steel squares, and a few other tools of excellent quality demanded by the most careful mechanics. Leveling instruments receive special attention, while Windsor & Newton's colors, boxwood rules, wood-stock levels and other standard goods have equal prominence.

Specialties in Wood-Working Machinery.

Two interesting catalogues devoted to specialties in wood-working machinery, and issued by Messrs. Trevor & Co., of Lockport, N. Y., have just come to hand. One of them relates more particularly to handle, rod and dowel machinery, while the other embraces a wider variety of wood-working tools, making together a very convenient collection of data. Both catalogues are fully illustrated, and the appended descriptions of apparatus are more than ordinarily complete. Messrs. Trevor & Co. make a specialty of a superior set of handle machinery, consisting of a new gauge lathe, chucks, chuck arbor and frame, broom-handle boring and topping machine, tumbling machine, short-log sawing machine, gang-saw machine and rod and dowel machine. They also turn out a full set of wood-pulping machinery for wet pulp.

An exchange, in commenting on modern styles of architecture, says: The craze for Queen Anne decoration and house-furnishing naturally led to a demand for houses built after the designs of the architects who lived during the reign of that queen, so all over the country we have had homes, villas, and even churches, erected in that style. There are fashions in architecture, as in dress. The late Bayard Taylor said that, in traveling through this country, it was easy to see when the various settlement were commenced. The exterior appearance of the houses told the story. The gabled edifices belong to the old Colonial period; the pillars extending to the roof and inclosing the large piazza were characteristic of the Sunny South in the days when slavery flourished; the mansard roof, once all the rage, marked an epoch of its own. And so through the the other variations, each popular in its day, now obsolete. No one style of house structure is suitable for this vast country of ours. A Southern dwelling should be entirely different from a Northern home. An Atlantic slope villa would be out of place on the Pacific coast, while a mountain chalet would be an anachronism in a low-lying valley. The national architecture of America, when it is developed, will be as varied as the surface of our country.

TRADE NOTES.

The United Asbestos Company, Limited, of 161 Queen Victoria street, London, E. C., send us a copy of their illustrated catalogue of pure asbestos goods. Although asbestos goods are in extensive use in this country, we judge from the statements contained in this catalogue, and also in the scientific and technical press of Great Britain, that they are in more extensive use on the other side. The articles shown in the catalogue comprise a wide range of goods, from asbestos fire-proof paint and asbestos fuel for gas fires, to such articles as lamp shades, filters, steam-boiler coverings, rope for fire escapes, rolled cloth packing, &c.

We are informed that the Metallic Tile Company, 103 Ohio street, Chicago, have recently made great improvements in the manufacture of their metallic tile for inside wall finish. These tile are made of sheet brass or other suitable metal, and are of a character to admit of any design of stamping, and may be finished in various ways. We are also informed by the company that the style of wall finish which they produce is growing in favor among those who are best acquainted with it.

The Sherwin Williams Company, of Cleveland and Chicago, send us a copy of one of their comic advertising pamphlets. We use this description advisedly. The pictures and the story contained are alleged to be comical in character, while the object in putting the book out is to advertise the Sherwin Williams' paints. The story is entitled "Professor O'Dothoreen's Dog." A portrait of the Professor and of the dog forms the principal feature of the design of the cover page, while the last page contains a portrait of Mrs. Callahan's cat, which proved the destruction of the Professor's dog. The text and the picture which illustrate it are on alternate pages, and great care has been taken to make the book so attractive as to insure its preservation, The advertisements of the company are modestly confined to the inside cover pages.

A significant statement is made by the Egan Company, of Cincinnati, Ohio, with reference to the present cost of desirable wood-working machinery, as compared with the prices that tools of similar capacity commanded but a short time since. In a letter from them, recently received, the statement is made that they are at present selling a better band-saw for $125 than has heretofore been sold for $250, and that planers, scroll-saws, molding machines, and so on to the end of the list, are proportionately cheap. With the present low rates it would seem that no one can afford to be without the equipment of machinery necessary to the economic conduct of business.

The H. W. Johns Manufacturing Company, of New York, will open a branch of their business at 175 Randolph street, Chicago, about December 15, where they propose to carry a full line of their goods, to meet the demands of their increasing trade in the West. Prices will be uniform with those in New York.

Messrs. Merchant & Co., of Philadelphia, have recently issued a circular-letter to architects and buildors, defining some of the guaranteed plates which they offering for roofing purposes. The circular contains much information with reference to goods of this kind that is important to architects and builders, and those who have not already received a copy will no doubt serve their own interests by applying for one.

Messrs. A. Northrup & Co., of Pittsburgh, are directing the attention of builders to the desirable qualities which their iron roofing possesses for use upon buildings employed as skating rinks and for other similar purposes. The roof is so constructed that, if required only for a temporary purpose, it can be removed and in turn applied to some other building. So large a trade of this character has been built up that the firm might be justified in describing their manufacture as "rink" roofing.

The Builders' and Manufacturers' Mutual Benefit Association of America announce that the cost of maintaining a membership, which entitles the family to a benefit of $1000 in the event of death, during the past year has been only the amount of annual dues, namely, $2. This, it is claimed, makes the association named one of the lowest-priced insurance companies now doing business. It speaks well, also, of the character of risks which have been taken. A. J. Bicknel, No. 239 Broadway, New York, is secretary.

Messrs. Lane Brothers, Poughkeepsie, N. Y., have written us, mentioning that the cut of their door-hanger was printed upside down in their advertisement in our issue for November. We take pleasure in directing the attention of our readers to the fact that these hangers are intended to be used in a rational manner, and that the peculiar appearance of the hanger in the advertisement referred to was altogether accidental. It will be found in proper position in the present issue.

STRAY CHIPS.

A joint stock company has been organized at Pensacola, Fla., for the purpose of putting up a hotel building. The capital stock is $50,000, divided into 1000 shares.

A. A. Cook, architect, of Vacaville, Cal., has prepared the plans for a two-story brick schoolhouse building, to be erected in the Ulatis school district, that will involve an outlay of $11,800. The contractor is J. B. McKenzie.

Elk Point, Dak., is to have a skating rink, 40 x 126 feet in size, fitted up with a stage and galleries.

A building, 80 x 125 feet on the ground and two stories in hight, to be used as a tannery, is under construction at Petoskey, Mich.

Thomasville, Ga., contemplates the erection of a church building, to cost $10,000.

Messrs. French, Hall & Co., of Rockland, Mass., are putting up a new factory building for the manufacture of tacks. The structure will be 34 x 80 feet in dimensions and one story in hight.

The Hare & Morgan Company, of Wilmington, Del., are about completing a new factory at the corner of Second and Lombard streets. The main structure is 40 x 107, with an L 20 x 80, and an extension for the engine and boiler. It will be occupied as a manufactory of bolts and nuts, bridge and car iron, &c.

A. Y. Sigmon, of Hickory, N.C., is erecting a four-story building, to be used as a flour mill; cost, $9000.

J. Sheehy, of San Rafare, Cal., is constructing a two-story frame dwelling, from plans furnished by T. J. Welsh, to cost $10,000.

Altamont, Tenn., is to have a court house to cost $7000. Full particulars may be obtained by addressing J. H. Gunn, of that place.

At Seymour, Ind., the Aurora Furniture Company are putting up a three-story brick building, 60 x 100 in size, to cost $5000, and the Seymour Butter Dish Company a frame factory building, 60 x 200 in size, to cost $3000. A number of small cottages are also under construction. The plans were furnished by J. Balsley, of Seymour, Ind.

A fine residence, 45 x 50 feet in plan, is going up on McClure avenue, Allegheny, Pa., for Mr. Geary. The plans were furnished by Thomas Boyd, and call for an outlay of $12,000.

New Orleans, La., is making some improvement in building operations. Mrs. Isabella Braunlee is erecting a two-story frame residence, 36 x 86 feet in plan; cost, $7000. N. D. Wallace is remodeling five brick stores into a hotel building, 150 x 100 feet; cost, $8500. Mrs. J. W. Coleman, two-story frame residence, 36 x 86 feet; cost, $7000. General Richart, three-story brick residence, 90 x 45 feet; cost, $7200. E. Augand, two-story brick store building, 53 x 75 feet; cost, $6500.

J. A. Crawford, of Covington, Ky., is putting up a frame structure for a tobacco warehouse, between Madison, Washington, Fifth and Sixth streets; cost, $1500.

A building is in progress of erection at Montclair, N. J., that will be used as a kindergarten school, under the management of the Misses Seymour. The cost is placed at $3500.

A large brewery is to be put up at Dallas, Texas, by L. Wagonhouser, of St. Louis. The structure will cost something like $130,000.

At Hagerstown, Md., a building to cost $25,000 is contemplated. It will be used as a creamery.

C. A. Dunham is the architect of a cottage for Charles Farnsworth, of Albert Lea, Minn. The cost is placed at $3500.

At Riverside Springs, a short distance from Colorado, Texas, a woolen mill is in progress of erection, to cost $30,000.